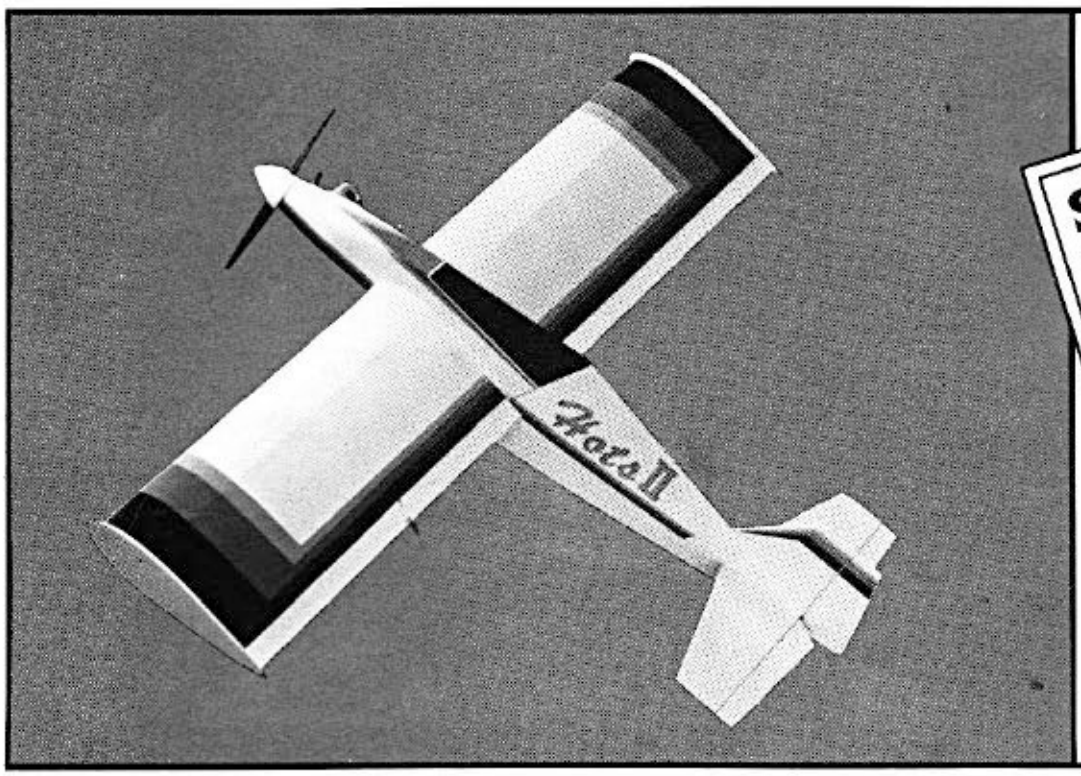
MIDWEST Hots II



Success Series®
This kit features a complete and fully illustrated step-by-step construction manual AND full-size plans that ASSURE SUCCESS!

Kit #164

High Performance Fun-Fly Model

About This Construction Manual

This booklet divides the construction into sub-assemblies; wing, fuselage, etc. Read each section carefully and identify all of the parts before starting on a particular sub-assembly. There is a complete description of all of the kit parts under "Kit Contents" (Pages #2 & #3). Please check to be sure that your kit is complete; that it is not missing any parts. If you do find that parts are missing, or you are having trouble identifying parts, see "Customer Service" (below). The instructions give the sizes of all the parts. Refer back to the "Kit Contents" when selecting parts, to be sure that you are using the correct sizes.

The illustrations in this manual clarify and detail many of the assemblies shown on the plan, and the two should be used together during construction.

Customer Service

Should you experience a problem with this kit, we recommend you see your dealer first. If you are unable to solve the problem, feel free to call or write:

Customer Service Department
Midwest Products Co., Inc.
P.O. Box 564
Hobart, IN 46342
(219) 942-1134

MIDWEST PRODUCTS CO., INC.
400 S. Indiana St., P.O. Box 564, Hobart, IN 46342

Micro-Cut Quality Woods

Kit Contents

Note: All Wood Parts Listed are Balsa Unless Otherwise Noted

Wing

4	1/16" x 1-7/16" x 22-7/16"	PRE-CUT Trailing Edge Sheeting
4	1/16" x 2-3/8" x 21-3/32"	PRE-CUT Leading Edge Sheeting
3	1/16" x 3" x 9"	Center Section Sheeting
6	1/16" x 2-7/8" x 1-11/16"	PRE-CUT Shear Webs
3	1/16" x 1/4" x 36"	Cap Strips & Filler
2	3/32" x 1/8" x 3-3/8"	PRE-CUT Torque Rod Filler Pieces
1	5/16" x 5/16" x 3-3/8"	PRE-CUT Torque Rod Block
1	1/4" x 1-1/4" x 2-3/4"	PRE-CUT Maple Wing Hold-Down Block
2	5/16" x 1-1/4" x 20-5/8"	Pre-Shaped Ailerons
2	1/4" x 3" Dowel	PRE-CUT Birch Wing Dowels
4	1/4" x 1/4" x 22-7/16"	PRE-CUT Spruce Wing Spars
2	1/4" x 1/4" x 9-3/4"	Spruce Spar Doublers (Save surplus for Fuselage Stringer)
2	1/2" x 3/8" x 22-7/16"	PRE-CUT Wing Trailing Edge
2	1/2" x 3/4" x 24"	PRE-CUT Wing Jig
2	1/2" x 1-1/8" x 21-1/8"	PRE-CUT Wing Leading Edge
2	1/4" x 1/4" x 2-1/2"	Spruce Wing Servo Rails
2		Aileron Torque Rods
2		Nylon Aileron Adjustment Fittings
2		Brass Torque Rod Bearings
2		Threaded Aileron Pushrods
2		Nylon Clevis

Fuselage

1	3/32" x 3" x 36"	Miscellaneous Fuselage Sheeting
1	1/4" x 15/16" x 1"	Servo Mount Block
1	3/32" x 1/2" x 11-7/8"	Turtle Deck Cap
1	3/32" x 1/4" x 36"	Fuselage Stringer
1	1/8" x 3" x 30"	Rear Fuselage Bottom Sheeting
1	1/4" x 1/2" x 3/4"	PRE-CUT Tailpost
1	1/8" x 7/8" x 1-1/2"	PRE-CUT Plywood Tail Wheel Mounting Plate
1	3MM x 3-7/16" x 4-5/8"	PRE-CUT Micro-Lite® Plywood Front Fuselage Bottom
1	3MM x 3-7/16" x 7-3/16"	PRE-CUT Micro-Lite Plywood Fuselage Bottom
2	1/4" x 5/8" x 1-1/2"	PRE-CUT, Pre-Drilled Maple Wing Bolt Bearing Blocks
3	1/4" x 1/4" x 3-1/8"	PRE-CUT Spruce Fuselage Servo Rails
1	1/4" x 1/4" x 1"	PRE-CUT Spruce Fuselage Servo Rail
1	1/4" x 1/4" x 36"	Spruce Fuselage Top Stringer
1	1/4" x 2-7/16" x 3-7/16"	PRE-CUT Maple Main Landing Gear Block
1	1/4" x 3" x 24"	Cowl Material
3	1/4" Triangle x 36"	Fuselage Bracing
1	1/4" x 3-1/8" x 3-5/8"	PRE-CUT Plywood F1
2	1" TTE x 5/8"	PRE-CUT Wing Bolt Block Filler
1	1/2" Triangle x 3-7/8"	Cowl Filler
1		.40 Size Nylon Motor Mount
1		Main Landing Gear
2		5/32" Axles
5		1/4-20 x 3/4" Nylon Bolts
4		4-40 x 3/4" RHMS Motor Attach
2		1/16" x 36" Pushrods
2		.095 x 20" Nylon Pushrod Tubing
1		Nylon Tailwheel Bracket
1		Pre-Bent 3/32" Tailwheel Wire
2		#2 x 3/8" SMS Tailwheel Screws
2		9/16" x 2-1/2" Cardboard Wing Bolt Tubes
2		Nylon Clevis
4		6-32 T-Nuts
4		6-32 x 3/4" RHMS
1		#4 Flat Washer

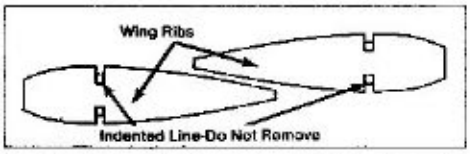
Stabilizer

1	1/4" x 2" x 15"	PRE-CUT Stabilizer Leading Edge
1	1/4" x 2-9/16" x 15"	PRE-CUT Stabilizer Trailing Edge
2	1/4" x 1-3/4" x 7-5/8"	PRE-CUT Elevators
2	1/4" x 1/2" x 2-1/2"	Stab Tips
1		Pre-Bent Elevator Connector Wire
1		Nylon Control Horn
2		2-56 x 1/2" Control Horn Screws

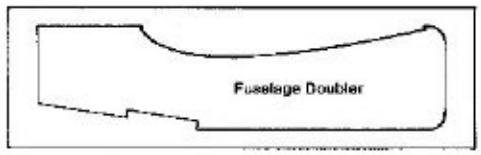
Fin & Rudder

1	1/4" x 2-3/8" x 4-1/2"	PRE-CUT Fin Leading Edge
1	1/4" x 2-3/4" x 5-1/8"	PRE-CUT Fin Trailing Edge
1	1/4" x 2-5/8" x 6-7/32"	PRE-CUT Rudder
1		Nylon Control Horn
2		2-56 x 1/2" Control Horn Screws

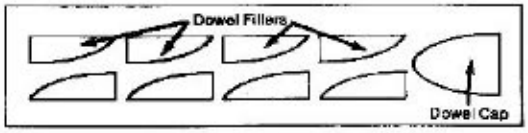
Die-Cut Parts



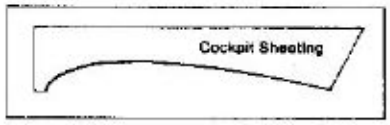
9 - Die #1 - 1/16" x 3" x 13-1/2" - Balsa



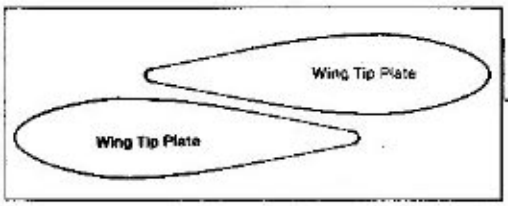
2 - Die #7 - 1/32" x 3-7/8" x 13" - Plywood



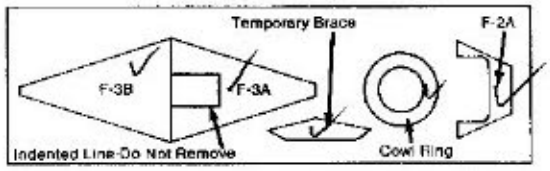
2 - Die #2 - 1/16" x 3" x 15-1/2" Balsa



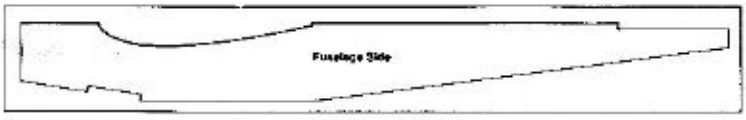
2 - Die #8 - 3/32" x 3" x 10-3/4" - Balsa



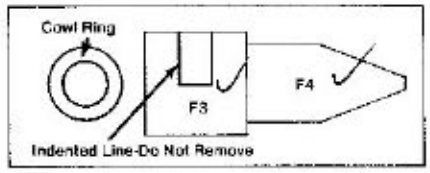
1 - Die #3 - 3MM x 5" x 15-1/2" Micro-Lite Plywood



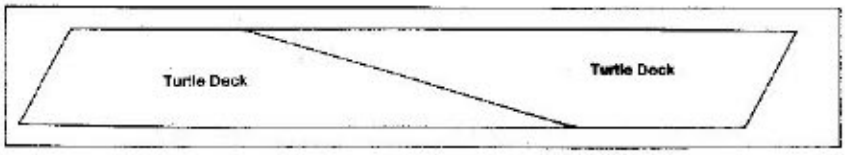
1 - Die #9 - 3MM x 4" x 15-7/8" - Micro-Lite Plywood



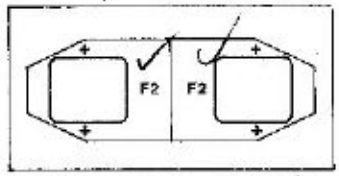
2 - Die #4 - 3MM x 4" x 30" - Micro-Lite Plywood



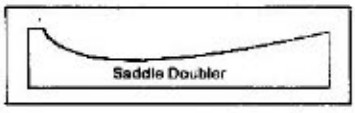
1 - Die #10 - 3MM x 4" x 11-7/8" - Micro-Lite Plywood



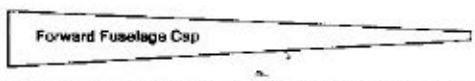
1 - Die #5 - 3/32" x 3-1/2" x 25" - Balsa



1 - Die #11 - 3/32" x 3-3/4" x 9-7/8" Plywood



2 - Die #6 - 3/32" x 2-7/8" x 10" - Balsa



1 - Die #12 - 3/32" x 1-3/4" x 14-1/2" - Balsa

Table Of Contents

Before You Begin

The Hots first appeared as a construction article in Model Airplane News. Its performance quickly made it a very popular fun-fly model, which prompted Midwest Products to offer it in kit form as a one-piece, quickly built, high-performance model. In filling out the evaluation card in that kit, many modelers suggested changes and improvements that would make the Midwest Hots easier to build and maintain. These suggestions have resulted in Midwest updating this popular kit.

The Hots II has a removable wing to allow easy access to the radio and fuel tank. The airframe has been strengthened to provide you with a model that will give many more hours of enjoyment. Fuel capacity has been increased and a stronger landing gear and cowling have been added. The center of gravity and control throws have been modified to provide smoother control and better handling.

#3-89-106

Materials You Will Need

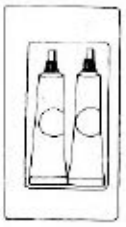
You will need these items to build this kit. Most of them are available from your Hobby Shop:

☐ **Fast-drying Cyanoacrylate Adhesive -** Used to bond wood to wood. (Use where an instruction tells you to glue, or bond parts with "CA".)

☐ **Slow-drying Cyanoacrylate Adhesive -** Used to bond wood to wood where access or size prevent the use of CA. (Use where an instruction tells you to glue, or bond, parts with "Slow CA".)

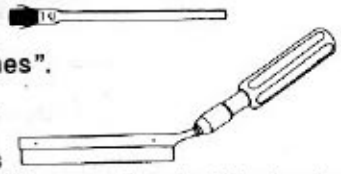
☐ **Accelerator -** Used to speed up the drying time of CA and CA+ adhesives.

☐ **5 Minute Epoxy -** Used to bond some hardwood joints.



☐ **Disposable Brushes -** Used to apply epoxy. Also called "Solder Brushes".

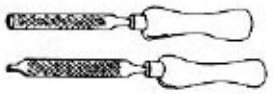
☐ **Fine Tooth Razor Saw -** Used to cut Hardwood parts. (Note: Razor Saws will stick, or bind, when cutting small parts if the tooth size is too large, or if you press down on the saw while cutting. If you let the saw slide across the part without pressing down, it will cut cleanly and smoothly.)



☐ **X-Acto® Knife and Extra #11 Blades -** This is a hobby knife with a metal handle. The #11 blades are a general purpose size, and can be used to cut and trim all of the Balsa Wood and Micro-Lite® Plywood parts in this kit.

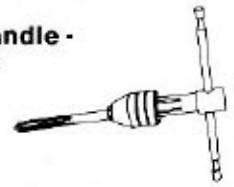
☐ **Small Plane -** Used to shape wood. (Stanley Tools makes an excellent One Inch Plane that will give years of service.)

☐ **A small Round and a small Flat File-** Used to shape parts.

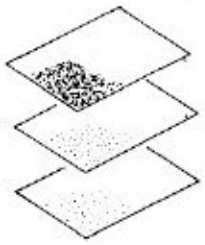


☐ **T-Pins -** Used to secure parts to the building board during construction.

☐ **1/4-20 & 4-40 Tap and Tap Handle -** Used to thread bolt holes in the Maple Blocks for the Wing and Landing Gear bolts.



☐ **80 and 120 Grit Aluminum Oxide Sandpaper and Sanding Block -** Used to shape and smooth wood parts. For the most part, the 80 grit paper can be used with the sanding block to shape parts and contour assemblies. The 120 grit paper is used to finish sand the model.



☐ **Incidence Meter -** Used to establish the relative angles between the Firewall, Wing and Stabilizer.

☐ **Small Square -** Used to align parts at 90° angles during construction.

☐ **Plastic Wrap -** Used to cover the plan so that parts are not accidently bonded to it during construction.

☐ **Building Board -** This can be any flat, stiff material that will accept T-pins; such as soft wood, cork bulletin board, etc. Note: You will need a building board that is at least 16" x 48". Because the Wing will be built on this board using a simple jig, the board must be "flat", with no warps or twists. Otherwise, the Wings will not be straight, and the finished model will not fly properly.

☐ **1/4" Electric Drill and a variety of drill bitts to include a 3-1/2" long 3/16" drill bitt (This is a standard length) -** These tools will be necessary to drill various mounting and bolt holes.

☐ **12" and 36" Steel or Aluminum Straight Edges -** Used to measure parts, and as a guide for cutting straight lines.

☐ **Soldering Gun & Solder**

☐ **Assorted Screwdrivers**

☐ **Pliers**

☐ **Pencil**

☐ **Light Weight Oil -** Such as 3-in-1 oil.

☐ **Masking Tape**

Additional Items you will need to build an operable R/C Model

Due to each modeler's preference, and the variety of accessory items available, the following items are left for the builder to select:

- ☐ **8 oz. Fuel Tank and Fuel Lines**
- ☐ **Radio**
- ☐ **Solder Links**
- ☐ **3/32" & 5/32" Wheel Collars**
- ☐ **Threaded Connectors**
- ☐ **Hinges**
- ☐ **2-1/4" Spinner**
- ☐ **2 - 1/2" Wheels**
- ☐ **3/4" Tailwheel**
- ☐ **Throttle Cable**
- ☐ **Engine**
- ☐ **Finishing Materials - (We recommend "Monokote"; two 6 foot rolls will cover the model, not including trim colors.)**

All of these items are available from your local Hobby Shop.

Construction Tips

Cutting

When cutting parts with your knife, make your first cut at light pressure, being careful that the point of the knife goes exactly where you want it. Subsequent cuts should be made at moderate pressure until the part is cut out. Use a steel straight edge to guide the blade when cutting straight lines.

Using Adhesives

When using CA, join the parts and then apply the CA. It will run into the joint and bond the parts. Be certain there are no gaps. When using Slow CA, apply adhesive to one of the parts and then join the assembly. On hardwood joints, apply accelerator as per the manufacturer's directions on the bottle, before bonding the parts together.

Assembly Instructions

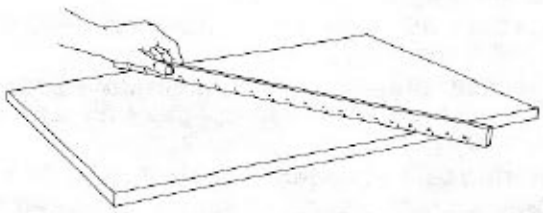
Wing Construction

In order to build the fuselage, it will be necessary to have the wing already built. So, we will start construction with the wing.

The wing for the Hots II is built on a simple jig made from two, 1/2" x 3/4" x 24" strips. It will be necessary to turn the wing over during construction. The construction sequence must be followed in order to properly build the wing. This method of construction will allow you to build the wing quickly and correct any misalignment before completion. Note that the plan shows the bottom view of the wing.

Check-off boxes (☐) appear next to each instruction throughout the text to help you keep track of your progress.

Wing Panels



☑ 1. Stand the 36" straight edge on edge, against the building board. Move it around the board and note any high or low spots. Correct these so that the board is **flat.**

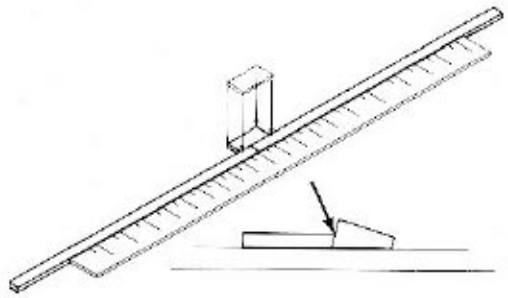
Note: If necessary, shims made from thin wood strips or folded paper can be placed under the board to raise the low spots.

☑ 2. The plan is easier to work with if the wing drawing is cut from it. Then, lay the wing drawing flat on your building board and cover it with plastic wrap.

☑ 3. Spray accelerator on all four sides of the four, 1/4" x 1/4" x 22-7/16" spruce spars.

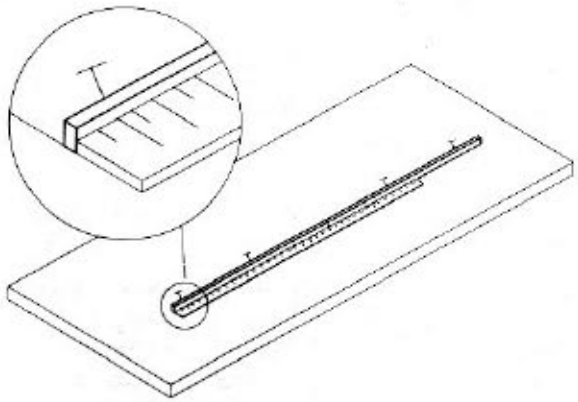
☑ 4. Align your 36" straight edge near the drawing of the spars on the wing plan. Butt the ends of two spars together and against the straight edge, so that the joint is aligned with the spar joint shown on the plan. Apply Slow CA to one side of one, 1/4" x 1/4" x 9-3/4" spruce spar doubler and press it into contact with the two spars, aligning it with the drawing of the spar doubler on the plan.

☑ 5. Repeat Instruction Number Four (#4) to join the other two spars.

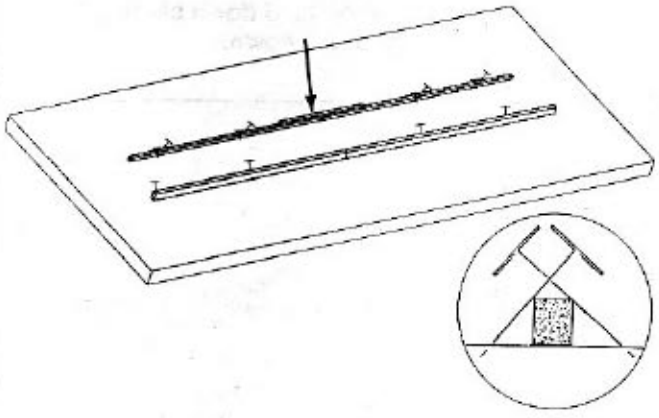


6. Apply Slow CA to the beveled edge of the maple wing hold down block. Use it to join the two pre-shaped tapered trailing edges in the same manner as the spars. Align these parts with the drawing of the trailing edge on the plan when joining them.

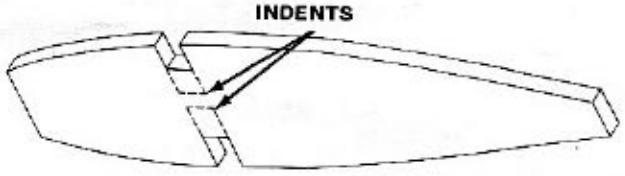
   Note: Join these parts accurately, as the wing hold down block aligns the Number Two (#2) ribs.



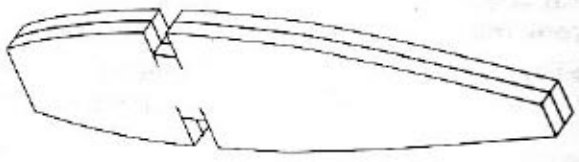
7. Align the ends of one, 1/2" x 3/4" x 24" balsa jig strip over the jig location marks on the plan. Pin the **ends** of the jig to the plan and building board, as shown. Be sure to lay the jig on the plan so that it stands 3/4" high, as shown.
8. Lay the 36" straight edge against the jig to be certain it is straight. Then, pin the center of the jig to the building board.
9. Butt the other jig strip against the end of the first jig strip. Lay the 36" straight edge against both jig strips and pin the second jig strip to the building board, over the alignment marks on the plan.



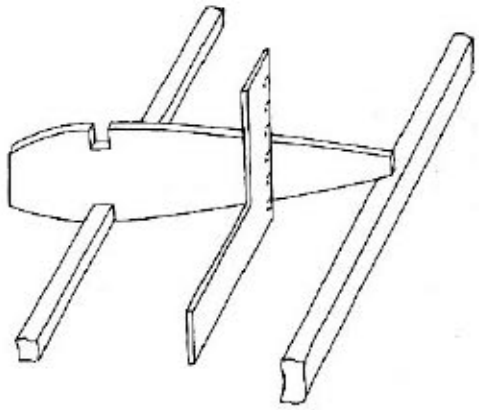
10. Pin one joined spar over the drawing of the spars on the plan so that the spar doubler is on top, as shown. Do not push pins through the spar, as this could cause it to crack.



11. Remove the eighteen (18) wing ribs from the nine (9) die-cut sheets. Use a sharp X-acto knife to cut through the indented marks on **four** of the ribs. These ribs will be placed over the spar doublers shown on the plan.

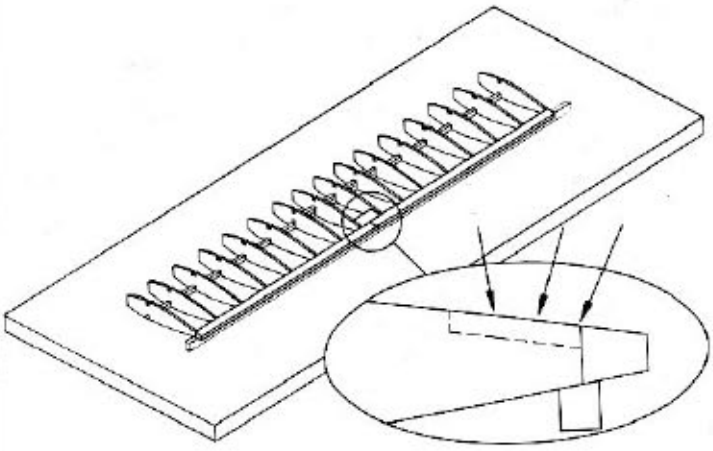


12. Apply Slow CA to one side of a rib that does not have the spar notches removed. Laminate it to another rib, so that the edges of the two ribs are flush, as shown. Repeat this procedure again to make a second laminated rib. These two laminated ribs will be used as the **tip** ribs, as shown on the plan.



☐ 13. Position all of the ribs on the spar, aligning each rib over the drawing of the ribs on the plan. Rest the trailing edges of the ribs on top of the jig. Holding a small square against each rib, bond them to the spar with CA.

Note: There is no center rib used in this wing. Also, pay particular attention to the alignment of the Number Two (#2) ribs with the plan, as they determine the spacing of the wing dowels.

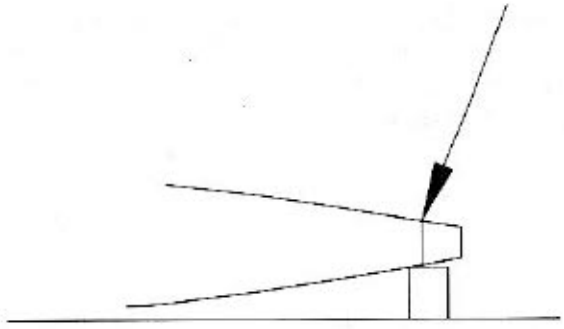


☐ 14. Position the joined trailing edge against the trailing edges of the ribs, so that the wing hold down block is between the Number Two (#2) ribs, and it is facing **up**, as shown.

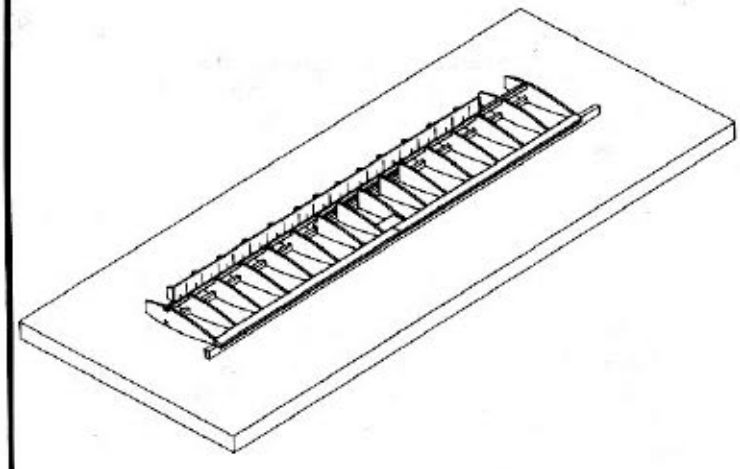
☐ 15. Using CA, bond the trailing edge to the **tip** ribs **only**.

☐ 16. Push a t-pin into the jig and against each end of the trailing edge, so as to trap it and prevent it from moving sideways. Be certain that the end ribs and the wing hold down block are aligned over the drawings of these parts on the plan.

☐ 17. Apply Slow CA to the ends of the wing hold down block. Align the Number Two (#2) ribs flush with the upper edge of the wing hold down block and against the trailing edge, as shown.

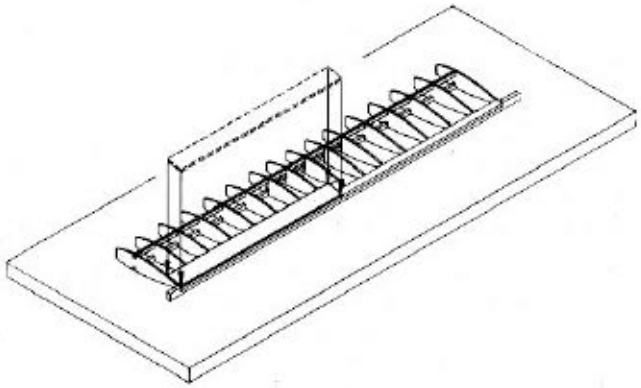


☐ 18. Bond the remaining ribs to the trailing edge with CA, as shown.



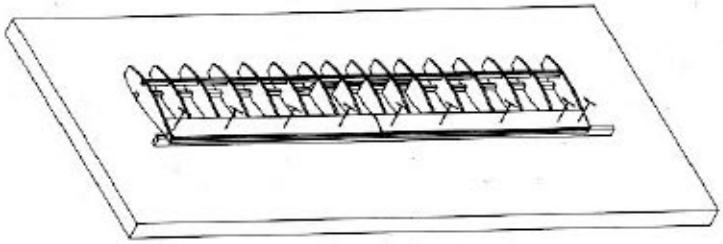
☐ 19. Press the remaining joined spar into the notches of the ribs. Stand a 36" straight edge on the spar, as shown, and adjust the spar so that it makes contact with the straight edge over its full length. Also, adjust the ribs so they are all square to the spars. Then, bond the spar to the ribs with CA.

☐ 20. Using a sanding block, lightly sand the edges of the ribs flush with the spar and trailing edge.



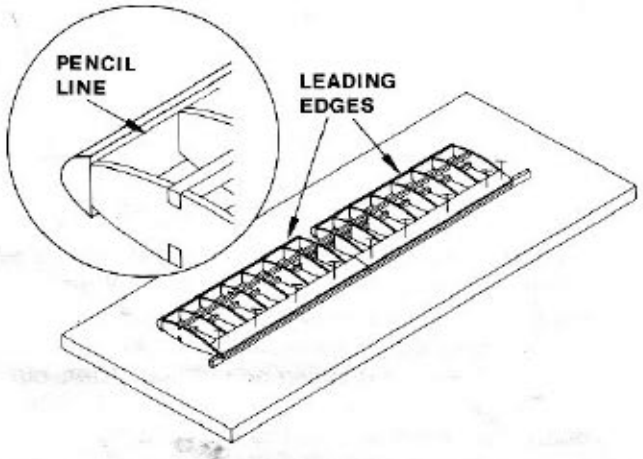
21. Apply Slow CA to the one half of the wing hold down block, the last 1" of each rib, and the trailing edge. Position a 1/16" x 1-7/16" x 22-7/16" trailing edge sheet flush over the trailing edge and flush over the end rib. Then, press it into place.

22. Repeat Instruction #21 to apply a trailing edge sheet to the opposite wing panel. Butt the two trailing edge sheets together over the wing hold down block.



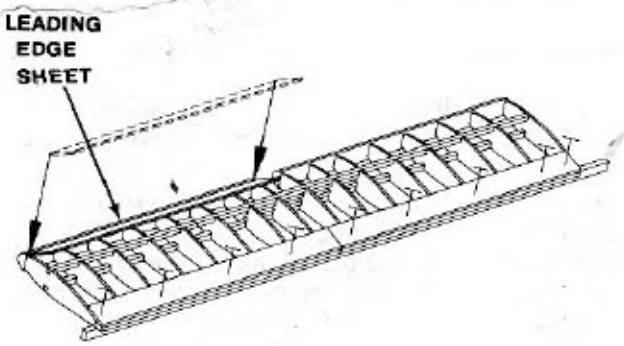
23. Push t-pins through the trailing edge, the jig, and into the building board, as shown. This will prevent the trailing edge from lifting from the jig.

24. Use a straight edge and a sharp pencil to mark a line 3/32" in from one edge of both pre-shaped leading edge parts, as shown.



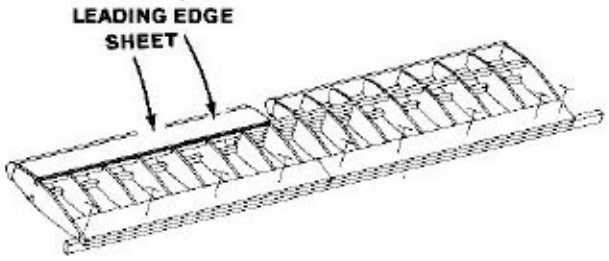
25. Bond each leading edge to the tip ribs and to the Number Two (#2) ribs with CA, so that the top edge of each rib is on the pencil line, as shown.

26. Press the leading edges against the remaining ribs, at the pencil line, and bond them to these ribs with CA.



27. Fit a pre-cut 1/16" x 2-3/8" x 21-3/32" leading edge sheet against one leading edge. Bevel the edge of this sheet with a sanding block to match the angle created by the leading edge and the ribs, and to remove any gaps.

28. Apply Slow CA to the first 1/4" of the ribs and to the beveled edge of the leading edge sheet. Position the sheet against the leading edge and the front portion of the ribs. Allow this assembly to cure. (About one minute).

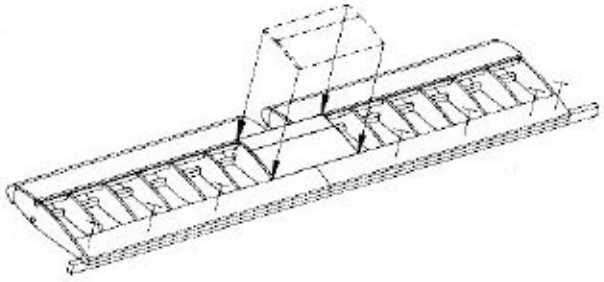


29. Insert the nozzle of the Slow CA under the leading edge sheet and apply Slow CA to the ribs and the spar.

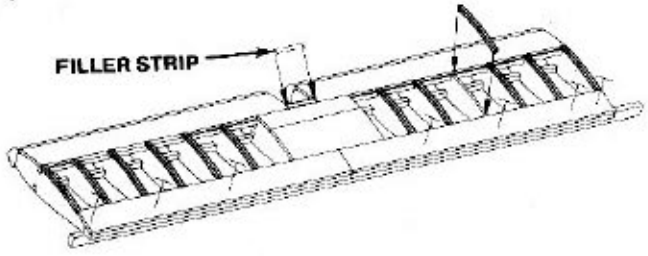
30. Lay your hand flat on the center of the leading edge sheet and roll it onto the spar. Hold it in position until the Slow CA "grabs", then roll the ends into contact with the spar.

31. Check to be sure that the leading edge sheet is in contact with the spar. If not, apply CA in the gap and press the sheeting into contact, working a small section at a time.

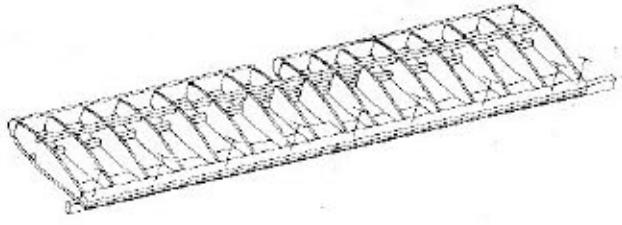
32. Repeat Instructions #27 thru #31 to glue a leading edge sheet to the other wing panel.



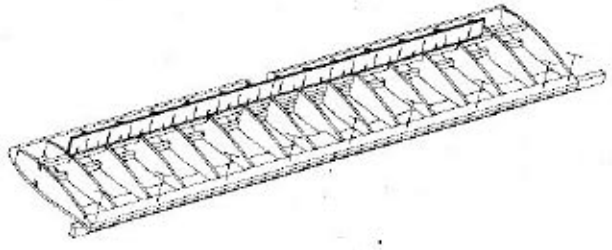
33. Glue the 1/16" x 3" x 9" center section sheeting in place with Slow CA. Save the cut-off portion of the forward center section sheet, as it will be used to sheet the center section on the opposite side of the wing.



34. Cut the cap strips to length from the 1/16" x ¼" x 36" balsa strips. Also, cut a filler strip to fit across the tops of the spars at the center section. Glue these parts in place with Slow CA.

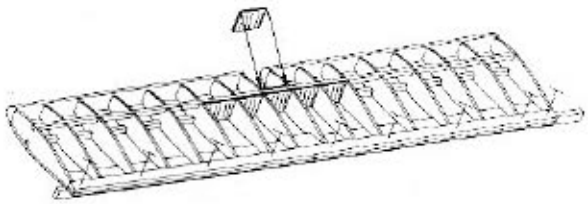


35. Remove the wing from the plan and jig. Turn it over and place it back into position as shown, so that the leading edge sheeting is in contact with the building board and the rear edge of he spar is in line with the spar drawing on the plan. Then, pin the trailing edge sheeting to the jig and building board, as shown, so that the sheeting makes contact with the jig along its full length.

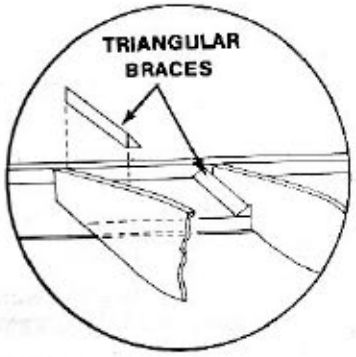


36. Stand a 36" straight edge along the trailing edge and then along the spar, making certain that these parts are flat.

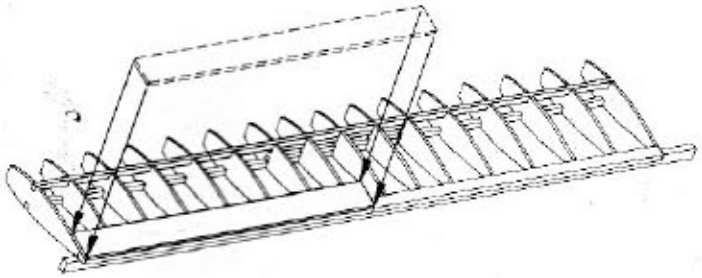
Note: This step is important. If the spar or trailing edge is bowed, this shape will be locked in when the next leading and trailing edge sheets are installed. Adjust the pins, or your building board, as necessary, to insure that these parts are flat.



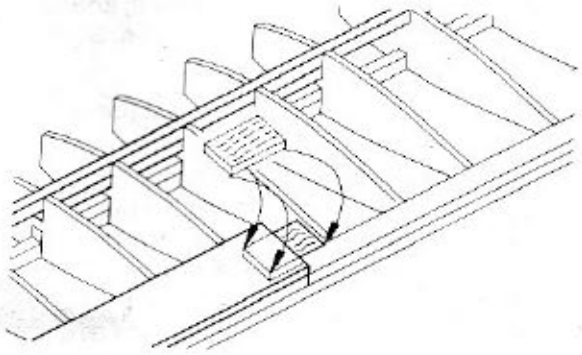
☐ 37. Use Slow CA to glue the 1/16" x 2-7/8" x 1-11/16" pre-cut shear webs to the spars, at the locations shown on the plan. Be certain that the wood grain runs vertically when installing these webs. Note that one shear web is to be glued across the front side of the spars, at the center section, as shown here and on the plan.



☐ 38. Cut two, 1/4" balsa triangle braces to fit the wing hold down block. Glue them in position with Slow CA. If necessary after installation, trim these braces flush with the tops of the ribs.



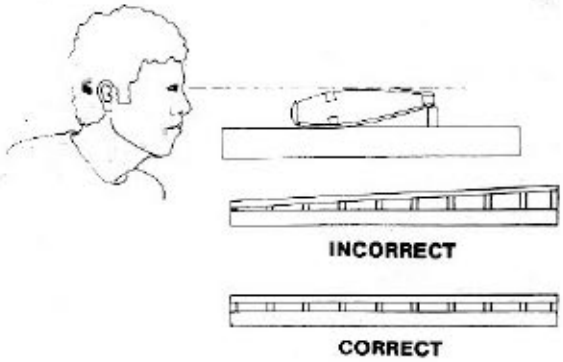
☐ 39. Apply Slow CA to the last 1" of the wing ribs, and one half of the trailing edge. Position a 1/16" x 1-7/16" x 22-7/16" trailing edge sheet flush over the trailing edge and flush over the end rib. Then, press it into place.



☐ 40. Cut a 1" x 1" gusset from the scrap of one of the rib die-cut sheets. Apply Slow CA to one half of one side of this gusset and glue it under the end of the trailing edge sheet, at the center section, as shown.

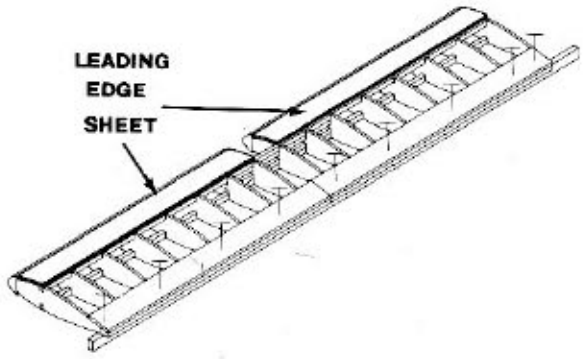
Note: For clarity, this gusset is not shown on the plan. The dimensions of this gusset are approximate. Its purpose is to tie the two trailing edge sheets together and to provide a base for aligning the trailing edge sheets. Its grain should be parallel to the grain of the trailing edge sheet, as shown here.

☐ 41. Repeat Instruction #39 to apply a trailing edge sheet to the opposite wing panel. Butt the two trailing edge sheets together over the gusset.

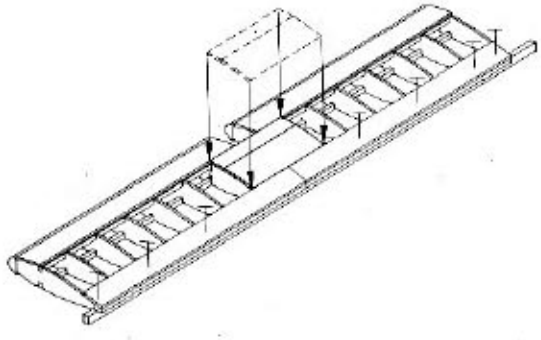


☐ 42. Sight across the trailing edge and the spar, as shown, to be certain that they are parallel. If necessary, adjust the wing to obtain the correct alignment.

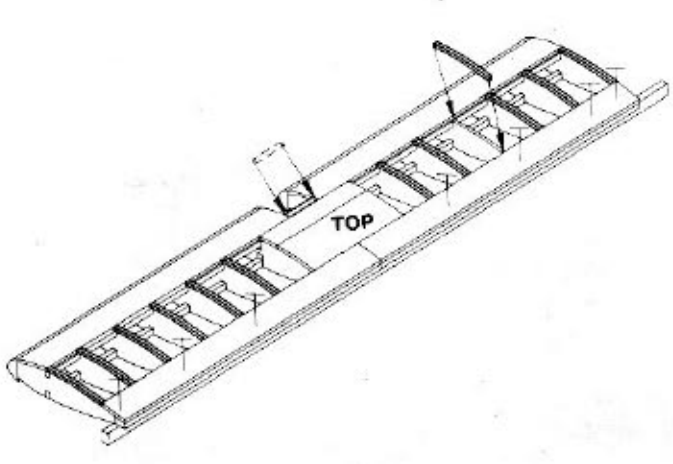
Note: This is the last chance you will have to correct any mis-alignment in the wing. Once the leading edge sheets are glued in place the wing will become rigid.



43. Bevel the two, 1/16" x 2-3/8" x 21-3/32" leading edge sheets and install them as explained in Instructions #27 thru #31. Again, check for gaps between the leading edge sheets and the spar.



44. Glue the 1/16" x 3" x 9" center section sheeting in place with Slow CA, in the same manner as explained in Instruction #33.



45. Cut the cap strips to length from the 1/16" x ¼" x 36" balsa strips. Also, cut a filler strip to fit across the tops of the spars at the center section. Glue these parts in place with Slow CA.

46. Mark the word **top** on the center section sheeting with a pencil.

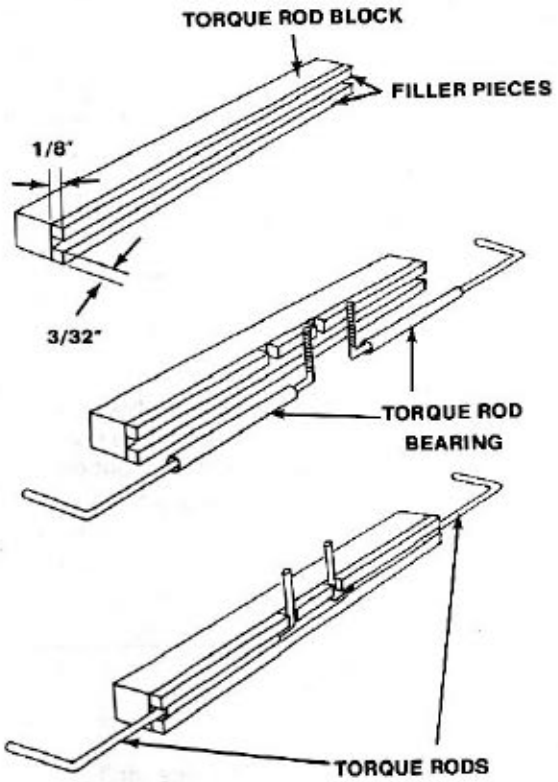
Note: This may sound unnecessary, but, if the wing is installed with the wing hold down block on the wrong side, the wing bolts will not engage the block. (See the plan, Side View.)

47. Remove the wing from the building board and jig. Use a sanding block to sand all of the joints smooth and flush.

The basic wing structure is now complete. Please note that it is unnecessary to fiberglas the center section of this wing. The spar doublers, wing hold down block, trailing edge gusset, and center section sheeting provide more than adequate strength against bending loads.

The 1/4" wing dowels will be installed when the fuselage is built. The wing tip plates will be added after the model is covered. This will make finishing your Hots II much easier. **Do not** glue any of these parts in place at this time!

Torque Rods



☐ 48. Glue the two pre-cut 3/32" x 1/8" x 3-3/8" balsa filler pieces to the edges of the pre-cut 5/16" x 5/16" x 3-3/8" balsa torque rod block, as shown.

☐ 49. Slip the brass torque rod bearings over the torque rods and bend the rods to shape, using the plan as a guide. (Be sure to make a left and right torque rod.)

☐ 50. Fit the torque rods into the slot in the torque rod block using the wing plan to position them. Remove the 3/32" x 1/8" balsa immediately behind the threaded ends of the torque rods, as shown.

Note: This is important. If the torque rods are spaced too far apart, the aileron pushrods may interfere with the other pushrods.

☐ 51. Locate the torque rod block at the center of the wing trailing edge with pencil marks.

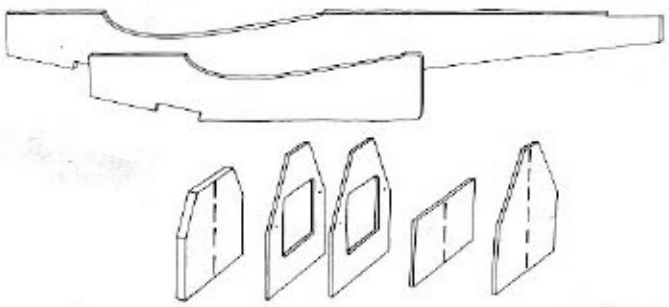
☐ 52. Rub light oil on the torque rods to prevent epoxy from bonding to them. Be careful not to get oil on the bearings.

☐ 53. Glue the torque rod bearings into the torque rod block and glue the block to the trailing edge of the Wing with 5 minute epoxy. Be sure the threaded rod ends face the BOTTOM of the wing. When the epoxy cures, taper the torque rod block to the wing contour, as shown on the Fuselage Side View.

Fuselage

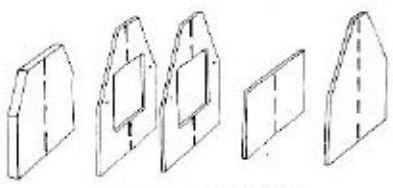
The Fuselage is a simple box structure and quite easy to build. However, because of the size of the cockpit structure which is bonded to the wing, the fuselage bulkheads must be located accurately, and squarely, in order to properly mount and remove the wing. Study the plan and text before beginning construction.

The plan shows cutaway views of the fuselage. On the Top View, the balsa upper side sheeting and the caps are not shown. On the Fuselage Side View, the left side is not shown. This has been done for clarity.



☐ 54. Remove the fuselage sides, fuselage doublers and the bulkheads from the die-cut sheets; also F-1 which is a pre-cut part.

Note: To avoid breaking the F-2 bulkheads, cut through the indented lines around the fuel tank hole with a sharp X-acto knife. Remove the wood from the hole and then remove the bulkhead from the die-cut sheet.



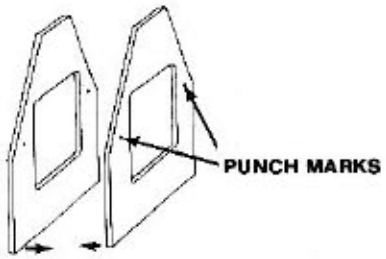
MARK CENTERLINES

☐ 55. Measure and mark the centerline on both sides of each bulkhead.

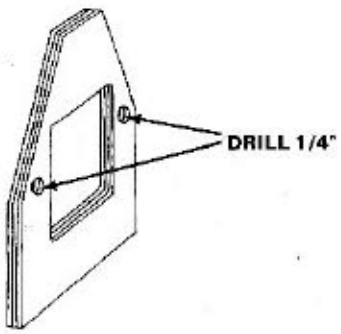
Note: Take the time to do this accurately. These centerlines will be used to align the fuselage, and to center the wing.

GLUE DOUBLER

☐ 56. Lay the fuselage sides on the building board. Using Slow CA, laminate the 1/32" plywood doublers to the fuselage sides. Be sure to make a right and left side.

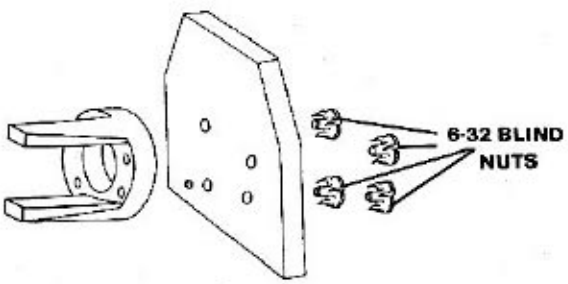


☐ 57. Use Slow CA to laminate the two plywood F-2 parts together, as shown. Be sure the punch marks for the wing dowel holes are facing out on one of the plywood doublers.



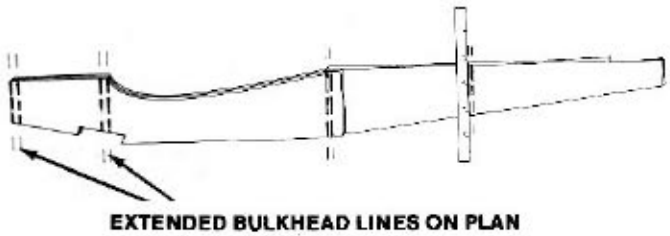
☐ 58. Using the punch marks as a guide, drill two 1/4" holes through F-2. Check the fit of your fuel tank through F-2 and then sand the edges of the tank hole smooth.

Note: The fuel tank must be installed on its side, as shown on the plan.



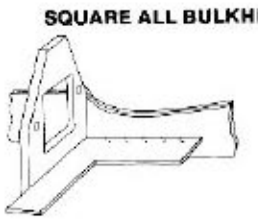
☐ 59. Use the motor mount as a drill guide to drill clearance holes in F-1 for the mounting bolts and install the four, 6-32 blind nuts. Also, drill a hole for your throttle cable and two, 1/4" holes for the fuel lines, as shown on the plan.

Note: Although the engine can be installed in any position, we recommend that it be side-mounted. This mounting position will allow the exhaust residue to blow under, and away from, the fuselage and wing.



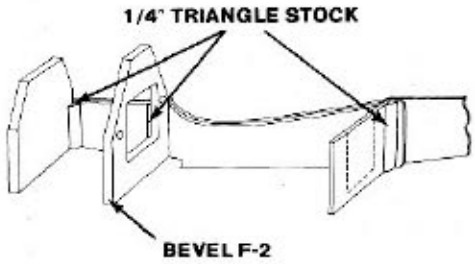
EXTENDED BULKHEAD LINES ON PLAN

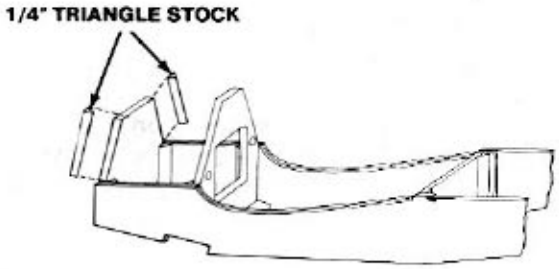
☐ 60. Lay the right fuselage side over the Side View on the plan and carefully align it with the drawing of the fuselage side. Using the extended bulkhead lines as a guide, lay a straight edge across the fuselage and mark the bulkhead locations for F-1, F-2, F-3, and F-4. Double check the accuracy of your lines.



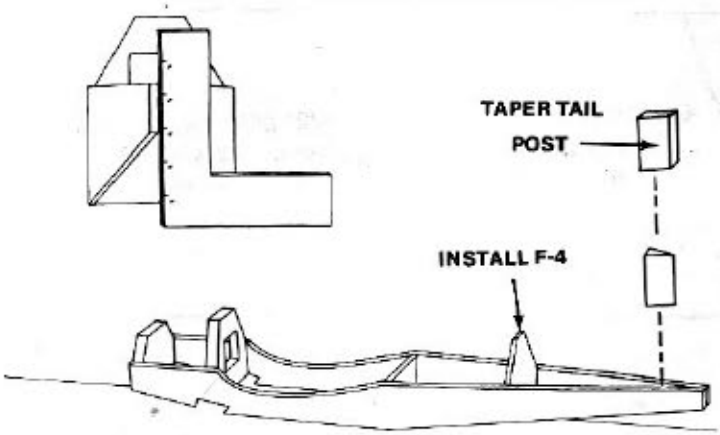
Note: Use a small square to position all of the bulkheads.

- ☐ 61. Using Slow CA, install F-1. Be certain that the lower front edge of F-1 is at the edge of the fuselage bottom, as shown on the plan.
- ☐ 62. Cut and install a piece of 1/4" triangle stock against F-1 and the fuselage side, using Slow CA.
- ☐ 63. Bevel the bottom edge of F-2 to match the angle of the landing gear block. Install F-2 with Slow CA.
- ☐ 64. Cut and install a piece of 1/4" triangle stock against the FRONT side of F-2 and the fuselage side, using Slow CA.
- ☐ 65. Install F-3 with Slow CA. Be sure the indented marks on this part face the front.
- ☐ 66. Cut and install a piece of 1/4" triangle stock against the BACK side of F-3 and the fuselage side, using Slow CA.

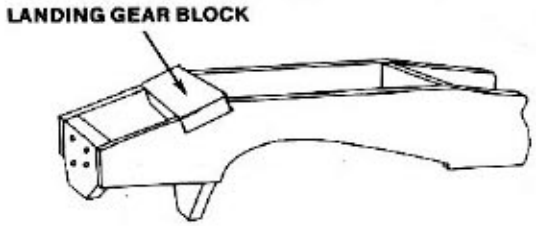




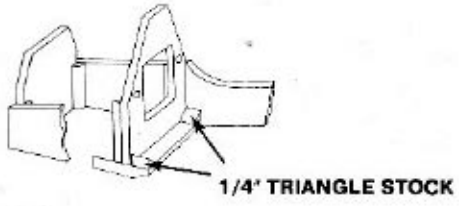
- ☐ 67. Carefully align and bond the left fuselage side to the bulkheads with Slow CA. Be sure the bulkheads are all square to the sides and that the top edges of the sides are parallel to each other.
- ☐ 68. Cut and install the 1/4" triangle stock against the bulkheads and left fuselage side. Also, install 2 pieces of 1/4" triangle stock on the upper sides of F-1, as shown.



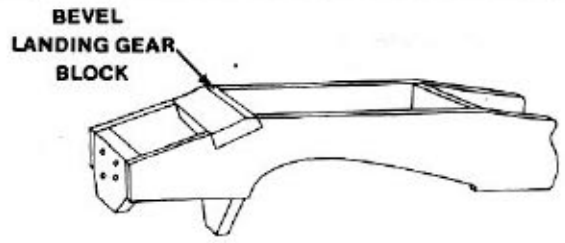
- ☐ 69. Position the fuselage over the Top View on the plan. Pin it in position so that the bulkhead centerlines are over the centerline shown on the plan.
- ☐ 70. Pull the back edges of the fuselage sides together and, using a small square as shown, align them over the centerline and bond them together with CA.
- ☐ 71. Install F-4 with Slow CA, using the plan and pencil lines as a guide to position this Bulkhead.
- ☐ 72. Taper the pre-cut 1/4" x 1/2" x 3/4" tail post to fit and install it with Slow CA. Remove the fuselage from the plan.



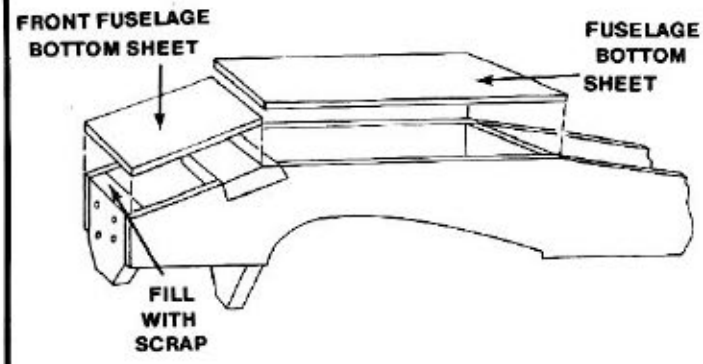
- ☐ 73. Install the 1/4" x 2-7/16" x 3-7/16" maple landing gear block with Slow CA.



- ☐ 74. Cut and install 1/4" triangle stock against the landing gear block and the fuselage sides with Slow CA.



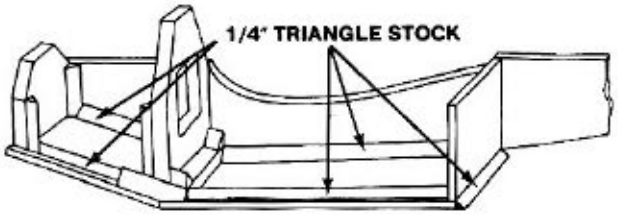
☐ 75. Using a plane or sanding block, bevel the landing gear block flush with the bottom of the fuselage, as shown in the Side View of the plan.



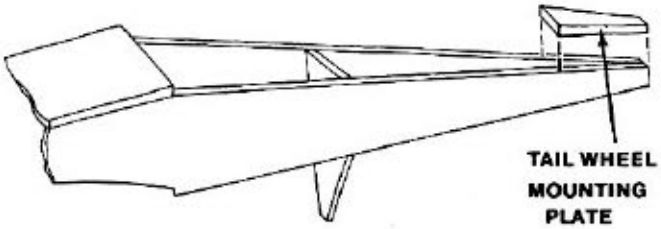
☐ 76. Glue a strip of scrap balsa across the bottom of F-1 and sand it flush with the edges of the fuselage.

☐ 77. Install the 3mm x 3-7/16" x 4-5/8" pre-cut Micro-Lite plywood front fuselage bottom sheet with Slow CA. Be sure it is in contact with the landing gear block.

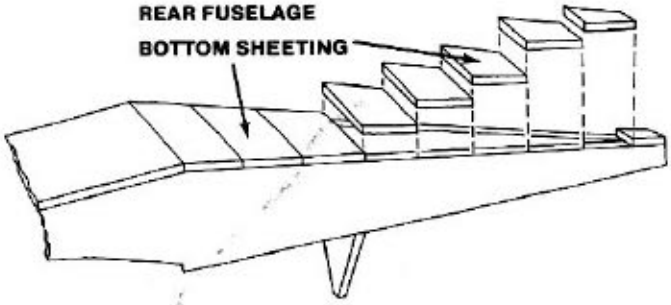
☐ 78. Install the 3mm x 3-7/16" x 7-3/16" pre-cut Micro-Lite® plywood fuselage bottom sheet with Slow CA. Be sure it butts against the front plywood sheet and makes contact with the landing gear block.



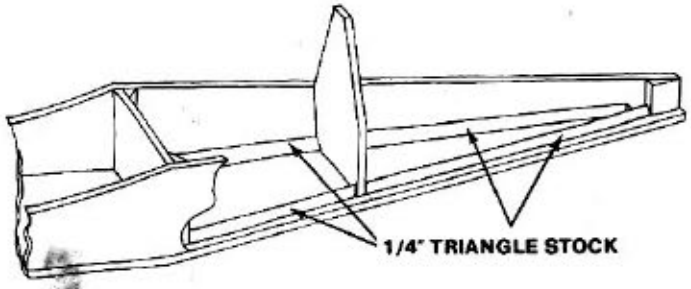
☐ 79. Cut and install 1/4" triangle stock on the inside of the fuselage against the front and bottom sheets, the sides, and the bottom rear edge of F-3 using Slow CA.



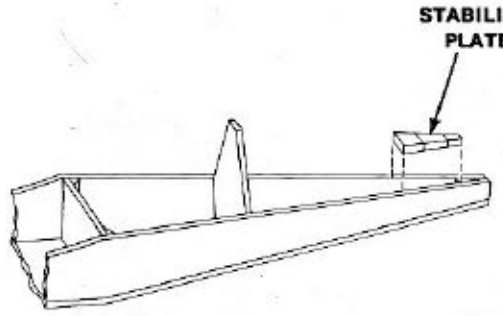
☐ 80. Install the 1/8" x 7/8" x 1-1/2" plywood tail wheel mounting plate with 5 minute epoxy. Cut and sand it flush with the sides after the epoxy cures.



☐ 81. Cut and fit the rear fuselage bottom sheeting from the 1/8" x 3" x 30" balsa sheet. Be sure to run the grain across the fuselage. Install these pieces with Slow CA.

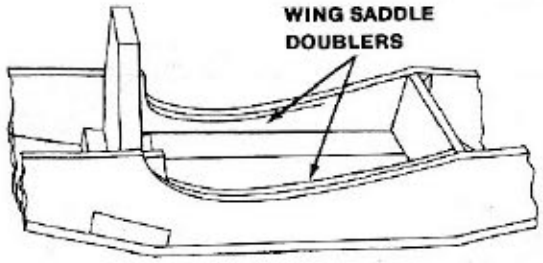


☐ 82. Cut and install 1/4" triangle stock on the inside of the fuselage, against the sides and bottom 1/8" balsa sheets, using Slow CA. Taper the rear pieces to butt against the tail post, as shown on the Top View of the plan.

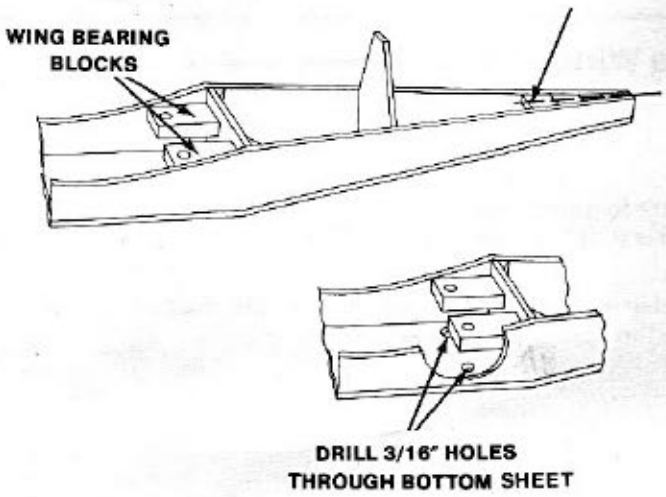


☐ 83. Cut and fit the stabilizer plate parts from the 3/32" x 3" x 36" balsa sheet. Be sure the grain runs across the fuselage. Bond these parts together with CA.

☐ 84. Insert the stabilizer plate into the fuselage so that it sticks up slightly above the edges of the sides. Invert the fuselage and press the plate against the building board to seat it flush with the top edges of the fuselage. Bond the plate to the fuselage with CA.



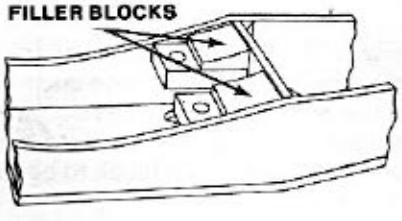
☐ 85. Fit the die-cut 3/32" balsa wing saddle doublers to the inside of the fuselage sides, as shown on the plan. Glue them in position with Slow CA and then trim the front edges flush with the wing saddle.



☐ 86. Butt a 36" straight edge against F-4's centerline. Center the straight edge over the tail post and mark the centerline on the top of the stabilizer plate.

☐ 87. Install the two pre-drilled wing bearing blocks with 5 minute epoxy, as shown on the plan. Be sure they are in contact with F-3 and the fuselage sides, and that the front edges of the blocks are flush with the edges of the wing saddle, as shown on the Side View of the plan.

☐ 88. Insert a 3/16" drill bit into the holes in the wing bearing blocks, from the top. Drill through the bottom Micro-Lite plywood sheet. DO NOT enlarge these holes at this time. They will be used later to act as a drill guide when you drill the tap holes in the wing.



☐ 89. Glue the pre-cut and tapered balsa filler blocks to the tops of the bearing blocks with Slow CA. Sand them flush with the wing saddle.

Radio and Pushrod Installation

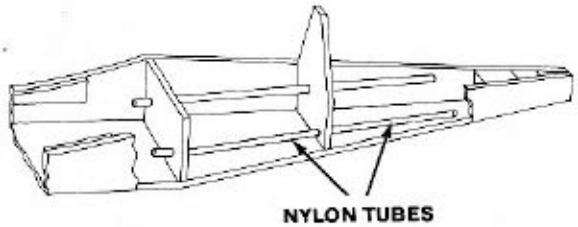
While the fuselage is open on the top side, it would be a good idea to install the three pre-cut servo rails and the pushrods for the elevator, rudder, and throttle.

When positioning your servos, bear in mind that the pushrods for the ailerons and a portion of the aileron servo may sit between the servos that are mounted on each side of the fuselage. Temporarily fit the cardboard guide tubes under the wing bearing blocks to be sure that the rudder and elevator pushrods will clear them.

The front throttle servo rail is supported on a pre-cut 1/4" x 15/16" x 1" balsa block. Glue this block to the fuselage bottom and side with Slow CA.

When positioning the aileron servo, be certain that the hole in the wing sheeting is centered so that the aileron servo will clear the servos in the fuselage. Glue the two pre-cut 1/4" x 1/4" x 2-1/2" spruce servo rails under the center sheeting with Slow CA, as shown on the plan.

Nylon tubing and 1/16" music wire are provided for the rudder and elevator pushrods. Flight trim is not effected by temperature changes with this type of pushrod, and, they are quite easy to install. They also help reduce play in the linkages.



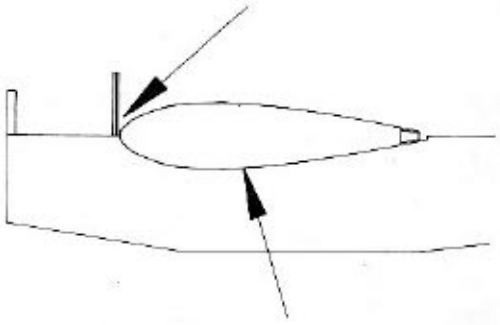
☐ 90. Drill 1/8" holes in the bulkheads to run the nylon tubes and bond them to the bulkheads and fuselage sides with 5 minute epoxy. After the epoxy cures, the tubing ends can be trimmed flush with the fuselage sides for a neat appearance.

If, however, you prefer regular pushrods, simply cut holes in the F-3 and F-4 bulkheads to clear them.

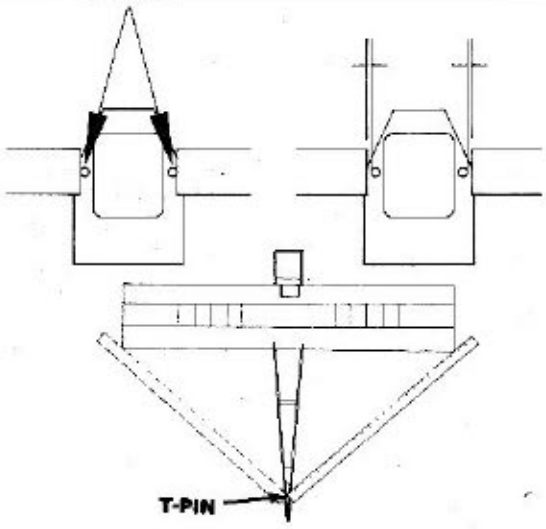
Mounting the Wing

The important elements in mounting the wing are to get it square to the fuselage and to correctly set the incidence. To do this, all we need is a 36" straight edge and an incidence meter.

Note: The wing dowels in this model are installed in a non-standard manner that eliminates the necessity of aligning and drilling holes. Follow the instructions carefully.

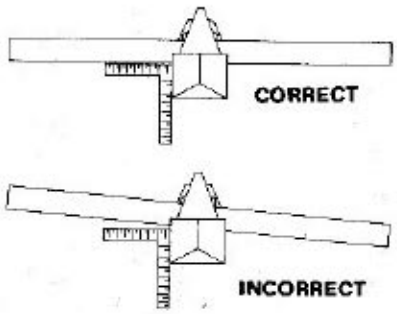


☐ 91. Place the wing on the wing saddle, so that the leading edge butts against F-2. Be certain that the bottom of the wing is against the saddle and the top of the wing is facing up. If necessary, trim the back edge of the torque rod block to obtain this fit.

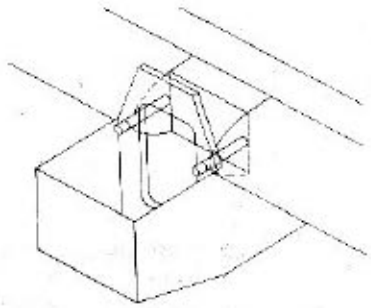


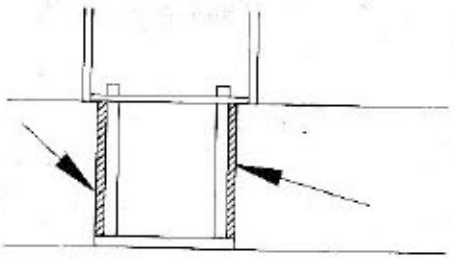
MEASUREMENTS TO BE EQUAL

☐ 92. Align the wing so that the two, Number Two ribs are just touching, or equally spaced from, the 1/4" holes in F-2, as shown. Push a t-pin vertically into the stabilizer plate at any convenient point along the centerline. Rest one end of a 36" straight edge against the t-pin and measure to one wing tip, as shown. Then, make the same measurement to the opposite wing tip. Pivot the wing as necessary to obtain the same distance between the t-pin and both wing tips. When the measurements are identical, and the Number Two ribs are aligned with the holes in F-2, the wing will be square to the fuselage. Pin it in position and make pencil marks on the trailing edge of the wing to indicate where it meets the edges of the fuselage.

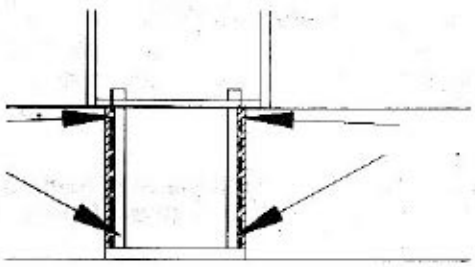


☐ 93. Sight down the fuselage from the rear. Use a small square to check the lateral alignment of the wing and fuselage. If necessary, sand the high side of the wing saddle to obtain the correct fit shown here.





(A)

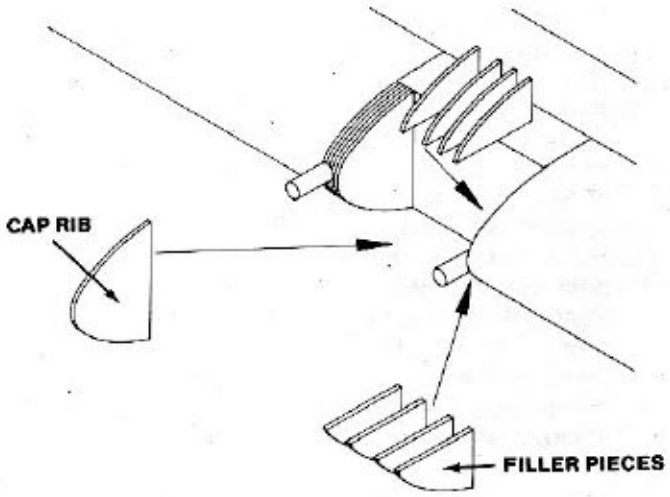


(B)

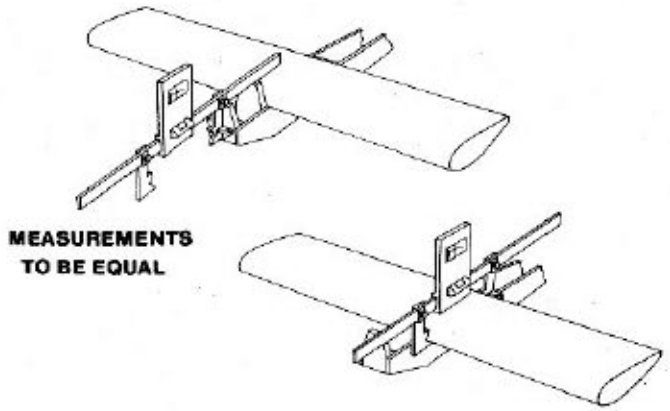
☐ 94. With the wing securely pinned to the fuselage, insert the two, 1/4" x 3" dowels into the holes in F-2. Butt their ends against the shear web and press them against the Number Two ribs. Center the dowels vertically. Then, carefully glue them to the Number Two ribs with CA. Be careful not to glue the dowels, or the wing, to the fuselage.

Note: The dowels should be a snug fit in the holes in F-2. If they are a tight fit, enlarge the holes slightly with a round file.

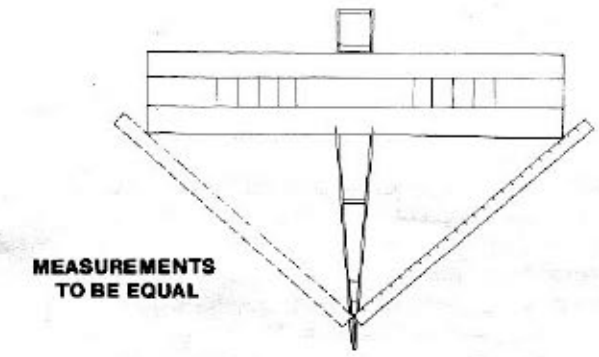
Also, if the dowels will not lay flat against the Number Two ribs when they are installed, place scrap shims between the ribs and the dowels to align them with the holes, as shown in (A). If the ribs partially cover the holes in F-2, sand the ribs with a sanding block until they will allow the dowels to fit properly, as shown in (B).



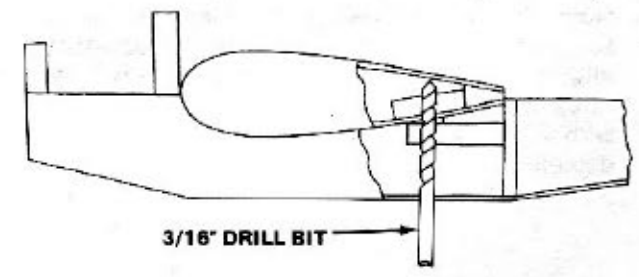
☐ 95. Carefully remove the wing from the fuselage. Laminate the die-cut dowel filler pieces to each side of both dowels with Slow CA. Laminate the cap rib over this assembly with Slow CA, as shown. Then, use a sanding block to sand these parts flush with the leading edge sheeting and the leading edge.



☐ 96. Re-install and align the wing on the fuselage. Check the incidence of the wing against the firewall with an incidence meter. Both readings should be the same. If it is necessary to lower the trailing edge, slip a sheet of 80 grit sandpaper between the wing and the saddle, grit side against the saddle. Lightly press the wing down and sand the wing saddle until the incidence is correct. If it is necessary to build up the trailing edge, scrap wood can be glued to the saddle and shaped with sandpaper to match the wing.

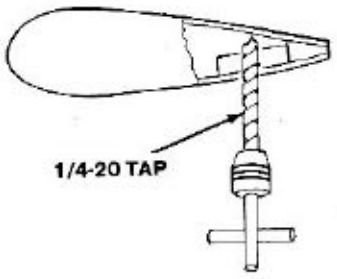


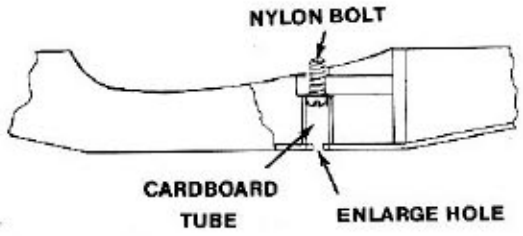
☐ 97. Once the incidence is set, align the trailing edge of the wing with the pencil marks on the trailing edge that locate the fuselage sides. Check that the distance from the t-pin in the stabilizer plate to the tips is still matched and then pin the wing securely to the fuselage.



☐ 98. Insert a 3/16" drill bitt into one hole in the bottom of the fuselage and through the hole in the wing bearing block. Drill through the wing hold-down block in the wing. Do the same on the opposite side.

☐ 99. Remove the wing. Drill through the wing bearing blocks in the fuselage, and the bottom of the fuselage, with a 1/4" drill bitt.





☐100. Using a 1/4-20 tap, cut the threads in the wing hold-down block, working from the bottom side of the wing.

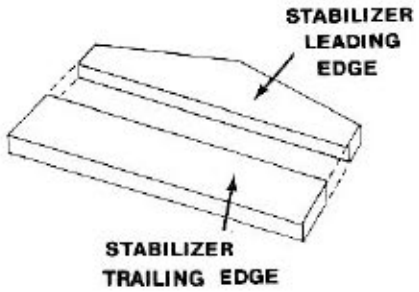
☐101. Insert two 1/4-20 x 3/4" nylon bolts into the wing bearing blocks, as shown on the plan.

☐102. Cut away the triangle stock around the 1/4" holes in the fuselage bottom sheet. Cut the two cardboard tubes to length and position them over the bolt heads and the holes in the bottom of the fuselage. Apply a small amount of 5 minute epoxy to both ends of both cardboard tubes to lock them in position.

☐103. When the epoxy has cured, open the holes in the bottom of the fuselage with a round file, flush with the inside edges of the cardboard tubes.

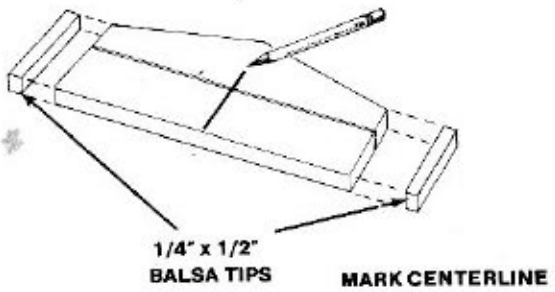
☐104. Position the wing on the fuselage and tighten the bolts. Re-check the wing's incidence, relative to the firewall, to be certain it is correct.

Stabilizer and Fin



☐105. Sand the mating edges of the two pre-cut 1/4" balsa stabilizer parts to remove any gaps. Lay these parts on the plan and bond them with Slow CA. Be sure to cover the plan with plastic wrap first.

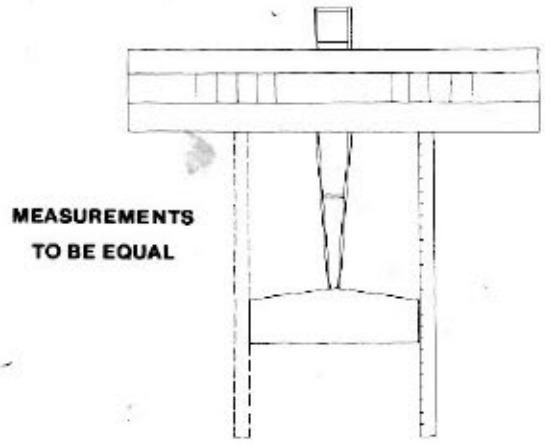
☐106. Sand the leading edge of the stabilizer to a round section, as shown on the plan.



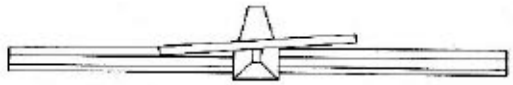
☐107. Glue the 1/4" x 1/2" x 2-1/2" balsa stabilizer tips in place with Slow CA. Then sand the corners of the tips to the shape shown on the plan.

☐108. Use a sanding block to sand the leading edges and tips of the stabilizer to a round section, as shown on the plan.

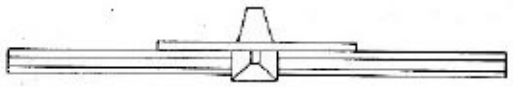
☐109. Mark the centerline on the stabilizer and pin it in position on the stabilizer plate.



☐110. Using the 36" straight edge, measure the distance from the stabilizer trailing edge to the trailing edge of the wing, as shown. When both distances are the same and the stabilizer is located on the centerline, push several t-pins vertically through the stabilizer into the stabilizer plate.



INCORRECT

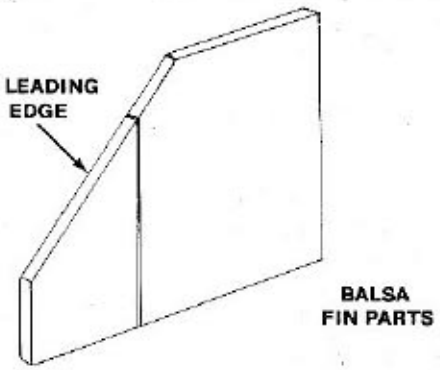


CORRECT

☐111. Sight across the stabilizer and the wing to align the stabilizer parallel with the wing, as shown. Make any necessary adjustments to the stabilizer plate with a sanding block.

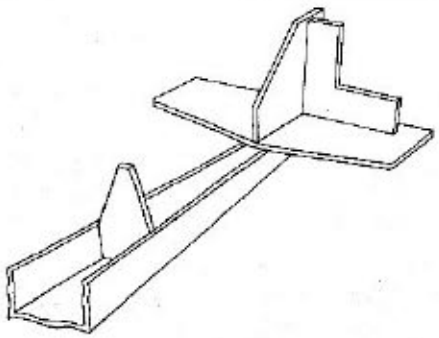
☐112. With the stabilizer pinned to the plate, check the incidence with an incidence meter. The reading should be the same as the wing and firewall.

☐113. When the stabilizer rests squarely on the stabilizer plate and the incidence is correct, remove the stabilizer. Push the t-pins through the pin holes in the stabilizer so they stick out of the bottom about 1/2". Apply Slow CA to the stabilizer plate, and using the t-pins to locate the pin holes in the plate, press the stabilizer into position. When the Slow CA has cured, remove the t-pins by twisting them to break them out of the CA and then pull them out.



☐114. Sand the mating edges of the two pre-cut 1/4" balsa fin parts to remove any gaps. Position them on the plan, protected by plastic wrap, and bond them with Slow CA.

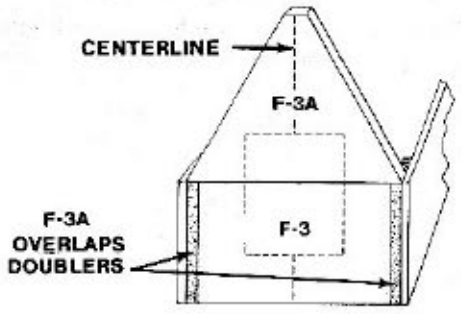
☐115. Sand the leading edge of the fin to a round section.



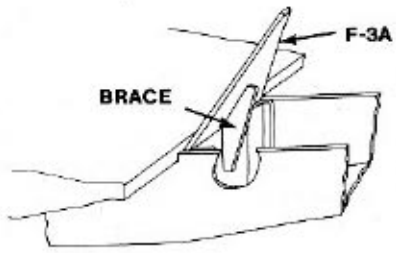
☐116. Apply Slow CA to the bottom of the fin. Position the fin over the centerline on the stabilizer and, using a small square as shown, press the fin into position. Be certain that the leading and trailing edges are centered over the centerline on the stabilizer.

Fuselage Upper Decks

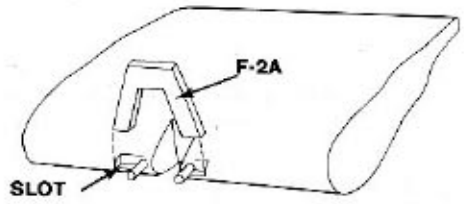
The cockpit is a fairly large structure which is bonded to the wing. Careful attention should be payed to fitting the upper bulkheads and locating the spruce stringers. Otherwise, you may find it difficult to install the wing with the cockpit attached. Study the plan and text before starting on this section to be certain you understand how these parts relate to one another.



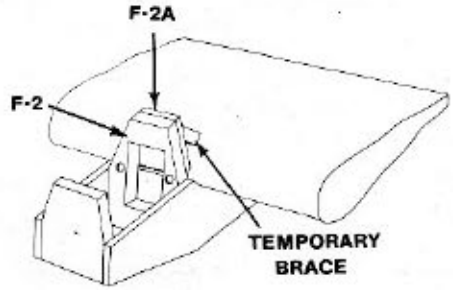
☐117. Measure and mark the centerline on F-3A. Center F-3A on F-3 so that the indented lines on F-3A face out, as shown.



☐118. Glue F-3A and the die-cut Micro-Lite plywood brace to F-3 with Slow CA. Tack-glue the brace in position. Although it will be removed later on in construction, do not omit it at this point.



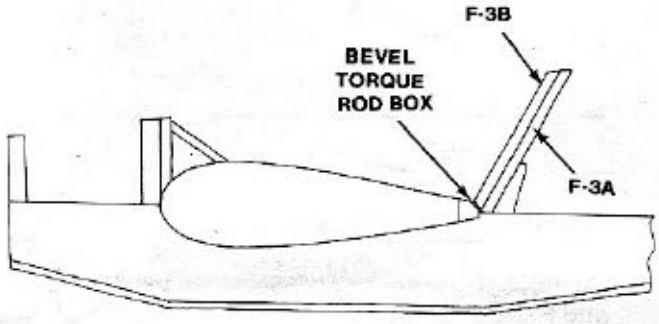
☐119. Cut a slot in the leading edges of the dowel filler pieces that will allow F-2A to rest on the dowels.



☐120. With the wing bolted to the fuselage, position F-2A in the slot so that it rests on top of the dowels. If necessary, adjust the slot or sand the edges of F-2A until it matches the edges of F-2.

☐121. Stack and insert four small pieces of notebook paper between F-2 and F-2A. Press F-2A against these paper spacers and bond F-2A in the slot with CA.

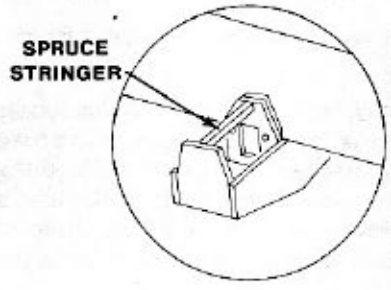
☐122. Make a temporary brace from scrap wood to support F-2A. Glue it to F-2A and the wing, as shown. This brace will be removed later, but, it is necessary at this time to hold F-2A in position.



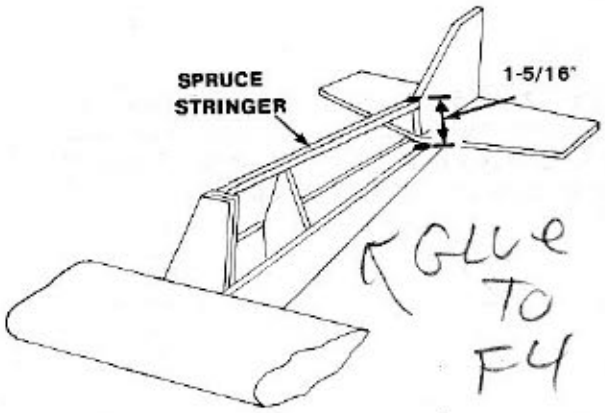
☐123. Sand a slight bevel in the top rear edge of the torque rod box to provide a base for F-3B. With the wing bolted to the fuselage, stack and insert four pieces of notebook paper between F-3A and F-3B. Center F-3B on the bevel of the torque rod box. Press F-3B against F-3A and bond it to the torque rod box with CA.

Note: Due to slight differences in construction techniques, there may be a gap between the torque rod box and F-3 which will not allow F-3B to rest on the edge of the torque rod box. If this is the case with your model, extend the trailing edge of the torque rod box by filling this gap with scrap balsa glued to the back of the torque rod box. When the gap is correct, bolt the wing to the fuselage. DO NOT remove it again until told to do so.

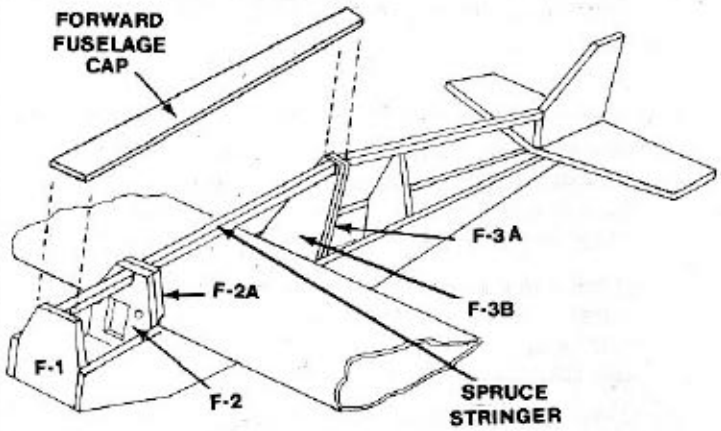
☐124. F-3B is an oversize part to allow for slight differences in wing position. Sand the edges of F-3B flush with the edges of F-3A.



☐125. Cut a 1/4" square spruce stringer to fit between F-1 and F-2, as shown on the plan. Bond it in position on the centerlines of the bulkheads with CA.



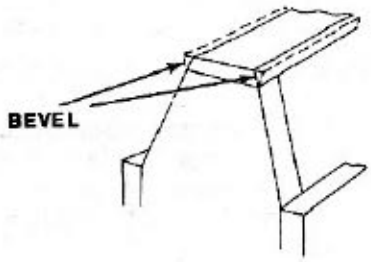
☐126. Cut a 1/4" square spruce stringer to fit between F-3A and the front of the fin, as shown on the plan. Position this 1/4" stringer so that its top edge rests against the front of the fin 1-5/16" up from the fuselage side, as shown. Sand, or build up, the top of F-4 so that the stringer is straight when resting on F-4. Glue it in position with CA on the centerlines of the bulkheads and flush with the fin.



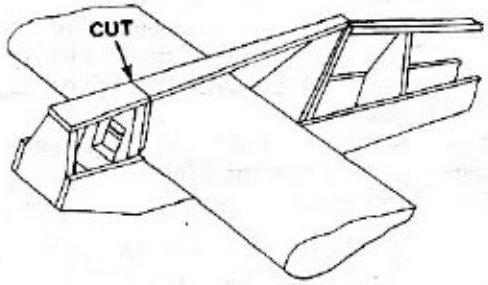
☐127. Cut a 1/4" square spruce stringer to fit between F-2A and F-3B. Be sure its top edges are even with the top edges of the other stringers, as shown on the Side View of the plan. Glue it in position with CA.

☐128. Sand the top edges of the bulkheads even with the tops of the spruce stringers, as shown on the Side View of the plan.

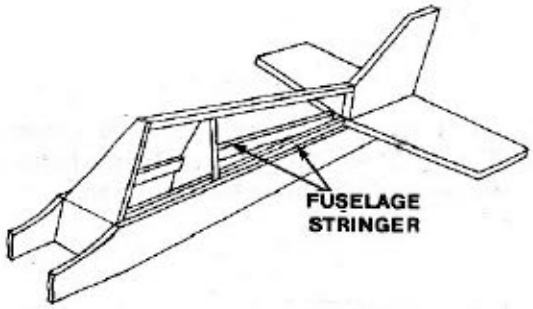
☐129. Glue the 3/32" die-cut balsa forward fuselage cap to the spruce stringers, F-1, F-2, F-2A and F-3B.



☐130. Bevel the edges of the forward fuselage cap flush with the angled sides of the bulkheads.

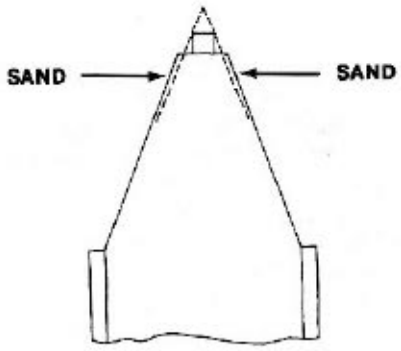


☐131. Cut through the forward fuselage cap between F-2 and F-2A, as shown on the Side View of the plan.



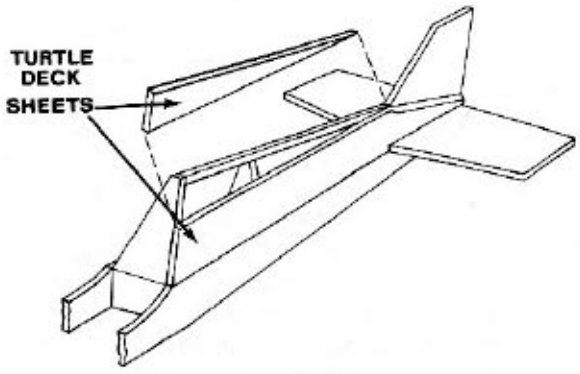
☐132. Remove the wing and paper spacers from the fuselage.

☐133. Cut and fit the two 3/32" x 1/4" balsa fuselage stringers to the top inside edges of the fuselage, as shown. Glue them in with Slow CA so that they are slightly above the top edge of the fuselage sides, as shown on the plan. These stringers will provide a stop to help position the turtle deck sheeting.



☐134. Sand the sides of F4 so that they match the top edge of the top stringer, as shown.

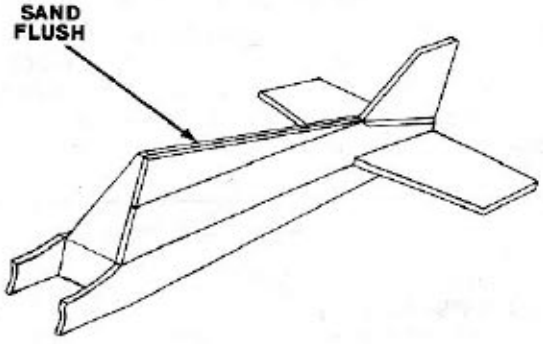
Note: Instructions #135 - #138 tell you how to install one side of the turtle deck sheeting. DO NOT install the turtle deck sheeting on the other side until told to do so.



☐135. Fit a die-cut 3/32" balsa turtle deck sheet to one side of the fuselage and tail assembly. Sand a bevel in the portion of the sheet that contacts the fin so that the sheet blends into the fin. Temporarily pin this sheet in place.

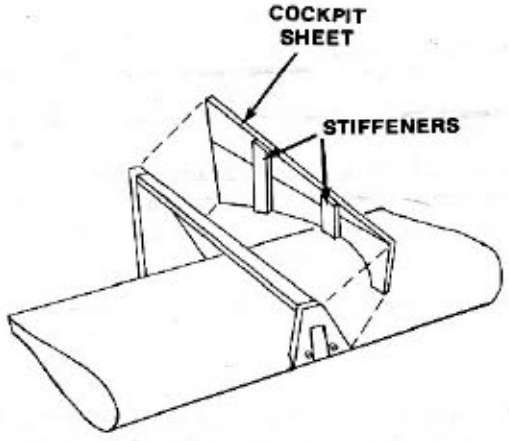
☐136. Cut a piece of 3/32" sheet balsa to fit the space above the die-cut turtle deck sheet.

Note: Both the UPPER turtle deck and cockpit sheets are to be cut from the 3/32" x 3" x 36" balsa sheet.



☐137. Remove the die-cut turtle deck sheet from the fuselage. Lay the two turtle deck sheets on a flat surface and edge-glue them together with CA.

☐138. Glue the assembled turtle deck sheets in position on the fuselage with Slow CA. Sand the edges flush with F-3A and the top stringer.



☐139. Fit a 3/32" die-cut balsa cockpit sheet to the wing and bulkheads. Sand as necessary to obtain a good fit with the wing.

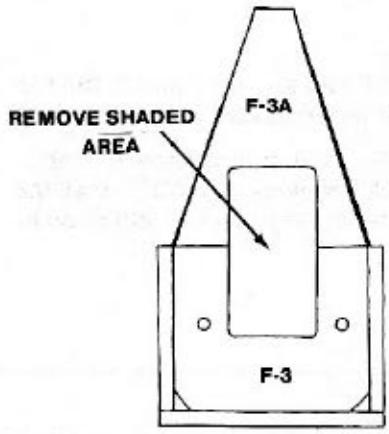
☐140. Cut a piece of 3/32" sheet balsa to fit the space above the die-cut cockpit sheet. Edge-glue these parts together in the same manner as the turtle deck sheets, using CA.

☐141. Cut the cockpit sheet stiffeners from a 1/16" x 1/4" balsa strip. Cut them short enough to clear the spruce stringer and the top cap. Glue them into position on the inside of the cockpit sheeting with Slow CA, as shown on the Side View of the plan.

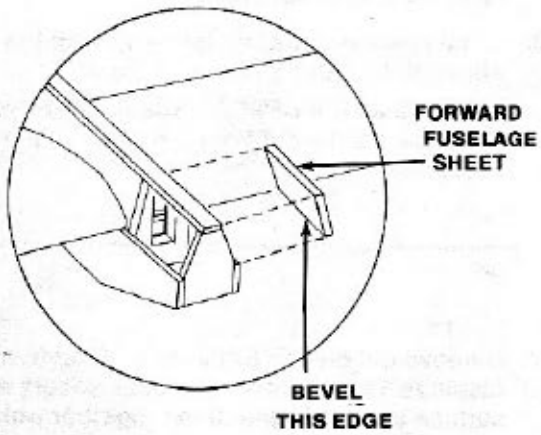
☐142. Glue the assembled cockpit sheeting in position with Slow CA.

Note: After one side is installed, remove the temporary brace on F-2A. Then, install the cockpit sheeting on the other side.

☐143. Trim the cockpit sheeting even with the bulkheads and the forward fuselage cap.

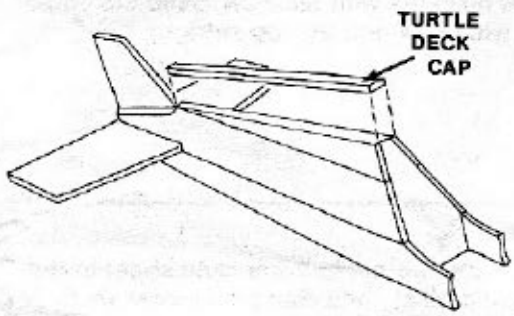


☐144. Install the aileron servo and pushrods. With the aileron torque rods set as shown on the Side View of the plan, position the wing in the wing saddle. Note that the torque rods will contact F-3A and prevent the wing from seating. Remove the die-cut brace from behind F-3 and F-3A. Cut a hole on the indented lines in F-3 and F-3A to clear the torque rods, as shown. When the hole is large enough to allow the torque rods to clear the bulkheads and pivot freely, install the remaining turtle deck sheeting.



☐145. Cut the two forward fuselage sheets from the 3/32" x 3" balsa sheet. Bevel the edge of each sheet that contacts the top of the fuselage side and glue them in position with Slow CA.

Note: After gluing one forward fuselage sheet in place, it would be a good idea to seal the wood in the fuel tank compartment with a coat of slow drying epoxy before closing it up with the other sheet. If you decide to do this, coat the motor mount bolts with light oil and screw these bolts into the blind nuts until they are even with the backs of the nuts. This will prevent epoxy from getting on the threads. Then, coat the entire fuel tank compartment and the inside of the last forward fuselage sheet with slow drying epoxy. Pin the sheet in position until the epoxy cures.

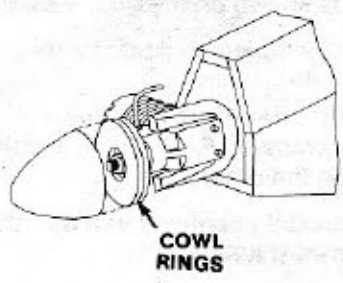


☐146. Cut a turtle deck cap from a 3/32" x 1/2" x 11-7/8" balsa strip and glue it to the top of the turtle deck with Slow CA.

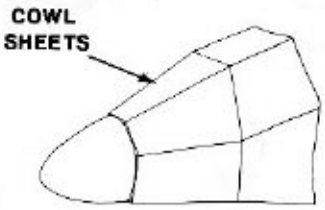
☐147. With the wing bolted to the fuselage, sand the upper deck sheeting and caps flush with the edges at the cockpit sheeting.

Cowling

Due to the large variety of engines and engine sizes that can be used in this model, it isn't possible to provide pre-cut cowl parts. Therefore, the following instructions are a general procedure using the 1/4" x 3" x 24" balsa sheet and the die-cut cowl rings. We have found this method to be quite simple and accurate.

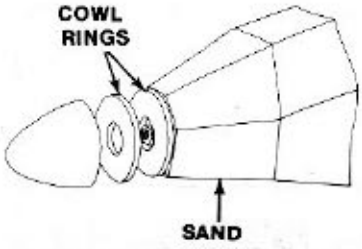


☐148. Install your engine and check that the thrust line is correct (0° - 0°), as shown on the plan. Tack-glue the two die-cut cowl rings to each other and to the backplate of your 2-1/4" spinner. Bolt the spinner to the prop shaft.



☐149. Assuming you have side-mounted your engine, start by cutting a bottom sheet of 1/4" balsa to fit between F-1 and the back of the cowl rings. Glue it in position with Slow CA.

☐150. Continue fitting and gluing the cowl sheets, working up the left side and across the top.

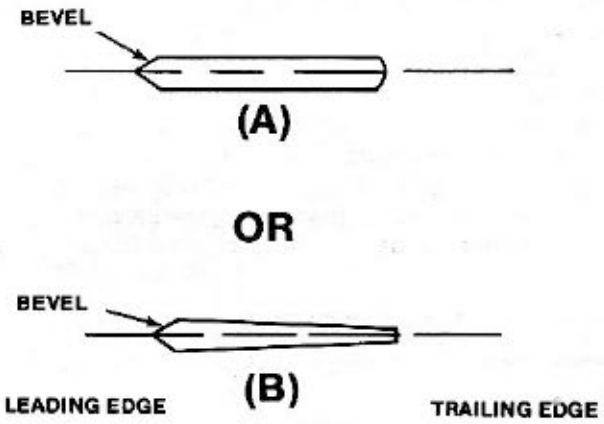


☐151. After installing all of the sheets, separate the two cowl rings by slipping a razor knife between them and cutting them apart.

☐152. Remove the engine.

☐153. Fill any corners on the inside of the cowl ring that the sheeting did not cover with the 1/2" x 3-7/8" triangle stock. Sand the cowl to its finished shape.

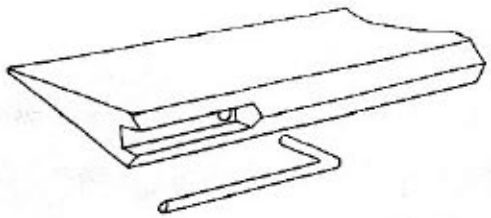
Control Surfaces



☐154. Bevel the leading edges of the pre-cut elevators and rudder with a plane and sanding block, as shown on the plan.

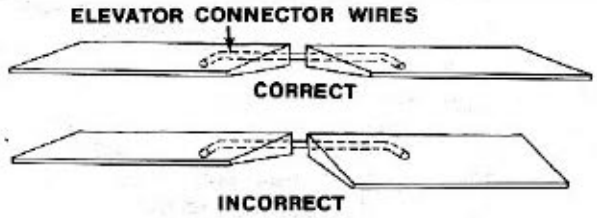
☐155. Round the trailing edges of the elevators and rudder with a sanding block, as shown in (A), and on the plan. This shape will give the controls a soft feel around neutral.

Note: If you prefer, the rudder and elevators can be tapered, as shown in (B). This shape will give the controls more sensitivity around neutral, however; trim settings will also be more sensitive and any play (slop) in the linkages will have to be eliminated.

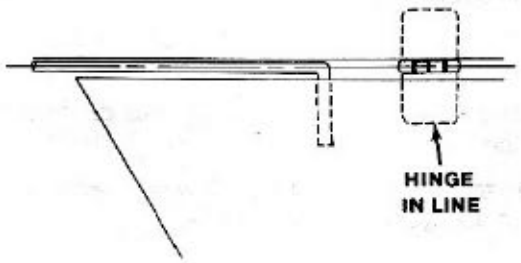


☐156. Cut a slot and drill a 3/32" hole in each aileron to accept the torque rods, as shown on the plan.

Note: When fitting the ailerons, be certain to leave a 1/16" gap between the ends of the ailerons,the fuselage side, and the wing tip plate.



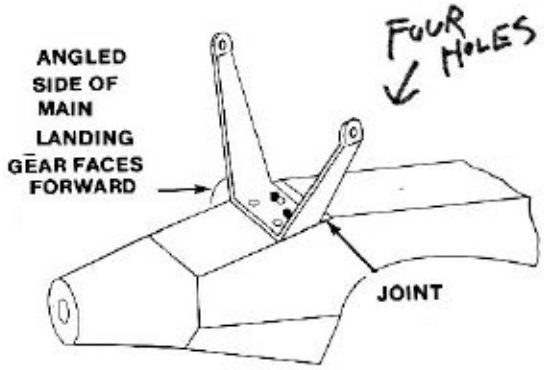
☐157. Cut a slot and drill a 3/32" hole in each elevator at the locations shown on the plan. Fit the elevator connector wire to the elevators. Make sure that the elevators are parallel to each other, as shown, with the connector wire in place. If necessary, bend the wire to get the correct alignment.



☐158. Fit your hinges to all of the control surfaces. Make sure that the hinges pivot in line with the torque rods and elevator connector wire. Otherwise, the control surfaces will bind and not move freely.

Final Assembly

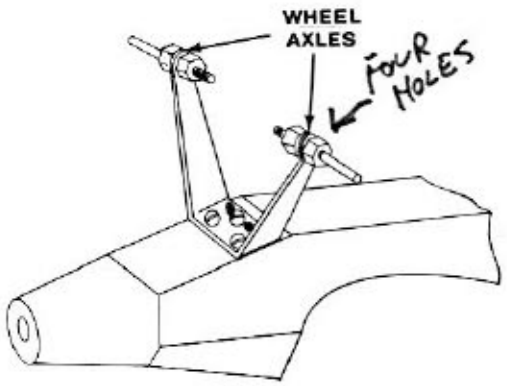
Main Landing Gear



☐159. Center the main landing gear on the plywood bottom sheet so that its back edge is 3/16" ahead of, and parallel to, the joint between the two bottom sheets, as shown. Note which way the gear faces.

☐160. Using the ~~three~~ FOUR pre-drilled holes in the main landing gear as a guide, drill 3/16" tap holes through the bottom sheet and landing gear block.

☐161. Drill out the holes in the main landing gear with a 1/4" drill bitt.

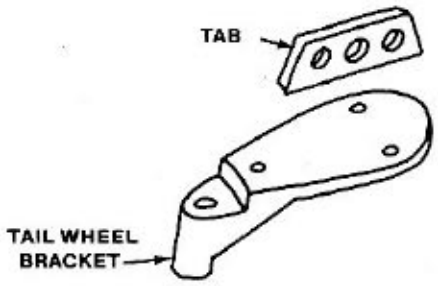


☐162. Cut threads in the landing gear block with a 1/4-20 tap.

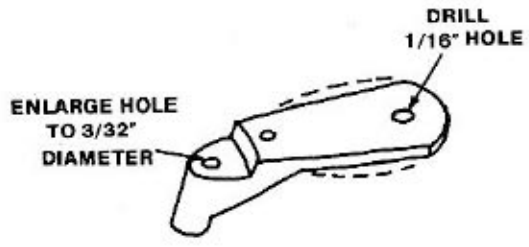
☐163. Install the main landing gear with ~~three~~ FOUR, 1/4-20 x3/4" nylon bolts. Install the wheel axles as shown.

Note: The nylon bolts give the landing gear a "knock-off" feature. In the event of a very rough landing, the main gear will shear the bolt heads and come off the model, preventing damage to the fuselage. To remove a broken bolt from the landing gear block, heat the point of a screwdriver and push it into the bolt. After it cools, the broken bolt can be screwed out of the landing gear block.

Tail Wheel



☐164. Cut the tab off of the tail wheel bracket, as shown.

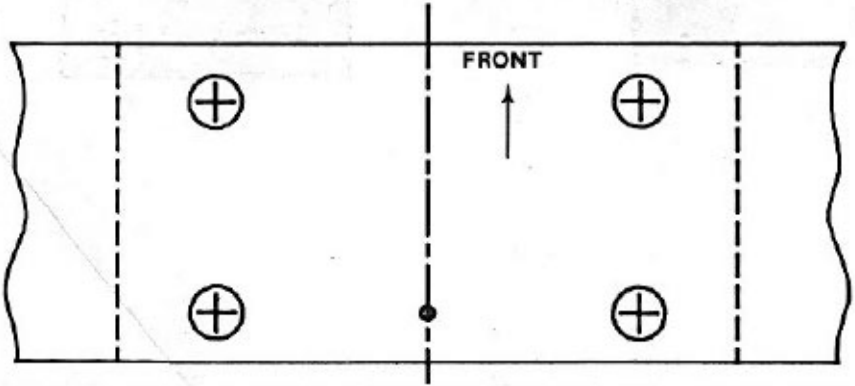


☐165. Position the tail wheel bracket on the plywood mounting plate in the fuselage as shown on the plan. Remove the portions of the bracket that extend beyond the fuselage sides.

☐166. Drill a 1/16" hole in the bracket for a #2 x 3/8" sheet metal screw.

☐167. Using the tail wheel bracket as a guide, drill two, 1/32" tap holes in the plywood plate.

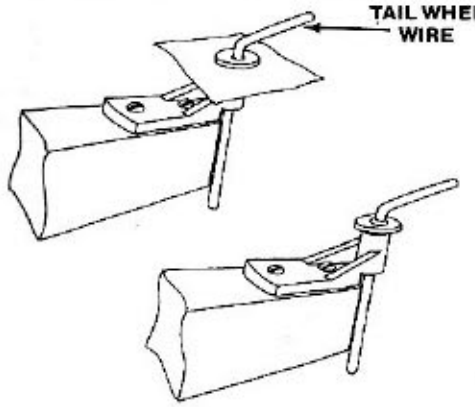
☐168. Enlarge the 1/16" hole in the tail wheel bracket to 3/32" to accept the tail wheel wire.



Before performing Instruction #159, complete this instruction.

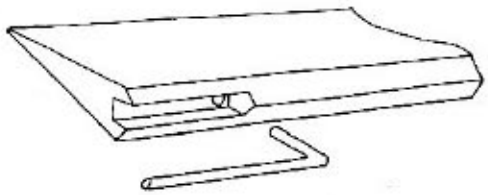
Note that this four bolt pattern is not shown on the plan. Place the template shown at the **left** over the main landing gear, so that two of the center marks are over the two holes along the front edge of the main landing gear. Mark the other two hole locations with punch marks.

Drill two new pilot holes with a 1/16" drill bit. Now drill out the four pilot holes with a 3/16" drill bit. Proceed with Instruction #159.



☐169. Bend the tail wheel wire, as shown. Slip a washer over the wire and push the wire through a piece of paper. Install this assembly on the tail wheel bracket, as shown. Solder the washer to the tail wheel wire. Remove the paper after the solder cools.

☐170. Make the remaining bends in the tail wheel wire, as shown on the Side View of the plan.

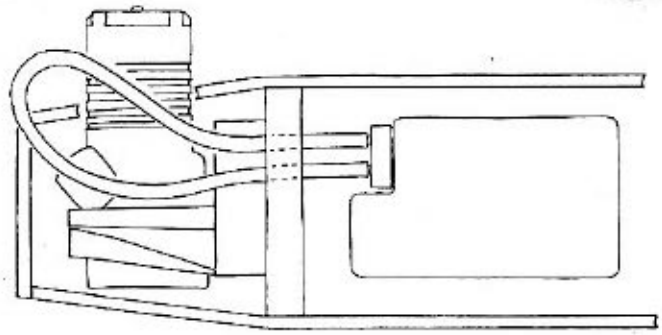


☐171. Slot and drill a 3/32" hole in the rudder to accept the tail wheel wire.

Finishing

The Hots II has a moderate wing loading to improve handling at low airspeeds. We recommend that you cover and finish your model with one of the iron-on coverings, such as Super Monocote. The wing and wing tip plates are best covered separately. After covering them, cut away the monocote on the face of the wing tips and on the portions of the tip plates that will contact the wing tips. Then, glue the tip plates in place with Slow CA, positioning them so that they extend equally above and below the wing tips, and are positioned as shown on the wing plan.

Equipment Installation

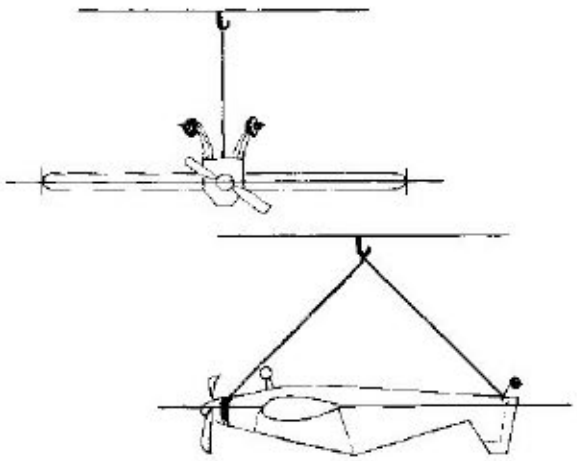


The plan shows the fuel lines running through 1/4" holes in the firewall. To install the tank, push a length of fuel line through the firewall from the front, as shown. Connect the ends to the tank and pull it into position. Then, slip sheets of foam rubber into the tank compartment to cushion the tank. Install the engine, cut the fuel line to length and connect the feed line to the carburetor.

The receiver and battery pack can be installed in the positions shown on the plan simply by sandwiching them between two layers of 3/4" foam rubber. The receiver antenna should be run through a small hole in the bottom of the fuselage and the end held by a spring, or rubber band, to the tail wheel leg. Locate the switch anywhere on the fuselage side, under the wing.

If you are using the wire pushrods that come with the kit, apply some light machine oil, such as 3-in-1 oil, to the pushrods before slipping them into the nylon tubes. The oil will prevent rust which could cause binding.

Weight and Balance



The center of gravity (C.G.) shown on the plan will provide the best all-around performance, and we recommend that you make the initial flights with the model balanced at this point. If necessary, add weight to the nose or tail to establish the C.G.

Any model's performance in looping maneuvers will be improved if the wings are also balanced. To do this, tie a piece of strong string around the prop shaft and the tail wheel leg. With all equipment installed and the model ready to fly; suspend the assembled model from the ceiling, as shown. Add weight to the light wing until the model hangs in a wings level attitude.

The best material for wing weight is lead shot mixed with epoxy. It can be poured through a small hole in the leading edge sheeting and the hole covered with a small piece of Monocote. Lead shot can be purchased at most gun shops.

Control Throws

The following control throws are recommended starting points and can be increased or decreased to suit your preference. They are measured at the widest point of each control surface with a ruler, as shown:

Ailerons - 3/16" up, 3/16" down
Note: for Dual Rate Radios, set high rate Aileron at 5/16" up, 5/16" down.

Elevators - 5/16" up, 5/16" down
Note: For Dual Rate Radios, set high rate Elevator at 1/2" up, 1/2" down.

Rudder - 1" left, 1" right

Flying

The Hots II is a high-performance model. It is capable of taking off in less than 10 feet. It can climb vertically out of sight and is capable of aerobatic maneuvers with the recommended C.G. and rudder throws. Even with this kind of performance, the model is very stable and predictable; and is easy to fly.

As mentioned under finishing, the Hots II has a moderate wing loading that improves handling at low airspeeds in gusty air. With reduced power, the model is capable of flying at high angles of attack that allow slow approaches and landings. The wing tip plates are very important to this performance and should not be omitted from the model.

We hope you have enjoyed building and flying your Hots II; and would appreciate your taking a few minutes to fill out and return the postage-paid Evaluation Card in the kit. We welcome any suggestions or comments you may have for improving our kits and instructional material.

Thank You,

Midwest Products Co., Inc.

Acknowledgements

The following people produced this construction manual:

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