

# BIG BINGO!

Designed by D.B. "Doc" Mathews

## Assembly Manual



## I. INTRODUCTION

The Ace Big Bingo is designed and engineered to provide you with a nice looking, easy flying model airplane that goes together in a minimum amount of time with a minimum amount of frustration. Please read and follow these instructions to ensure that these two goals are accomplished.

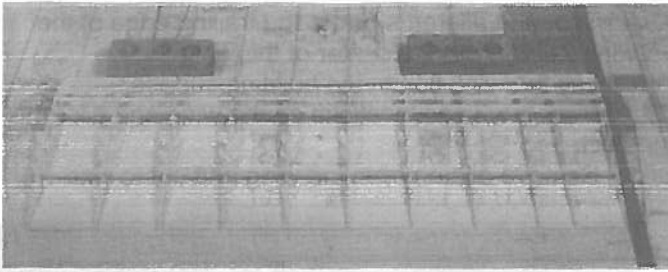
We recommend the use of modern cyanoacrylate (CyA) glues for the most part. There are many brands available (Jet, Pic, Pacer, Hot Stuff, etc.) and they all have three basic viscosities available: thin (for close fitting balsa joints), thick (for plywood, hardwood, and not-so-perfect balsa joints), and very thick (for joints where a fillet or "bead" is required). For the most part, we recommend the thick variety used in conjunction with an accelerator or "setter" which cures the glue upon command. Epoxy is recommended for the firewall components. Of course, any modeler has his favorite techniques of gluing.

Furnished in the kit is a length of 4" wide. Thin, woven material that we call polymat cloth. You

will use it several places as reinforcement. Adhere it with spray 77 cement followed by thin CyA, Epoxy, or thinned white glue.

There are a few things to keep in mind when building this kit with its lite ply construction. It's a wonderful material that has a tremendous strength-to-weight ratio and is easy to work with. It should punch out of the die cut sheets easily; if not, sand the back of the sheet a bit ... some cutting with an X-Acto knife may be needed. (Don't break it out because this will cause splitting.) Some warping of the material is normal and the key lock construction technique eliminates this being a problem. Also, one side of the lite ply is generally better than the other, which may have some dark streaks, knots, and fill. Simply keep the good side to the outside of the structure, especially on the fuselage sides.

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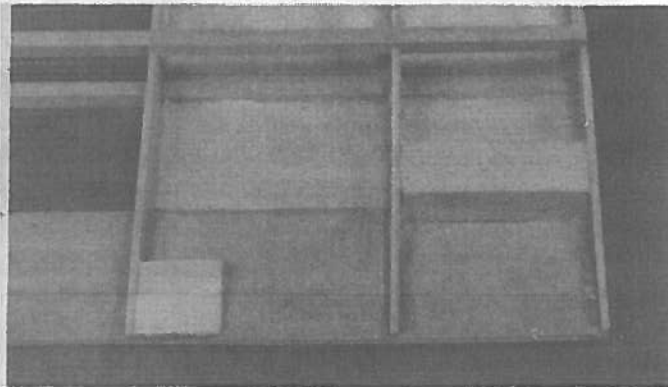
[ ] Prepare the PVC pipe leading edge by cleaning up the outer surface with some 120 grit sandpaper. Some bow is normal and won't hurt.

[ ] Keeping the wing on the flat surface, and still leaving the trailing edge unglued, install the PVC pipe leading edge. Begin by gluing the pipe I use thick CyA to the center rib. Hold the pipe in position with a couple bricks slid up against the front of the leading edge. Using a straight edge to keep the center rib straight, glue the pipe to the next few ribs.

[ ] Now move out to the tip rib and, keeping it straight, glue to the pipe. Now glue the rest of the ribs.

[ ] Press down on the rear of the ribs to rock the wing up (so the ribs contact the trailing edge), straighten the ribs out and glue in place.

[ ] Locate the 11/32" x 1" x 10" tapered balsa. Cut to one inch lengths for trailing edge hinge blocks.



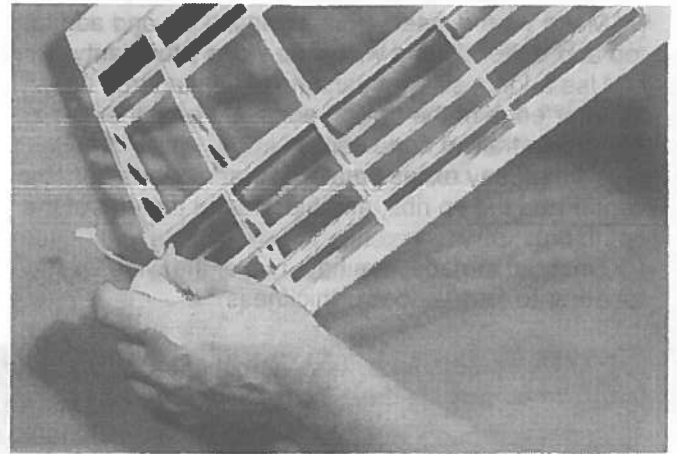
[ ] Glue hinge blocks in place as shown on the plans and photo. Make sure that they are flush With the top edge of the ribs.

[ ] Add the hardwood wing rear spacer block, epoxy it between Rib "W-1" and Rib "W-2". Some fitting may be required to make sure it doesn't extend beyond the top edge of the ribs and to accommodate the slant of Rib "W-1 ". Refer to the side view of "W-1" on the plans for proper orientation and location of the part.

[ ] Glue the top trailing edge in place.

[ ] After the glue has set, remove the wing from the work surface.

[ ] Add the two 1/4"sq. hardwood bottom front spars:



[ ] Cut the phenolic wing outer joiner tube to match the length of the inner aluminum tube, 2 pieces 10" long. The phenolic tube is easily cut with a razor saw or fine tooth hack saw. Be careful not to collapse or "burr" the tube. Small "burrs" may be removed by using fine sandpaper.

[ ] Insert the phenolic outer wing joiner tube into the holes between the main spars.

[ ] Keeping the center edge flush With Rib "W-1", securely glue the tube in place With thick CyA. Be very careful not to get any glue on the inside of the tube. Use one of the lightening hole punch-outs, to glue a cap over the outer end, to keep the aluminum tube from going past it.

[ ] It is now time to sheet the center top of the wing with the die cut light ply furnished. Notice there are four die cut pieces that contain the center sheeting. The two that are the top sheeting contain six parts and the two that contain the bottom sheeting have five pieces. Note that they are in the same order as they are installed on the wing. It may be a good idea to lightly label them with a pencil (T-1, T-2, T-3, etc. and B-1, B-2, B-3 etc.) so you don't get them mixed up after they are punched out.

[ ] Glue the 6 top sheeting pieces on the center of the wing between the spars, leaving a little overhang in the center to be sanded off later. Some fitting may be required. Let the front piece hang over the leading edge to be trimmed later.

[ ] Turn the wing over and add the hardwood wing front spacer block. It fits between Rib "W-1" and "W-2", The perpendicular edge glues to the top sheeting between the second and third spar and the angled edge should be flush with the bottom edges of the ribs. See the "W-1" side view for clarification. Fit if necessary.

[ ] Add the bottom center sheeting.

[ ] Using a scrap 1/16" x 2" x 2" plywood or plastic, tape this to the workbench to serve as a drill jig. This will give you the proper height to drill for the Robart Hinge Points. Using a triangle, drill 1/8" holes 90 degrees to the trailing edge, keeping the drill bit flat on the spacer. Drill about 1" deep. Either move the jig or slide the wing to the hinge locations.

[ ] Turn the aileron upside down. Using the same procedure, drill the 1/8" hinge holes; **do not drill into the aileron stock over 3/4", as the aileron stock becomes too thin past this point.**

[ ] Cut the Robart hinge points to 5/8" length on the aileron side.

[ ] Mount the aileron with hinges tight against the trailing edge and tape at neutral. **Do not glue hinges in at this time. They will need to be removed for covering.**

[ ] Glue the wing tip portion of the aileron stock in place ensuring it matches the aileron.

[ ] Turn the wing upside down and sand the aileron and trailing edge to match.

[ ] **Repeat this construction procedure for the other wing panel.**

[ ] Two servos are required for aileron operation. It is recommended they have at least 40 oz. torque. They will be mounted on an access plate and connected to a control horn on each aileron by means of a straight pushrod. The aileron servo needs to have leads that are at least 24" long and it is recommended that because of this length, an Ace Noise Trap (#26K17) or similar device be used at the receiver end, wired in a "Y" configuration.

[ ] Locate the two 1/8" lite ply aileron servo mounting plates. **Note: it is a good idea to put an "R" or an "L" on the access plate to identify which panel it's for.**

[ ] Using epoxy or CyA, cover the inside of the aileron servo mounting plates with polymat cloth.

[ ] Using the stock furnished, construct the access plate rails by cutting three 1/4" sq. hardwood the same length as is the distance between the ribs in the appropriate bay.. (To prevent gluing the access plate in, cover it with plastic wrap on all sides.)

[ ] Put the plate into position and, keeping the wing and plate flat on the work surface, glue one of the 1/4" sq. hardwood pieces to the ribs up against the front of the plate, flush with the bottom of the wing.

[ ] Add another piece of 1/4" sq. to the rear of the one you just installed. Have it flat against the access plate to give it a ledge to rest on.

[ ] Give it a rear ledge by gluing the last 1/4" sq. hardwood to the front of the rear spar, flat against the access plate.

[ ] Remove the access plate and go over the glue joints you just made.

[ ] Turn wing upside down, remove plate and protective cover.

[ ] Put the plate back into place and mark and drill 1/16" holes for the attachment screws, 1/8" from each side at each corner of the plate.

[ ] Remove the plate and drill out the holes in the plate to 3/32".

[ ] Cut two 1/4" x 3/8" x 1-1/4" servo rails from the hardwood stock furnished.

Note that in the access plate, there are two cutouts to accommodate these rails ... one is sized to fit the rail and the other is longer to make it adjustable. According to the size of your servo, securely glue the rails in place so they are spaced properly (perpendicular to the plate and flush with the outside of the plate).

[ ] Using material from the punch out, fill in any voids in the adjustable slot.

[ ] Repeat for the other panel.

#### **PAY ATTENTION TO THE NEXT FEW STEPS ... THEY ARE IMPORTANT!**

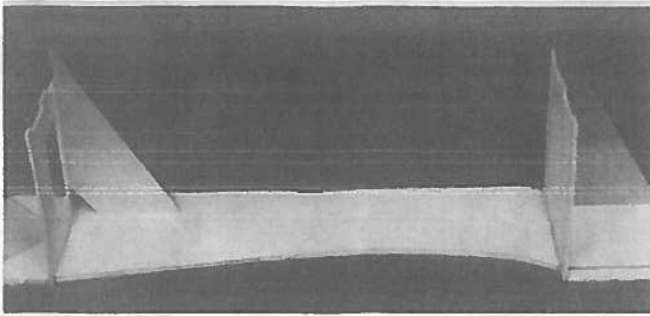
[ ] Carefully plan your aileron servo installation at this point in time so you get proper control movement. Assuming both servos rotate the same direction, they need to face each other or they need to face away from each other. They will have to be one way or the other so that right aileron corresponds to right stick movement. If you have servo reversal in the transmitter, it doesn't make any difference. As you visualize the installation, realize that it is best for the pushrod to hook to the servo arm through the plate or out the bottom of the wing.

[ ] After you have determined how the servos are to be oriented, mount them on the rails with #2 x 1/2" self-tap screws and install the plates into the wings.

[ ] Route the servo cable out the appropriate lightening holes, cutting a hole in the top sheeting near the center rib for the connector to exit through. If you wish, a paper tube can be rolled and put through the lightening holes to provide a tunnel for the servo cable to travel through; or, just use a piece of music wire to fish for the servo cable when reinstalling the servo after the wing is covered.

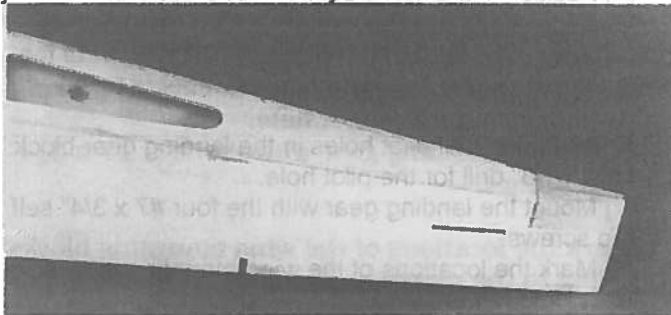
[ ] With the aileron installed (not glued), locate the control horn on the aileron so the pushrod will be perpendicular to the wing. Drill for and mount the aileron control horn with the 2-56 screws provided.

[ ] 4-40 threaded metal pushrods are furnished for the ailerons. Use the solder link for the servo end and the adjustable clevis for the control horn end.



[ ] Assemble the sides, deck, F1, F2, and F3, holding together with tape. Check to make sure that the formers (F 1, F2, and F3) are 90° to the sides. (NOTE: DO NOT GLUE F1 IN AT THIS TIME.)

[ ] When satisfied with the fit, glue F2, F3, fuse sides, and deck together by tacking with thin CyA in all the corners, then running a bead of thin CyA over all the joints to penetrate the joint, then reinforcing all the joints with a bead of thick CyA on the inside.



[ ] Tape the lite ply fuselage bottom in place and after checking alignment. use the gluing method above to secure in place.

[ ] Epoxy the slotted triangular hardwood tail wheel block in place so the slot is on the bottom and centered on the fuse. Hold fuse sides flush with the sides of the tail wheel block.

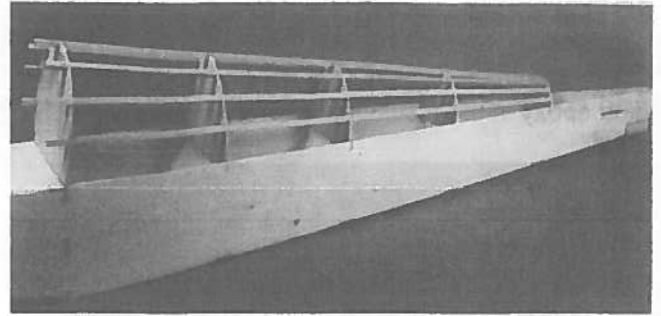
[ ] Epoxy the two lite ply stab mounting plates together. Sand edges and trial fit in the top of the fuselage using FT7 for alignment.

[ ] Remove stab plate and epoxy in place flush with the top of the fuse Sides.

[ ] Cut a 5/16" x 1-3/4" balsa strip from the 3/16" balsa sheet provided. Sand to fit between the fuse sides. Glue in place.

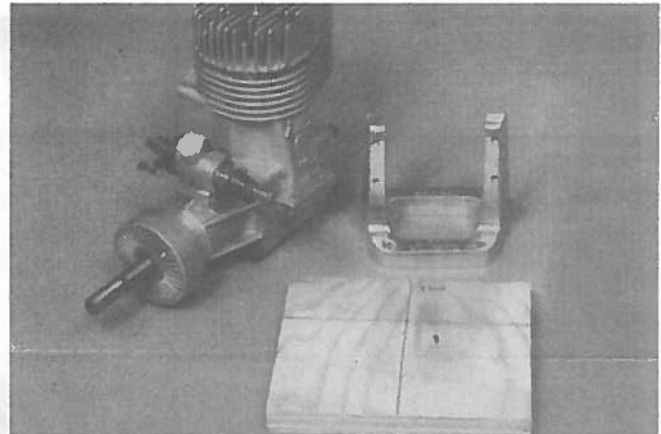
[ ] FT3 former is angled back. Using the FT3 guide, glue FT3 in place.

[ ] Glue FT4, FT5, FT6, and FT7 in place making sure that they are square to the top of the fuselage sides.



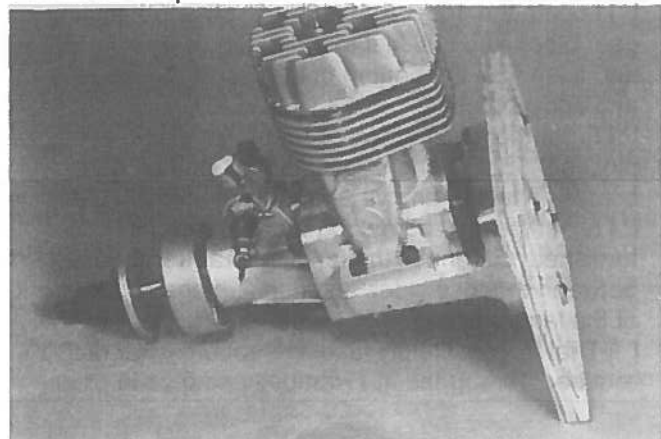
[ ] Seven 1/4" square hardwood stringers are provided for the rear deck. (They are longer than required and will need to be trimmed after gluing. Start with the rear of FT7 and let the excess extend past FT3, trimming these later.)

[ ] Make the rear fuselage filler scallops (just rear of the canopy area) from the 3/16" balsa sheet provided. Sand to shape and glue in place



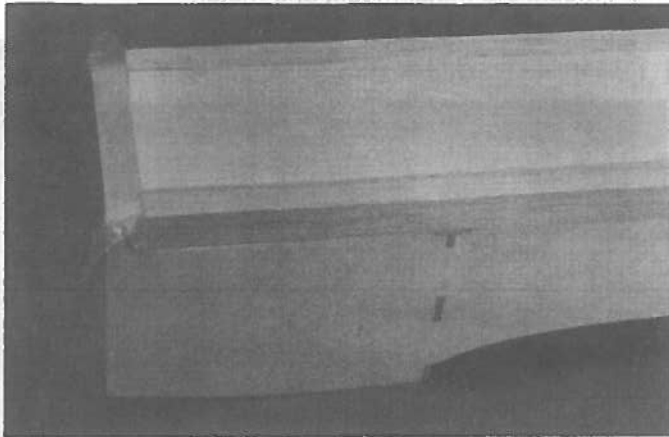
[ ] F1, the 1/2" plywood firewall has been pre-cut with an angle at the bottom to conform with the fuselage. Mark the top and front with a pen.

[ ] Mark the center and thrust line on the firewall as shown on the plans.



[ ] At this point, you must decide what engine and type of motor mount that will be used. We show a ST3000 and a Tatone motor mount.

[ ] Referring to Section A-A, laminate the lite ply side liners to the balsa filler blocks, making sure you make a right and a left side. There should be 1/8" clearance on the top edge to accept the lite ply deck cover.



[ ] Measure 6-3/8" from the front surface of the FT1 assembly and make a mark on the fuselage top. This marks the location of the front edge of the balsa hatch block which will be installed later.

[ ] Tape a piece of waxed paper to the rear vertical surface of the FT1 assembly.

[ ] Using the lite ply deck end plates and the balsa hatch block for spacers, tack glue the deck side assemblies to the fuselage top.

[ ] Glue both lite ply deck end plates in place, flush with the top of the deck side liners.

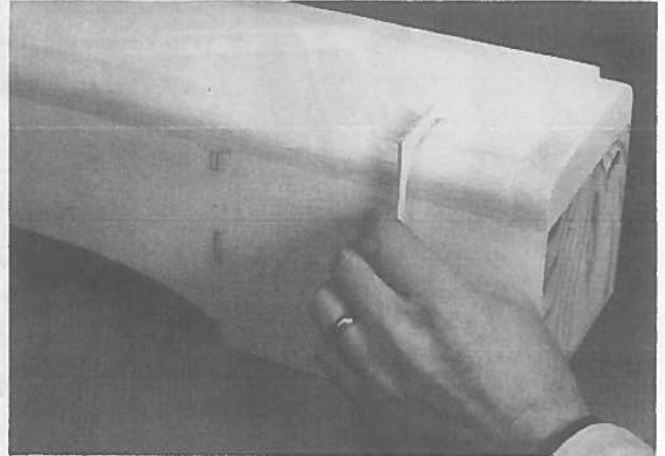
[ ] From 1/8" lite ply scrap, make an instrument panel backing plate and glue it in place.

[ ] Gluing to the deck sides only, secure the balsa hatch block in place with the front edge lined up with the mark you have on the fuselage top.

[ ] Glue lite ply deck cover in place.

[ ] Sand the top deck sides flush with fuselage sides and the deck cover.

[ ] Before rounding the deck sides to shape, a strip of masking tape along the fuselage sides under the hatch line and a strip down the middle of the deck cover will help keep the sandpaper from digging into the sides and deck cover.



[ ] Shape and sand the top deck using the template provided.

[ ] To cut the front top deck apart for the hatch, first mark as follows. Measure 7-1/2" back from the front edge of the FT1 assembly and mark the top. Draw a perpendicular line across the deck cover. Measure 6-1/2" back from the front of FT1 and mark both fuselage sides where the deck joins.

[ ] Diagonally connect these lines and cut along this line with a razor saw. Pop loose your tacked glue joints and remove the front hatch portion. This gives access to the gas tank and battery area.

[ ] Also remove the rear portion of the deck assembly and reinforce all interior joints with a bead of CyA.

[ ] Tape the hatch back into place. Using waxed paper to separate the hatch and the rear portion of the deck, glue the rear portion in place.

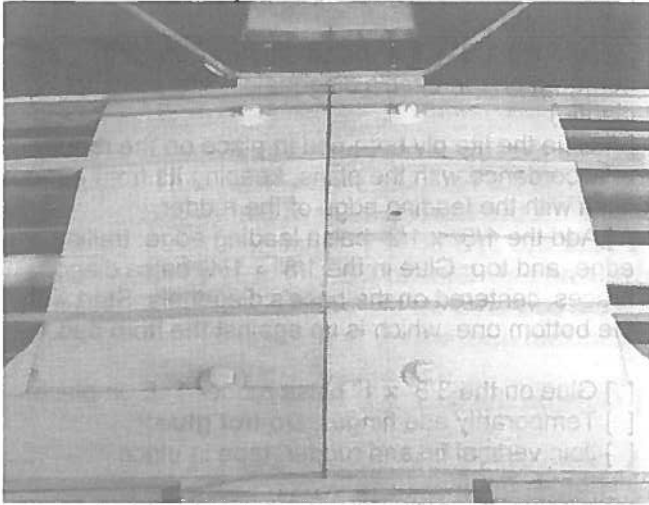
[ ] Using the tick marks for alignment, drill two 1/4" holes through the FT1 assembly into the deck end plates. Refer to the side view on the plans.

[ ] Cut two 1/4" dowels to 1" length, round one end of the dowel as shown on the plans. Slide the dowels through FT1's and into the front deck.

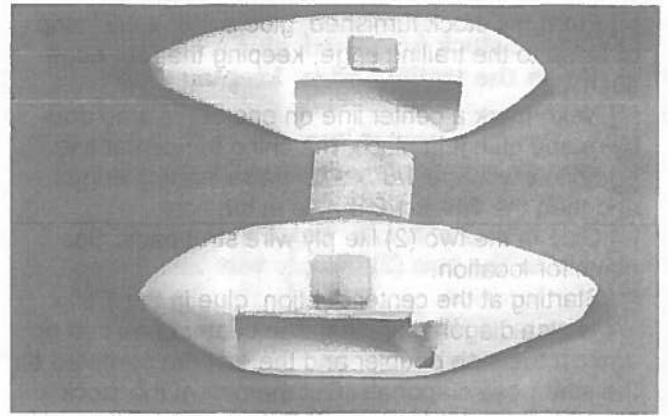
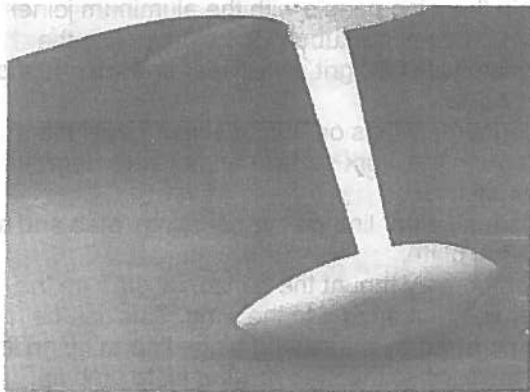
[ ] Being careful, wick thin CyA around the dowel on the front side of FT1. The other side will be glued later.

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- for fillets between the fuse sides, cowl sides, and spinner ring, if desired.)
- [ ] Cut and glue 1/2" balsa triangular filler stock in place.
- [ ] Remove engine and shape cowl. Gussets may be added as shown in photo.

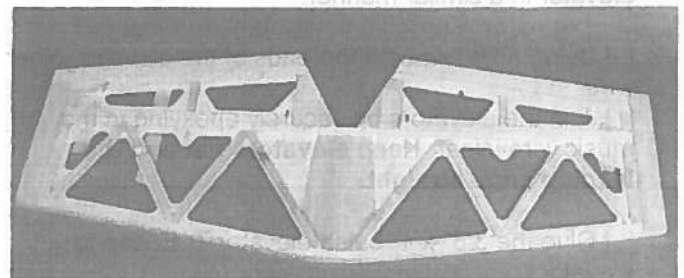


- [ ] Mark a center line on the bottom of F2 at the front of the wing saddle and also on the bottom of F3 at the rear of the wing saddle.
- [ ] Put the wing in place, securing it with tape. The front holes are located 2-1/8" from the center of the wing and 2-3/4" rear of the leading edge. The rear holes are 2-1/8" from the center of the wing and 2-1/2" forward of the trailing edge. (See plans.)
- [ ] Carefully drill 3/16" holes through the wing and the hold down blocks, keeping the drill bit perpendicular to the top surface of the wing. Plus, keep the wing in position as you drill each hole. A 3/16" drill bit or dowel in each hole after drilling will help maintain the wing in position.
- [ ] Remove the wing and tap the holes in the hold down blocks to 1/4 x 20. Impregnate the holes with thin CyA and re-tap. Drill out the holes in the wing 1/4". Nylon bolts and large washers are furnished for the wing. The long ones may have to be shortened a bit so they don't bottom out. We suggest doing so by putting them in a pencil sharpener and tapering the end . . . this also aids installation.



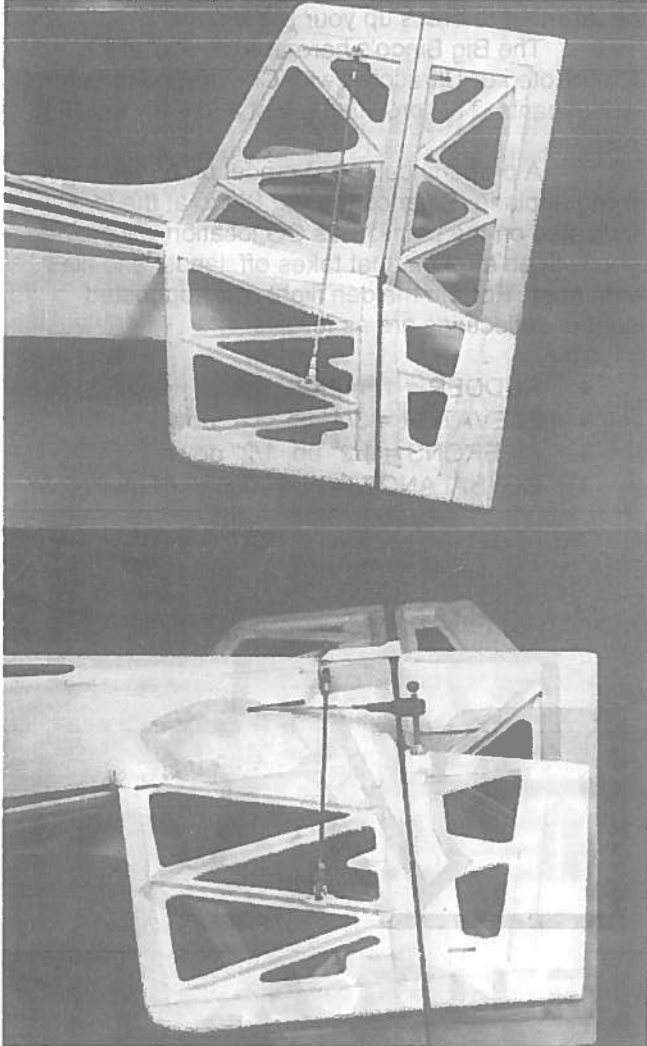
- [ ] Assemble wheel pants as shown on the plans.
- [ ] Large airplanes require a rigid wheel pant mount. Two 1/8" x 1" x 1-1/4" aircraft ply spacers are used to reinforce the axle mounting area.
- [ ] Sand the recessed area in the wheel pant. CyA the ply spacer in place.
- [ ] Mask off a 2-1/2" section as shown in the photo.
- [ ] Cut a 2" square piece of polymat cloth and epoxy it over the plywood area/wheel pant. This reinforces the area and provides for a stronger wheel pant.
- [ ] Drill holes for the axles and mount wheels as shown on the plans.

#### IV. TAIL GROUP ASSEMBLY

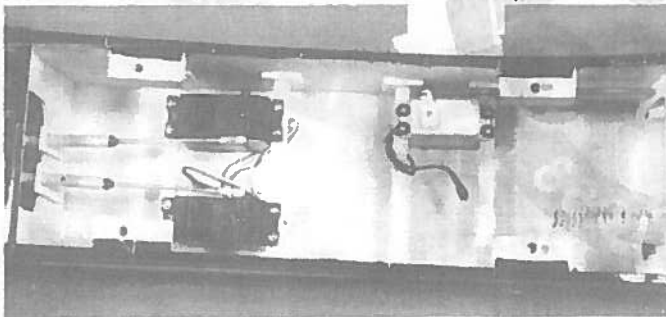


- [ ] Punch out the horizontal stab, elevators, vertical fin, and rudder.
- [ ] Lightly sand the horizontal stab and vertical fin.
- [ ] Cut four (4) pieces of polymat cloth 29" long for the stab and four (4) pieces 9" long for the fin.
- [ ] Using either epoxy or CyA, cover the stab with the polymat cloth, overlapping 1/2" at the seams. Do not wrap polymat cloth around leading edge or trailing edge. Trim away the polymat cloth in cutouts.
- [ ] Cover the other side using the same procedure.
- [ ] Divide the trailing edge of the stab base in half (13") and mark with a pencil. Draw a line at this mark perpendicular to the trailing edge. Repeat for other side.
- [ ] For the following steps, work on a flat surface and keep the stab flat until the glue is completely set.

- [ ] Using a triangle, temporarily tack glue the vertical fin in place. Ensure that the trailing edge of the fin and stab match.
- [ ] Laminate the three lite ply dorsal fin pieces. Sand and glue in place

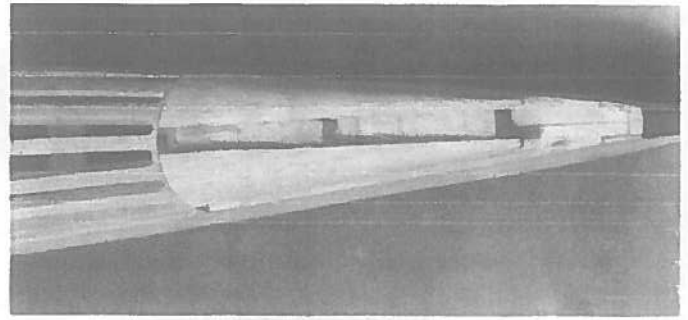


- [ ] Make up the tail wires as shown on the plans. We recommend using silver solder when soldering.
- [ ] Temporarily mount the rudder and elevators with the hinges and taped in neutral. Have the tail wheel assembly in place when mounting the rudder.
- [ ] Make up the pushrods as shown on the plans.



- [ ] Install the servos and pushrods. We recommend using 1/4-scale servos on the elevators and rudder. Use pushrod guides at F3. Pushrod guides at FT4

- are made from scrap lite ply.
- [ ] Disassemble the airplane and finish sanding.



- [ ] Form the 1" x 1" x 5-3/4" fin fairing blocks as follows. Use some 3/8" thick material for spacers to simulate the vertical fin and horizontal stab, and tack glue the fin fairing blocks into place. Now carve and sand them into shape as shown in the photo. Disassemble.

- [ ] Now make the 1/2" balsa triangular stock bracing for underneath the horizontal stab. It is easiest to cover these braces and the fairing blocks before final assembly. Make sure you don't cover where the glue joints will be.

- [ ] Trim the canopy as the scribe lines indicate. If desired, you may tint the canopy with a hot solution of Rit dye. Wash the canopy first with soapy water. After the plane is finished, attach the canopy with a compatible cement or better yet, use 3/8" wide DJ's striping tape to secure it; that way, it is replaceable if some mishap should occur.

