

## Min-E Mambo; An Update, Tribute and Restoration

Construction Notes and Modifications

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### Construction:

#### Cutting out the wood parts:

For ease of fabrication, duplicate parts are cut at the same time by temporarily 'laminating' balsa sheets together. To **temporarily laminate** two pieces together, **spray adhesive is used ONLY ON ONE SURFACE TO BE JOINED!** Use a drop cloth/old sheet on the floor where the spray adhesive is to be used. Do not ever walk on the drop cloth.

Print and tape together the fuselage top view, fuselage side view, wing plan, horizontal stabilizer plan, parts sheet 1 and parts sheet 2,

The two pieces of 3/32" x 4" x 36" balsa sheet are to be used for the fuselage sides. Spray one side of one 3/32" x 4" x 36" sheet of balsa and carefully temporarily 'lamine' it to the other selected piece of 3/32" x 4" x 36" piece of balsa. Cut out the template containing the fuselage side (Parts 1). Spray its back side with adhesive and carefully align on the temporarily 'laminated' 3/32" pieces.

Cut the 1/16" x 4" x 36" piece of balsa sheet in half. Temporarily 'lamine' the two pieces following the above procedure. Cut the template containing the front doubler and wing ribs W2 (parts 1). Cut that template in half and set aside the piece with the 1/16" plywood landing gear template. Spray the back of the doubler template and carefully align it to the top of the temporarily 'laminated' 1/16" piece.

Cut out and use spray adhesive to affix the template containing the vertical fin and rudder. With spray adhesive, affix it to the 3/32" x 3" x 36" balsa sheet.

**DO NOT affix any other templates at this time.** Special cutting instructions follow.

Using a pin vice with a 1/16" bit, drill the pilot/centering holes for the landing gear dowels, rear wing hold down dowel and horizontal stabilizer leading and trailing edges. Be sure to do the ones on the temporarily 'laminated' 3/32" sheet and the 1/16" x 3" x 36" sheet. Drill out the holes with a 3/16" drill bit. Don't forget to use the 1/16" drill in the pin vice to drill the pilot/center hole in F8, the rearmost former and then drill it out with a 3/32" bit.

Using a metal straight edge and a single edge razor blade, cut all of the straight lines on the laminated sheets (don't forget the straight lines on the fuselage and in the horizontal stabilizer). Also, cut the straight edges of the parts on the sheet with the front fuselage doubler on it. Some of the parts will be 'freed' from the temporarily 'laminated' sheets at

this time. Do NOT remove the template or separate the temporarily 'laminated' pieces at this time.

Use a scroll saw to cut the remaining parts from the sheets. When using the scroll saw, cut just outside of the line on the template and sand back to the line on the template. Again, do NOT remove the templates or separate the temporarily 'laminated' pieces. Save the 1/16" scrap for possible use later.

A #11 blade is used in the X-Acto knife and a single edge razor blade to cut the wing spar slots in all of the ribs. Cut the slots from both sides of the wood. Poke a straight pin through the corners of the slots on the templates as a guide for cutting the rear of the slots. The W1 ribs are quite fragile near the slot and may need to be glued.

Pull a piece of wax paper to assemble the vertical fin on. With the wax paper laying on a flat building surface, use Titebond to butt join R and R1. Set aside on a flat surface to dry.

Permanently laminate the two R3s together with Titebond. Set aside with the vertical fin.

### **Cutting the 3/32" plywood parts**

Do NOT affix the paper template to the plywood at this time.

A table saw is used to cut the parts, except for the plywood joiners. A 12" ruler is handier to use than the 36" metal yard stick for measuring the plywood pieces.

1. Cut across the 6" width of the plywood 4.5" from an end.
2. Cut a 1/4" x 4.5" strip to be used to make the screw backplates for the firewall.
3. Cut a 3/16" x 4.5" strip to be used to make the screw backplates for the servo mount.
4. Cut a 1-31/32" x 4.5" strip to be used to make part F, the servo mount and F1, the firewall
5. Cut a 2-15/32" x 4.5" strip to be used to make F3, the front cabin former
6. Cut the 1-31/32" x 4.5 strip 1-27/32" from the end to create former F the servo mount, then cut the remaining piece for F1, the firewall 2-3/8" from the end of the remainder of the 1-31/32" x 4.5" strip. Cut F1 to a width of 1-13/16" inches

Cut the 1/4" x 4.5" strip into two lengths of 1-5/8" each using a scroll saw.

Cut the 3/16" by 4.5" strip into two lengths of 5/8" each using a scroll saw.

Cut and affix the templates for F, F1 and F3 to their respective pieces. Align the bottom of the F3 template with the bottom of the 2-15/32" x 4.5" piece. It makes cutting the angles at the top with a scroll saw much easier. Cut the angles at the top of F3 with a scroll saw.

Use a pin vice with a 1/16" drill bit to create pilot/centering holes all the way through the plywood in the center of all of the circles on F, F1 and F3, except the motor screw holes, which are to be determined by the motor selection.

Drill the four 1/4" holes in F and F3. Drill the 7/16" and 5/8" holes in F1, the firewall. Drill the 3/32" hole in the servo mount for the torque rod.

Remove the saw blade at the top on the scroll saw and insert the blade through one of the 1/4" holes in F3. Reinstall the top of the blade. Cut the straight lines between the 1/4" holes in F3. Release the top of the blade and remove F3. Follow the same procedure for the servo cutout in F, the servo mount.

Affix, using spray adhesive, the wing plywood dihedral brace template onto the remaining 6" x 7.5" piece of 3/32" plywood. Cut out the dihedral braces with the scroll saw. The bottom edges can be sanded to adjust them later.

Label all of the plywood pieces and set them aside.

Affix the 1/16" plywood landing gear plate template to a piece of 1/16" plywood. The front and rear of the plate can be cut with a table saw or scroll saw and the sides with a scroll saw. Do **NOT** drill the holes for the dowels yet.

### **The 3/16" x 3" x 36" sheet**

Mark a 3/8" wide strip from the long edge of the sheet. Spray the back of the metal yard stick with adhesive. Lay it on the marks and press down. Use a single edge razor blade to make the wing spar. Draw the razor blade through the wood several times while pressing down firmly on the yard stick. Do NOT cut the spars to length yet.

Use the same procedure to cut the 3/8" x 15-29/32" stabilizer leading edge, 5/8" x 15-29/32" stabilizer trailing and 3/16" x 14-3/4" stabilizer spar.

Affix the template with the stabilizer tips to the remainder of the 3/16" sheet. Cut all of the horizontal straight cuts with a single edge razor blade. Make the cross-grain cuts with the scroll saw, as well as the curved tip cuts. S, the horizontal stabilizer tips need notching. It can be done with the scroll saw and #11 X-Acto blade. Be accurate.

### **The remaining balsa sheets**

The two remaining 1/16" x 3" x 36" balsa sheets do not need to be cut at this time. They will be used for the wing center section sheeting, wing leading edge sheeting, top and bottom stabilizer cap ribs and sheeting the top and bottom of the fuselage.

### **Construction of the Doublers and Other Permanently Laminated Parts**

Templates are to be removed during construction.

Using Titebond, permanently laminate the 3/32" balsa top and bottom pieces to F1 and F3. Glue the 3/32" plywood vertical screw hole backplates to F1. The positions are shown on the fuselage top view plans.

The servo mount (F): Be sure the servo fits the hole. If it doesn't, enlarge the hole slightly using a homemade sanding stick. Be sure that the center of the servo arm aligns with the center of the 3/32" hole in part F. Once the servo fits correctly, glue the servo screw backers to the rear of F1 using Titebond. Use a Dremel cutting wheel to cut off an approximately 1/8" piece of 3/32" O.D. brass tube. Epoxy the 1/8" length of 3/32" O.D. brass tube into the hole in F. It acts as a bushing for the torque rod. Also cut a 1" length of the 3/32" O.D. brass tube for the rear bushing and set it aside.

Poke pin holes through the corners of the battery hatch template so that the 3/32" balsa magnet holder can be aligned and glued to the bottom of the battery hatch using Titebond. Do NOT remove the battery hatch template.

Using Titebond, laminate the six pieces that make up the windscreen. The largest one is 1/16" thick balsa while the other five are 3/16" thick balsa.

Set the parts aside to dry and cure.

### **Creating the wing leading edge and building the horizontal stabilizer.**



Cut the 1/4" square x 36" balsa into two 17-1/4" lengths to create the wing leading edges. The length is oversized, for now, compared to the plans. Mark one side of one leading edge 1/8" up from the bottom. An easy way to mark it is stack the two remaining 1/16" balsa sheets, hold the 1/4" square balsa to the stacked sheets and use a fine line marker to mark 1/8" up on the 1/4" square balsa. Sand the angle between the rear edge and the 1/8" mark on the front edge. See drawing side view. Set aside.

Tape the horizontal stabilizer plans onto a flat building surface. Tear a sheet of wax paper slightly longer than the horizontal stabilizer. Spray adhesive on the plan completely covering the horizontal stabilizer. Smooth the wax paper onto the plan covering the horizontal stabilizer.

Spray the wax paper. Carefully align the 3/16" x 14-3/4" horizontal stabilizer spar on the plan. Press down and it will stay in place. Align the stabilizer tips on the plan and press them down. Align and press the 3/16" x 3/8" leading edge and the 3/16" x 5/8" trailing edge onto the wax paper over the plan. Use thin CA to glue the parts together.

From one end of a 1/16" x 3" x 36" balsa sheet cut twelve 1/4" x 3-3/8" cap rib strips and four 1/2" x 3-3/8" cap rib strips for the center section. After adjusting their length with sandpaper, use thin CA to glue the cap strips in place over the top of the framework. Be sure the 1/2" wide cap strip ribs are used for the center section.

The leading edge sheeting, 1/16" x 17" x 1-1/2" can also be cut from this sheet at this time and then set aside.

Release the horizontal stabilizer framework from the wax paper by sliding a metal rule between the framework and wax paper.

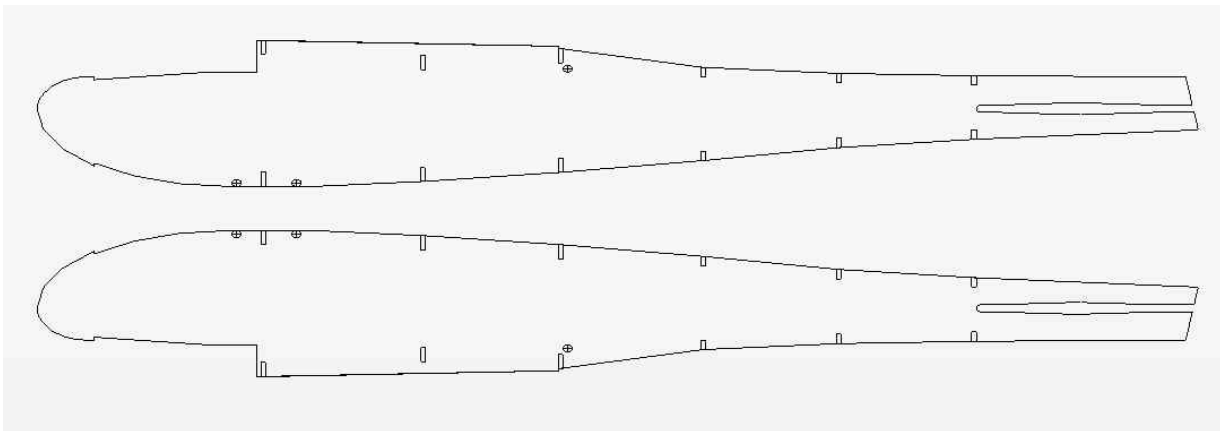
Turn over the frame work. Thin CA the leading edge to the tips, spar and trailing edge. Small 'gaps' can be filled with baking soda and then thin CA applied. Spray the wax paper over the horizontal stabilizer plan with adhesive. Position the stabilizer top down and use thin CA to secure the bottom cap strip ribs.

Sand the leading edge of the leading edge and the trailing edge of the trailing edge to a 'rounded' shape. Sand the cap strip ribs smooth to the LE and TE. Sand the outside edges of the tips to a somewhat rounded shape.

Set the completed horizontal stabilizer aside.

### **Preparing the motor mount and permanently laminating the fuselage doublers.**

Align the outrunner's "+" mount on the firewall, F1. Mark the holes. Drill the holes with the pin vice and 1/16" bit. Using #2 machine screws, screw the motor mount to the firewall. Note how much the screws stick through the back side of the motor mount. Remove the screws and use a Dremel 409 cutting wheel to cut off the protruding ends of the screws. Place the screws in a small container for use later.



Lay the fuselage sides on the building board as shown.

Trial fit F3 to both sides. Once the fit is good, use F3 as a guide to permanently laminate the 1/16" nose doubler using Titebond. Do both doublers. Also permanently laminate the rear landing gear dowel doubler (H) in place on each side using F3 as a guide. Remove F3 and set it aside.

Trial fit F4 on both sides. Set F4 aside after the fit is good.

Trial fit F5 on both sides. Once the fit is good, use F5 as a guide to permanently laminate the 1/16" rear dowel doubler F5B behind F5 using Titebond on both sides. Remove F5 and set it aside.

Trial fit the cross pieces F6 & F7 and set aside.

Trial fit F8 and set it aside.

Cut the 1/16" x 1/8" vertical brace pieces from the scrap of the 1/16" sheet used for the doublers. Cut to size. Glue the 1/16" x 1/8" vertical braces in front of the slots for F6 and F7 on both fuselage sides.

Permanently laminate the 1/16" x 1/4" rear fuselage top and bottom doublers to both sides using the slots for F7 and F8 as a guide. See the fuselage side view for positioning.

Set the fuselage sides aside to dry on a flat surface.

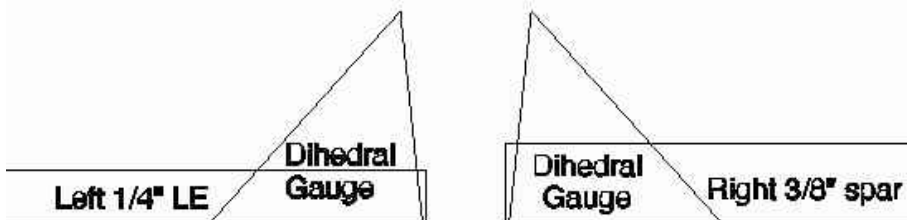
### **Preparing the wing leading edge (LE), trailing edge (TE) and spar**

To allow for the wing dihedral, there are going to be angles sanded onto one end of each of the left and right leading edges, trailing edges and spars using the sanding bar with fine sandpaper on it. That means there will be a right and left set as viewed with the wing plan's leading edge away from the builder.

The previously prepared 1/4" leading edge has already been cut into two oversize 17-1/4" lengths.

Cut the 3/16" x 3/8" x 36" balsa wing spar (previously cut from the 3/16" sheet) and trailing edge stock into two over-length 17-1/4" pieces.

The following procedure is used for all three pieces.

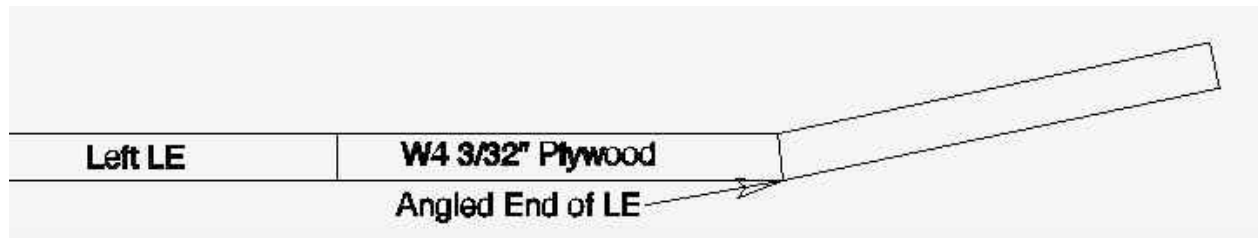


Set one leading edge on a flat surface with the 1/4" side facing the builder. Position the dihedral gauge tool flat against it as previously shown. Mark the angle on the end of the LE.

Sand the LE end to that angle. Reverse the angle tool and repeat for the other right side LE.

The right wing spar is also shown in the diagram. The trailing edges also needs to be done.

Separate the left and right side LE, TE and spar and set them aside.



The diagram shows the alignment of the dihedral brace with the left leading edge.

Epoxy the dihedral braces to the rear of the left LE and left spar and the front of the left trailing edge. The bottom edges of the braces align with the bottom edges of the LE, spar and TE. Wrap the epoxied parts with masking tape.

Set the parts aside to cure.

### **Landing Gear Assembly and More Wing Construction Preparation**

A Great Planes Dural Landing Gear .19 is modified to create the landing.

Cut the landing gear (L.G.) leg length guide templates from the top view. Spray with adhesive. Align the landing gear (L.G.) length guides with the top of each L.G. leg. Mark the bottom of the guide across the landing gear leg. It should be perpendicular to the leading edge of the landing gear

Use safety glasses. Cut off the excess landing gear, using the perpendicular line as a guide, with the Dremel Fiberglass Reinforced Cutoff Wheel.

Using a vice, make a bend on each leg perpendicular to the ground 5/8" from the end of the cut off leg. Drill a 5/32" hole in each leg for the 6-32 x 1" axle bolts. The holes should be 15/32" from the leg's front leading edge and 5/16" from the leg's end.

Assemble the Dave Brown Lectra Lite Flite Wheel 2" and axle in this order; 6-32 bolt through the wheel, 6-32 hex nut close to but not snug against the wheel, landing gear leg and then a 6/32 hex nut or 6-32 lock nut tightened against the landing gear leg. Use blue Loctite on hex nuts. Be sure the wheel spins freely.

Use the remainder of the 1/16" x 3" wide sheet that the horizontal cap strip ribs and leading edge sheeting were cut from and the remaining 1/16" x 3" x 36" sheet, crosscut eight 2-3/8" x 3" pieces and the. They will become the wing center section sheeting. On wax paper, butt join the pieces using Titebond to create four 2-3/8" wide by 6" pieces. Use Titebond, not CA, for the butt joints. Set aside to dry.

Using a sanding block, sand the angle to the assembled windscreen block. This takes awhile.

### **Beginning Fuselage Construction:**

The fuselage is constructed over the top view. The construction moves from the rear to the front.

Tear a piece of wax paper slightly longer than the fuselage top view. Tape the top view to a flat building board. Spray the top view with adhesive and smooth the wax paper over the top view.

Carefully align the two 3/32" balsa fuselage sides. Run a few straight pins through the fuselage sides to hold them in alignment. Once the alignment is correct all along the fuselage, use thin CA to glue the rear fuselage side joints together. Remove the alignment pins. Next insert former F8, align with the top view and thin CA F8 into position. Install the remaining cross pieces and formers through F2 using the same procedure. Be sure to always check the alignment before thin CAing into position. **Do NOT install former F, the servo mount!**

Mix up some epoxy to glue in former F1, the motor mount. Epoxy the motor mount into position and the front end of the fuselage with wrap masking tape at F1 to 'clamp' the front of the fuselage tightly together.

Temporarily pin a piece of scrap 1/16" balsa across the bottom, rear end of the fuselage. Use it to align R3, the non-movable rudder bottom. Mark R3's position on the end of the fuselage. Remove the temporary 1/16" balsa. At the mark on the fuselage end, thin CA R3 to the end of the fuselage. (R3 was only one piece of 3/32" balsa in the original kit.) Using the pin vice with a 1/16" bit, drill a pilot/centering hole through the joined ends of the fuselage about 3/64" above R3 and centered between the two sides. Drill the pilot hole to 3/32" to hold the rear 3/32 O.D. brass tubing that will be added later.

Using Titebond, glue the 3/16" magnet holder 3/32" down from the top of the F2 cross piece and to the left fuselage side. Once the magnet holder is glued into the approximate position, place the battery hatch, with the 3/32" top magnet holder, on the fuselage to get the exact depth. Carefully remove the battery hatch and tape the 3/16" magnet holder into position.

Epoxy the 1/16" landing gear plate into place using the side view as a reference. Tape it into position.



Set aside to let the glue and epoxy cure.

### **Setting up the servo mount**

Mark and drill two small holes in F, the servo mount, to mount the servo. A drill bit, less than a 1/16", provided with the pin vice, will be good. Screw the small servo screws into the servo mount screw holes, to get them started. Remove the screws. Screw the servo to the servo mount. Using the radio system, check to see that one arm on the servo horn is as 'vertical' as possible. Drill out the 'top' most hole on the vertical arm of the servo horn to accept a Dubro E/Z Connector. Attach the E/Z Connector through that hole in the arm. No screw should be put in the E/Z Connector.

Set the assembly aside.

### **Beginning Wing Construction**

Tape the wing plan to a flat building surface. Tear a piece of wax paper longer than the wing span. Spray the plan with adhesive and then smooth the wax paper over the wing plan.

The left wing panel is to be completed first.

Cut two of the 2-3/8" x 6" center section sheeting pieces (previously made) to exactly 5-5/32". Mark one of them as "Bottom Right" and set it aside. The unmarked one is the bottom, left center section sheeting.

Spray the wax paper on the left side of the wing plan with adhesive. Carefully 'stick' the bottom left sheeting in place. Align and stick the leading and trailing edge with the dihedral braces epoxied onto them in place. The LE and TE will extend past W3 and the excess removed later with a razor saw blade. Thin CA the front and rear dihedral brace to the bottom edge sheeting. Trial fit all the ribs for proper length. Adjust the rib length with sandpaper if necessary.

Be sure the previously sanded angle is toward the right side of the spar. Slide the ribs onto the spar in the proper order with the two W1s furthest right on the spar and the W3 furthest left. Space them to their approximate positions. The W1 that is the root chord rib will have the LE, TE and spar angle next to it.

Position the ribs exactly. If W2 rib slots were cut into the trailing edge, slide the rear of the W2s into their respective slots.

Use the dihedral guide to set the angle for root rib W1. The angle should be the same as on the LE and TE. Thin CA the rib to the LE, TE and center section sheeting but not to the spar yet. Slide the remaining W1 into position at the edge of the bottom center section sheeting and perpendicular to the leading and trailing edge. Thin CA the rib to

the LE, TE and sheeting. Thin CA gusset W7 into position between the root rib and rear dihedral brace.

Align W3 into its proper position. Thin CA W3 perpendicular to the LE and TE. Thin CA gusset W7 to the rib W3 and trailing edge.

Carefully move the spar into its proper position at the root rib. Once the spar is positioned correctly, Thin CA the spar to all of the ribs.

Using a razor saw cut off the excess length off the LE, TE and spar outside of W3.

Remove the left wing panel from the building surface. Set the 1-1/2" by 17" leading edge sheeting into the grooves for it in W3 and all of the W2 ribs and extending to the W1 root rib. Hold the rearward end of the sheeting in place with masking tape. Bend the sheeting over the LE and mark the sheeting to be cut to the correct width. Using a metal straight edge, cut the LE sheeting to the correct width.

Press the left panel back down onto the building board. If the wax paper on the left side of the plan is not tacky, respray the left wing panel wax paper over the plan.

Using Titebond, glue and pin the leading edge sheeting into place from the root rib end and into the rib slots and along the LE. Try to align the sheeting with the root rib W1 or just slightly over, as it can be sanded off later. The sheeting will 'stick out' past W3.

Cut a piece of 1/16" x 2-3/8" x 6" balsa to the correct size for the top, center section sheeting. The top center section sheeting will butt join with the LE sheeting and the trailing edge dihedral brace. The trailing edge dihedral brace will show. Use Titebond to glue position and pin the top sheeting to in place.

Let the sheeting glue dry before removing it from a flat surface.

### **Installing the torque rod and servo mount, F**

Remove the servo from the servo mount and place the screws in a small container.

To make the torque rod, cut a piece of 0.055 or 0.062 by 36" music wire in half. On the 18" piece, measure in 1.5" and make a bend, using pliers, as shown on the side view at the servo mount (F).

During this process, F, the servo mount is just free floating and moved as necessary. The wire will be inside the fuselage during this process. Feed the wire through the bushing in F and hole in F8 and out between the fuselage sides in the rear. Temporarily run the 1" piece of brass tube over the wire and about 1/2" into the 3/32" hole in the rear of the fuselage. DON'T FORGET TO RUN THE WIRE THROUGH THE 1" X 3/32 O.D. BRASS TUBE.

Pull the torque rod forward enough to run the torque rod through the E/Z connector on the servo arm, feed the servo lead through the servo mount hole and slide the servo in place. Do NOT screw the servo into position at this time.

Set up the radio system and check the vertical position of the servo arm. Shut off the radio system.

Set up the radio system and check the vertical position of the torque in the fuselage. It may be necessary to tape the servo into position.

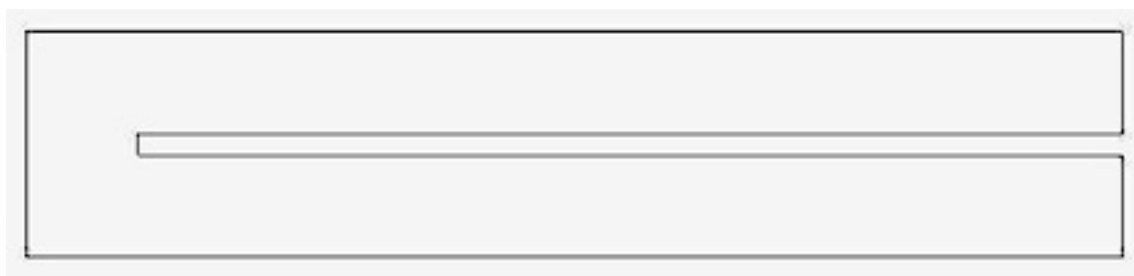
Tape the rudder (R2) to the previously assembled vertical fin. Set the vertical fin into position on the fuselage with its front in F8 and rear setting on top of the back of the fuselage.. The rudder should parallel the fuselage rear. With a thin line marking pen, mark where the bend needs to be made at the rear of the torque rod. Remove the vertical fin and rudder. Using both sets of pliers, bend the torque rod vertical as shown on the plan side view.

If the end of the torque rod can be centered on the rudder without adding too much trim, shut off the radio system. (If the rear bend does not work out well, use a Dremel cutting wheel to cut the torque rod and try again with the other section of 18" music wire.)

Once everything is working well, screw the servo to the servo mount. Glue the 1" x 3/32" O.D. brass tube through the hole and to R3, the bottom rudder piece. Be sure the torque rod remains free to rotate.

Glue the servo mount in place in the fuselage using thin CA to hold it into position. Epoxy F, the servo mount, in place.

From some of the remaining 1/16" balsa, cut a 1" x 4-7/8" long piece. Centered on the piece, cut a 3/32" slot for the vertical fin 4-3/8 long.



The diagram is not to scale.

Using Titebond, glue and pin it to the top, rear of the fuselage. The vertical fin should be used as a guide and then removed after a few pins are in place.

Cross-grain the remainder of the the top of the fuselage forward to F5 using 1/16" balsa using Titebond and pins to hold the pieces in place. The sheeting at F5 Vs to follow the angle of F5.

Cross-gran 1/16" balsa to the bottom of the fuselage from the rear of the fuselage to the 1/16" landing gear plate and forward from the landing gear plate to the firewall. Use pins to hold the balsa in place.

Using Titebond, glue the windscreen block into place.



Sand the outside edges of the battery hatch to about a 45 degree angle on the fuselage sides. Sand, towards the inside, about a 45 degree angle on the right side of the battery hatch compartment fuselage side. The two angles on the right side allow using the covering as a hinge and on the left side a place to grab to open the hatch.

Using Titebond, glue the landing gear dowel reinforcement block in place behind F3 and across the top of the landing gear plate.

Glue the 1/16" wing side doublers in place across the wing saddle area using Titebond.

Set the fuselage aside to dry.

### **Wing Construction, Right Panel**

Spray adhesive on the wax paper on the right side of the wing. Prop up the left side wing panel with something; books, magazines, wood, whatever, so that the bottoms of the plywood wing joiners are lying flat to the building board.

Follow the same procedure as building the left side wing panel.

Set the wing aside to dry.

### **Fuselage continued**

Sand the top and bottom 1/16" cross-grained balsa to conform to the fuselage sides. A single edge razor blade can also be used, especially on the top rear.

Sand a little angle to the R3 pieces going towards the tail and round the bottom of R3 slightly towards the center joint.

Set the fuselage top down on the building surface. Using the landing gear, mark the dowel holes on the 1/16" landing gear plate. Use a pin vice to create pilot/centering holes and then drill the 3/16" holes through the landing gear plate for the short knock-off landing gear dowels.

Run dowel through the landing gear dowel holes and rear wing hold down dowel hole. They should stick through the fuselage about 1/2" on each side. Cut to length. Round the ends of the dowel with sand paper. Cut the knock off dowels to length and trial fit. Do NOT glue the dowels in until after the fuselage has been covered.

Using a 1/16" bit in a pin vice, drill pilot/centering holes for the dowels going through the windscreen. Carefully align the 3/16" bit and drill the holes for the front hold down dowels. Cut them to the length shown on the fuselage side view. Trial fit them. Again, none of the dowels are glued in until the fuselage has been covered with iron on covering.

Trial fit the horizontal stabilizer into its slot in the rear of the fuselage. Remove and set aside once a good fit is achieved.

Pin the battery hatch into position. Use a 1/16" bit in the pin vice to create pilot/center holes for the magnets. Drill out the hole for the magnets using a drill bit the same diameter as the magnets. Remove the battery hatch. Epoxy the magnets in place.

Set the fuselage and battery hatch aside for the epoxy to cure.

### **Wing Tips**

Bevel the straight edge of the wing tips (W10) to an angle that will work with the wing angle brackets W8 & W9. Thin CA the W8, W9 and W10 to their respective tips.

If W10, the wing tip, is above W3, the outside rib, cover W3 with masking tape and sand the tip 'level' with W3.

Sand the wing structure. Be sure the leading edge is sanded to the profile shown on the fuselage side view.

## Covering

Sand the back edge on the right side of the vertical fin and front edge of the right side of the rudder to a 45 degree angle. With one piece of covering for each side for the vertical fin and rudder, cover the vertical fin and rudder. Do the right side first. Cover the vertical fin only, then align and hold the rudder over the 'backside' of the fin. Be sure to align the rudder at the top of the fin. Hold it in place and iron the covering onto the 45 degree angles and the aligned rudder. Trim as necessary. Iron the covering onto the left side of the vertical fin and rudder as one piece. Trim. A 'fold-over' hinge is now between the vertical fin and rudder. This same procedure is used for the battery hatch and right fuselage side.

Cover the fuselage, wing and horizontal stabilizer with iron on covering. Remember to hinge the battery hatch and right fuselage side in the same manner as the vertical fin and rudder.

After covering, open all of the holes and slots in the fuselage with a soldering iron. F1 holes, including the motor screw holes, dowel holes, horizontal stabilizer slots on both sides of the fuselage, vertical fin slot.

Cut out the templates for the windows and side stripe. Cut a length of iron-on covering a little more than twice as wide as the stripe. Fold the piece in half with the outside of the covering facing itself. Using spray adhesive, affix the windows and stripe to the back of the iron-on covering. Cut out the windows and stripe. That will create windows and stripes for both sides. Use the fuselage side view for placement of the windows and side stripe and iron them onto the fuselage. If the stripe is to be a different color from the windows, two different color pieces will be needed.

Glue in all of the dowels with Titebond.

Attach the wing to the fuselage with a couple of #64 rubber bands. Slide the horizontal stabilizer into its slot. Align it with the wing and be sure that it is not 'cocked' compared to the wing. Adjust as necessary. Once the fit and alignment is good, mark the horizontal stabilizer along the edge of the fuselage, top and bottom with a tin line marking pen.

Remove the horizontal stabilizer. Use a single edge razor blade to remove the covering material that would have been inside the fuselage.

Remove the wing. Follow the same procedure for the vertical fins and rudder unit, removing the covering material from the area that will be inside the fuselage.

Attach the wing with #64 rubber bands. Using 30-minute epoxy, epoxy in the vertical fin/rudder assembly and the horizontal stabilizer. Check all alignments once again, pin as necessary.

Set aside for the epoxy to cure.

Using the fuselage side view, bend the tail skid from 0.055 or 0.062 music wire. Put it in the small parts container.

Using the fuselage side view, bend the rudder yoke. Smaller diameter music wire can be used if available. It will bend easier than the 0.055 or 0.062 music wire.

**Be absolutely sure that the epoxy has cured before continuing with the next steps.**

Mark the holes for the wire tail skid on the bottom, rear center line near the end of the fuselage. Drill the holes with the pin vice and a 1/16" bit. Epoxy the skid into place and hold with making tape.

Mark the hole in the rudder for the yoke screw. Use the fuselage side view as a guide. Drill the hole. Insert the screw through the yoke and rudder. Use blue Loctite to hold the nut securely to the screw.

Install the motor, but not the prop yet.

Use a length of hook-and-loop fastener to secure the radio receiver behind former F3 near the top of the fuselage side.

Use a length of hook-and-loop fastener to secure the LiPo battery in the battery compartment.

Use a length of hook-and-loop fastener to secure the electronic speed control (ESC) battery in the battery compartment across from the LiPo battery.

Hook up the servo, ESC and motor. Turn on the radio transmitter and then hook up the battery. Test that the rudder is moving in the correct direction and that it is centered. Check the motor for correct rotation. Disconnect the battery and then shut off the transmitter.

Put the prop on the motor. Check the balance. The original plans showed the balance about 2" from the leading edge. To balance the Min-E, it was necessary to add exactly 1 oz. of nose weight.

The plane has not been flown, so the recommended CG for this version is not known. It will be flown with the original CG.