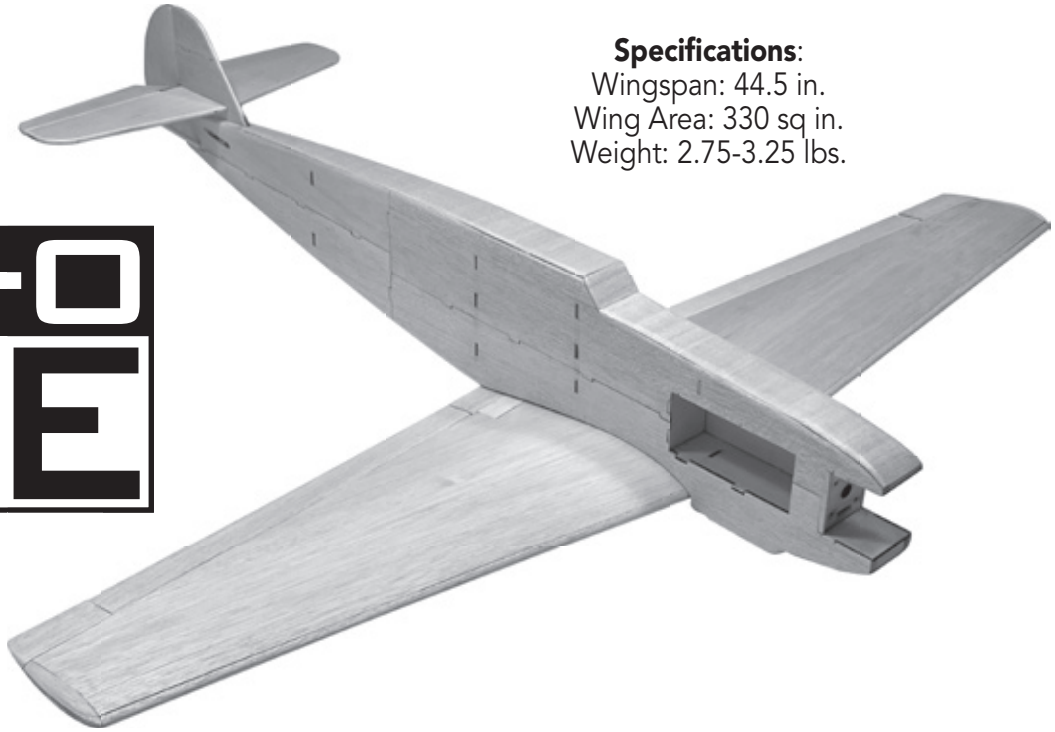
ONE-O NINE



Specifications:
Wingspan: 44.5 in.
Wing Area: 330 sq in.
Weight: 2.75-3.25 lbs.

CONSTRUCTION MANUAL

Using the Manual

Be sure to read each step thoroughly before you start the step. Test-fit the parts together to make sure they fit properly. If necessary trim to fit.

Beside each step you will notice a check box (or two). These are so you can keep track of your progress while building your kit. For steps that have two boxes, as in the construction of the vertical fins, these steps must be performed two times.

- Your **Old School Model Works** aircraft should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, this model, if not assembled and operated correctly, could possibly cause injury to yourself or spectators, and damage to property.
- You must assemble this model according to the instructions. Do not alter or modify this model, as doing so may result in an unsafe or un-flyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.
- You must take time to build straight, true and strong.
- You must use a R/C radio system that is in first-class condition, a correctly sized power system and components (electronics, batteries, wheels, etc.) throughout the building process.
- You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air. (Installation shown in the manual is a suggestion. You may have to adjust the mounting steps to accommodate the size of your radio equipment.)
- You must check the operation of the model before every flight to insure that all equipment is operating and that the model has remained structurally sound. Be sure to check clevises or other connectors often and replace them if they show any signs of wear or fatigue.

- If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.
- While this kit has been flight tested to exceed normal use, if this model will be used for extremely high stress flying, such as racing, or if a power system larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.

Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.

Old School MODEL WORKS

www.oldschoolmodels.com

WARNING

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT WARNINGS AND INSTRUCTIONS CONCERNING THE CONSTRUCTION AND USE OF THIS MODEL.

A Radio-Controlled aircraft is not a toy! If misused, it can cause serious bodily harm and damage to property. Fly only in open areas, preferably at AMA (Academy of Model Aeronautics) approved flying sites, following all instructions included with your radio, powerplant, electronics and batteries.

- Inspect your model before every flight to ensure it is airworthy.
- Be aware of any other radio frequency user who may present an interference problem.
- Always be courteous and respectful of other users in your selected flight area.
- Choose an area clear of obstacles and large enough to safely accommodate your flying activity.
- Make sure this area is clear of friends and spectators prior to launching your aircraft.
- Be aware of other activities in the vicinity of your flight path that could cause potential conflict.
- Carefully plan your flight path prior to launch.
- Abide by any and all established AMA National Model Aircraft Safety Codes.

IMPORTANT!!! Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

INCLUDED ITEMS

Wood parts included in this kit:

- 1 - LP1 - laser cut 1/8" x 5" x 24" sheet
- 1 - LP2 - laser cut 1/8" x 5" x 24" sheet
- 1 - LP3 - laser cut 1/8" x 1.5" x 24" sheet
- 1 - LP4 - laser cut 1/8" x 3" x 12" sheet

- 1 - BP1 - laser cut 1/8" x 4" x 12" sheet
- 1 - BP2 - laser cut 1/8" x 4" x 12" sheet
- 1 - BP3 - laser cut 1/8" x 4" x 24" sheet
- 2 - BP4 - laser cut 3/32" x 4" x 24" balsa
- 2 - BP5 - laser cut 3/32" x 4" x 24" balsa
- 2 - BP6 - laser cut 3/32" x 4" x 24" balsa
- 1 - BP7 - laser cut 3/32" x 4" x 24" balsa
- 1 - BP8 - laser cut 3/32" x 4" x 24" balsa
- 1 - BP9 - laser cut 1/16" x 4" x 12" balsa
- 1 - BP10 - laser cut 1/16" x 4" x 12" balsa
- 1 - BP11 - laser cut 1/16" x 4" x 24" balsa
- 1 - BP12 - laser cut 1/16" x 4" x 12" balsa
- 7 - 1/16" x 4" x 24" balsa sheets

- 2 - 5/16" sq. x 36" balsa strips
- 4 - 1/4" sq. x 36" balsa strips
- 2 - 5/16" x 1-1/4" x 36" tapered balsa strips
- 2 - 3/16" x 3/8" x 36" basswood strips
- 1 - 3/16" sq. x 12" basswood strip

Hardware parts included in this kit:

- 10 - 2-56 x 3/4" self tapping screws
- 10 - 2-56 x 1/2" machine screws
- 2 - 1/4"-20 wing bolts
- 4 - control horns
- C/A type hinges for control surfaces
- 1 - 1/4"x 6" wooden dowel

Other items included in this kit:

- 2 rolled plans (wing and fuse)
- 1 - Construction Manual

ITEMS NEEDED

Hardware needed (not included in the kit)

For some of these items there are more than one option which will require you to make decisions ahead of time. There isn't a right or a wrong choice, so choose the items that work best for you.

We strongly recommended supporting your local hobby shop.

- Powerplant: 350+ watt, 60 amp ESC, 3-4s lipo electric power system (or .25 sized 2-stroke, if glow)
- Propeller
- Engine/Motor mount and mounting hardware
- 4 ounce fuel tank and fuel tubing (if glow)
- 3" spinner
- Receiver - (4 channel minimum)
- 4 servos (electric) or 5 servos (if glow) - we recommend mini servos all around.
- Pushrods (two 6" for ailerons, one 10" for throttle if glow, two flexible 26" for rudder/elevator.)
- Clevises for the pushrods.
- Covering (1.5 - 2 rolls)

Additional Required Building Tools and Adhesives

- Drill & assorted drill bits
- Hobby knife and #10 blades
- Sandpaper: coarse (80 or 100 grit) & medium (150-200 grit)
- Pencil or pen
- Ruler
- T-Pins
- Waxed paper
- Building board
- 2-part epoxy (15 or 30 minute)
- Epoxy brushes and mixing sticks

- Wood adhesives of your choice. We use medium CA (cyanoacrylate) viscosities, but aliphatic resin and/or carpenter's glues will work just as well and give longer working time. They are also recommended when sheeting the wings.

Our One-O Nine kit is not for the novice builder. We are assuming the builder is used to constructing balsa kits and has the techniques and skills necessary to do so.

Closely inspect the supplied laser cut parts for damage. If you find any damaged or missing parts, contact us within 60 days of purchase.

When removing the laser cut parts from their sheets, you'll notice the parts are held in place by several small "tabs". These tabs are uncut pieces of wood and can sometimes make it difficult to remove a part. Rather than breaking and/or splintering the wood by forcing out the part, we recommend removing any laser cut parts from their sheets by using a hobby knife with a #10 blade. A quick cut of the tab will allow the piece to be removed with no damage. Sand any tab remainders flush with the part so there will be no problem aligning them later.

It's best to not remove parts from their sheets until they are needed. Refer to Appendix A of this manual as a reference to what all the laser cut parts look like and are called.

You'll notice a check box next to each step. Check these off as you go along so you don't miss a step. Note that some steps (in building the wing) have two boxes - this means that the step will be done twice - once for each wing half.
There could be a step or two which leaves you a bit puzzled. If this happens, step back and study the photo(s) for that step - both in this manual and on-line.

All photos shown in this manual are of different One-O Nine prototypes. Several pieces may have changed slightly with improvements we've made so parts may look a little different in some steps.

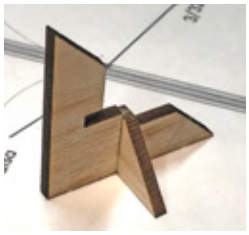
Online Supplementary Photos

We realize that the smaller black-and-white photos in this manual might not show some of the steps as clearly as you might want. So we've anticipated this and made these photos available on our website. You can either scan the QR code or type this address into your browser:

www.oldschoolmodels.com/mpics/one-o-nine/

IT IS VERY IMPORTANT THAT YOU ASSEMBLE THIS KIT IN THE ORDER DESCRIBED. SKIPPING FORWARD IN THE STEPS COULD LEAVE YOU WITHOUT THE PROPER LENGTHS OF WOOD TO FINISH THE KIT.
WE'VE INCLUDED ENOUGH WOOD TO EASILY COMPLETE THIS KIT, BUT YOU MUST TAKE CARE TO PROPERLY MEASURE AND NOT WASTE WOOD WHEN CUTTING.

☐ **Alignment triangles**

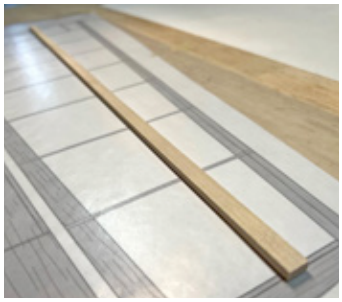


Pre-cut into BP2 & BP3 are two triangles. Punch out the two 90° triangles as these can be used to vertically align any of the parts in the construction of your One-O Nine. BP1 & BP2 also includes foot pieces that can be used with the triangles to hold them hands-free vertically.

☐ **Step 1 - Prepare your work area**

You'll need a flat building surface that is a minimum of 36" long. Position the starboard wing plan over the surface and tape into position. Tear off a length of waxed paper long enough to cover the plan and tape that into position, over the plan.

☐☐ **Step 2 - Wing - Lower Spar**

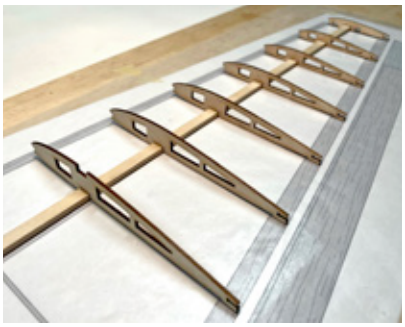


Locate one length of 3/16" x 3/8" basswood to use as the lower spar. Measure and cut it to length - making sure it extends beyond both R1 and R9 by roughly 1/8" to 3/16".
Using a few drops of medium CA glue, tack this spar in place as shown, making sure it is straight along it's entire length.

☐☐ **Step 3 - Wing - R9 rib**

Starting with R9 from BP5, it's time to start gluing the ribs in place. To make sure R9 is perfectly aligned when gluing it to the bottom spar here's a few tips.
I like to put a small drop of medium CA on the bottom of the backside tabs of each rib to help lock it in place to the waxed paper (or you can use pins if that's your thing). Also make sure to use the included triangles that you should have at hand from the first step of this build. Using the triangles ensure that this rib, and all subsequent ribs are perfectly aligned at 90° to the building surface.

☐☐ **Step 4 - Wing - R3-R8 ribs**

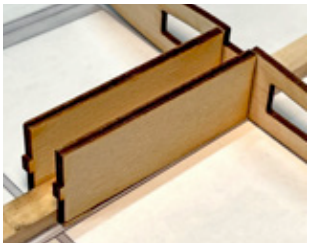


Locate ribs R3-R8 from BP4, BP5 and BP6. Using the same techniques that you used on R9, glue each of these ribs in place as shown. Make sure each one is in the proper place and all are perfectly aligned at 90° to the building surface.

☐☐ **Step 5 - Wing - SW3**

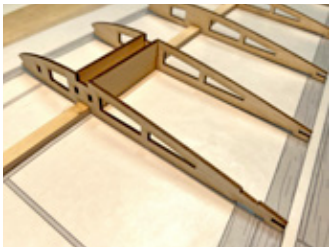
Now locate two SW3s from LP4. These are glued between R3 and R2 (not yet installed). Note there is a small circle etched on SW3

which designates the top edges. These are glued in place as shown, butted-up against R3 and make sure that the tabs on both SW3's point towards R2. The SW3s should also be glued to the lower spar as shown here.



☐☐ **Step 6 - Wing - R2**

Locate one R2 from BP5. Glue it in place as shown, making sure the tabs from both SW2s are fully inserted. Also make sure that R2 is perfectly aligned at 90° to the building surface.



☐☐ **Step 7 - Wing - TE**

Locate one TE from BP8. This is the trailing edge of the wing and note the angle of it's pre-cut slots. When properly installed, these slots will line up with each of the ribs installed so far.

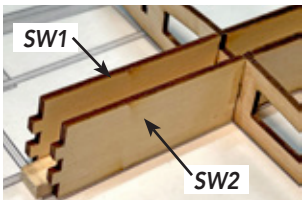
BE CAREFUL AND TAKE YOUR TIME WHEN INSTALLING THIS PIECE. *Now is not the time to rush, as this piece, as well as the backs of each rib, are delicate.*

A little at a time, work TE into the back of each rib. Once installed properly, TE will be flush with the back of each rib as shown here. Glue this in place to each rib.

☐☐ **Step 8 - Wing - SW1, SW2**

Locate one SW1 from LP2, one SW2 from LP3 and one R1 from LP1. As before, there are circles etched into SW1 & SW2 to designate their top edges. *Dry fit this next step first so you'll understand where I'm going here.*

Slide the single tab on SW1 (fore) and SW2 (aft) into the holes on R2. Now, to get both to the proper height, use R1 as a guide by pushing it into place, with the twin tabs on the SWs sliding into the holes in R1. You'll see that R1 will hold the SWs at the proper height, and you can use this to your advantage when you glue the SWs in place. Now remove the SWs apply glue and attach them in place, making sure they are also glued to the lower spar ***but do NOT GLUE R1 IN PLACE AT THIS TIME.***



☐☐ **Step 9 - Wing - SW1B**

Locate one SW1B from LP3. Note the circle - which designates what? That's right - the top edge.

It is glued in place as shown, making sure it's tabs are fully seated into the R2 and R1 tabs.

And while you're at it, it's time to glue R1 in place. Cut into LP4 is a dihedral gauge that has it's own "foot" inside it. Pop it out and use it to help align R1, as shown here. When R1 is properly installed (with the tabs in SW1 and SW1B fully inserted and TE inserted on the trailing edge), it should be perfectly flat and the same 5° angle along it's entire length.

☐☐ **Step 10 - Wing - WH2**

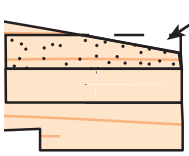
Locate one WH2 from LP3. This is glued in place between R1 and R2, on the back edge. The notches in each rib will allow the tabs in WH2 to fit into place. When in place, it will sit proud of the rib's surface by 1/16" - and that's by design. Glue this piece in place.

☐☐ **Step 11 - Wing - HS**

Locate three HSs from BP8. These are glued in three spots on TE - between R2 & R3, between R4 & R5, and between R7 & R8.

Once they're glued in place, you'll need to CAREFULLY sand them so their profiles match the profile of the ribs.

Refer to this drawing so you'll see the portion to lightly sand away. Do this for each HS.



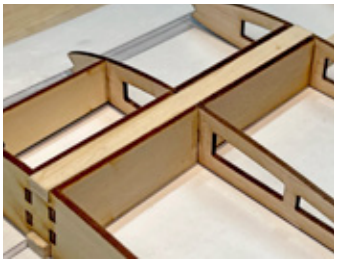
☐☐ **Step 12 - Wing - R2**

Carefully cut away the center of the R2 rib, leaving a box as shown in the photo. Carefully sand the inside of the box so the edges are smooth and flush. This forms three sides of the dihedral box and needs to be smooth and free from edges so the dihedral brace will slide in smoothly when joining the wing halves later.

☐☐ **Step 13 - Wing - Upper Spar**

Measure and cut the upper spar from the left-over 3/16" x 3/8" basswood strip you used to make the lower spar, making it an extra 1/8" or so longer.

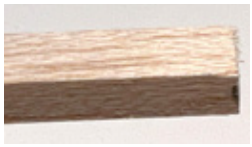
Apply glue to the sides of the spar, and to the top of the R1 and R3 ribs where they will contact the upper spar.



Starting at R3, carefully press the upper spar into position. This will be a tight fit and might require "wiggling" the spar from side to side to slip in-between the sheer webs. Be sure to press the spar completely into the slot in both ribs, making it flush.

Once the spar is in place, wick thin C/A along the spar-to-sheer web joints (front and back) along the length of the spar.

☐☐ **Step 14 - Wing - Leading edge**



Locate one of the 5/16" sq. x 36" balsa strips that will be used as the leading edge. This fits into the diamond-shaped cutouts in the front of each rib.

Before cutting it to length, sand a bevel into one end of the strip as shown here. The bevel should be roughly 1" long and take the "point" off the strip. This section will be positioned on the tip of the wing (R9) and this bevel helps it fit correctly and give clearance to your building surface. You may have to work on this with a little trial and error to get the proper fit.

When it's sanded, mark the length of the leading edge and cut it, leaving yourself about a 1/4" extra.

Glue this piece into each of the ribs as shown here.

☐☐ **Step 15 - Wing - Top sheeting (part 1)**

Locate two of the uncut 1/16" x 4 x 24" balsa sheets. These will be used to create the wing's top sheeting.

Now this needs to be measured carefully so you have enough sheeting to cover the top and bottom of the wings successfully - and here's how we did it.

First, the leading edge piece of sheeting will need to bend along it's entire length to match the curvature of the ribs. As the sheeting we get can vary in density, you might need to apply a bit of Windex® glass cleaner to loosen up the grain and allow it to bend without cracking. Soak the outer side of the wood to expand the fibers. Now hold it to curvature needed, use a hair dryer or covering heat-gun to help "set" the balsa's bend as it dries. Once dry, and with the proper bend, it's much easier to make the following measurements.

☐☐ **Step 16 - Wing - Top sheeting (part 2)**

Place this sheet you just formed up-against the leading edge of the wing, with the upper-left-hand corner just overlapping R1 by an 1/8" or so. Temporarily tape this in position.

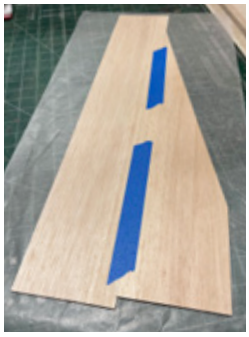
Now, the second sheet will make up the back half of the sheeting, but needs to be cut on an angle to roughly match the trailing edge of the wing.

Position this sheet up against the first piece of sheeting, again with it's upper-left corner just overlapping R1 by an 1/8" or so. Temporarily tape this sheet to the first piece of sheeting. Now you'll need to mark where to cut this second sheet, along the trailing edge of the wing, leaving yourself a 1/4" or so longer to play with. When done correctly, this diagonal mark should divide the sheet into two, roughly equal pieces when cut. (The cutoff piece of sheeting will be used when sheeting the underside of the wing later on.)

When satisfied with your measurements, it's time to cut the piece and in preparation for the next step.

☐☐ **Step 17 - Wing - Top sheeting (part 3)**

When edge gluing the sheeting pieces together, first make sure the edges are flat (give a quick, swipe or two with a sanding block).



Then tape the two pieces together as shown here with some masking/painter's tape. As you lift the sheeting from the board you'll see that the tape will act as a hinge allowing you to put a small amount of adhesive in the joint. When the adhesive is applied, place the sheeting back down on the waxed paper, so that it's flat (as shown in the photo). Use pressure and weights if necessary to hold it flat along the entire length of the joint. When cured, remove the tape and you'll now have a single, wider piece of sheeting.

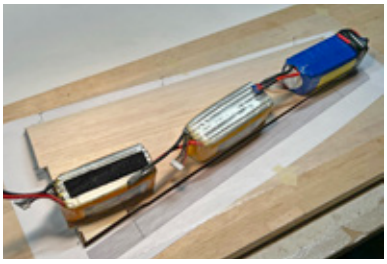
☐☐ **Step 18 - Wing - Top sheeting (part 4)**

Glue the leading sheeting up against the leading edge first (medium CA works well for this).

Once cured, bend the sheeting back over the wing and temporarily tape it in place (or weigh it down).

You'll now need to make a cutout in the sheeting for WH2. Take your time and don't try to make the exact cut the first time. Work at it, little by little until you have a great looking cutout.

☐☐ **Step 19 - Wing - Top sheeting (part 5)**



Now apply a slower drying glue (aliphatic resin and/or carpenter's glue) to the upper framework of the wing (tops of the ribs, upper spar, trailing edge, etc.). Note that a paint or epoxy brush works great for this.

Then work your way rearwards, gluing a little at a time. Press the sheeting firmly against the ribs and weigh it down before gluing the next section of sheeting - slowly working your way back to the trailing edge, being careful not to put a bend (warp) in the wing.

☐☐ **Step 20 - Wing - WH1**

Once the glue has dried from the previous step, carefully remove the wing panel from the building board and flip it over.

Locate WH1 from LP3 and glue it in place as shown here - making sure the tabs are inserted into the cutouts in both R1 and R2 ribs. Note that WH1 will stand proud of the ribs by 1/16", as designed.

☐☐ **Step 21 - Wing - WH3**

Locate two WH3 from LP1. These are glued between WH1 and WH2, as shown here - on either side of the pre-cut hole in WH1.

☐☐ **Step 22 - Wing - Remove tabs.**

Now it's time to remove all the underside tabs that helped hold the ribs in place. There's one on the back of each rib. When trimming these tabs, make sure you cut them away just enough so that the airfoil shape of each rib is not interrupted.

☐☐ **Step 23 - Wing - HS**

Locate three HSs from BP8. Just like you did on the top of the wing, now you'll glue these pieces in three spots on TE - between R2 & R3, between R4 & R5, and between R7 & R8.
Once they're glued in place, you'll need to CAREFULLY sand them so their profiles match the profile of the ribs.

☐☐ **Step 24 - Wing - Wing dowel**

Locate the 1/4" dowel and cut it into three 2" sections. Set two of those aside.

Round one end either by hand, or do it like I do - chuck it up in a drill spin it like a little lathe. Use sandpaper to quickly round off one end.
With the wing flipped over, mark where the leading edge will need to be cut to allow the wing dowel to be installed.

Now cut the hole into the leading edge, making cure it is centered on the leading edge strip and perfectly inline with the pre-cut hole in SW1B. Cut the hole a bit undersized, then gradually enlarge it until you get a nice, snug fit. Test fit the dowel, slipping the flat end first through the leading edge and into SW1B - flush with the back side of SW1B. Once in place, glue it to the backside of the leading edge and to SW1B.

☐☐ **Step 25 - Wing - Hatch rails**

Locate the left-over 3/16" x 3/8" basswood strip used in the spars. Cut two 2-5/16" lengths.
Also cut one similarly sized piece of 1/16" from the scrap area of BP9, BP10, or BP11.

One basswood rail is glued to the outside of R3, and the inside of R4, using the following method.
Place a few drops of glue to the 3/16" (thinner) side of one of the basswood rails. Place the 1/16" piece you cut on top of the rail, then press the rail in position - up against the lower spar, and making sure that the 1/16" piece is flush with the edge of rib. Be sure NOT to glue the 1/16" piece in place as it's just a spacer.

When finished, you'll have two rails in place, set just below the surface of the ribs - 1/16" below.

☐☐ **Step 26 - Wing - Hatch frame**

Locate left-over 5/16" sq. balsa strip, cut when creating the leading edge. Measure and cut a length to go between R3 and R4 as shown here. Make sure it is a snug fit and glue it in place, up against the hatch rails, you just installed, but flush with the bottom surface of the ribs.

☐☐ **Step 27 - Wing - Underside sheeting (part 1)**

Using the same techniques use when creating and installing the upper sheeting, it's now time to install the underside sheeting.
Locate one of the uncut sheets of 1/16" balsa, and the leftover 1/16" piece you cut when making the top sheeting.
Glue these together in the same way as before, then glue them to the leading edge.

☐☐ **Step 28 - Wing - Underside sheeting (part 2)**

Once cured, bend the sheeting back over the wing and temporarily tape it in place (or weigh it down). You'll now need to make a cutout in the sheeting for WH1. Take your time and don't try to make the exact cut the first time. Work at it, little by little until you have a great looking cutout.

☐☐ **Step 29 - Wing - Underside sheeting (part 3)**

Again, using the same techniques you used on the top side, apply some slower curing glue to the frame - the ribs surfaces, lower spar and the balsa hatch-frame (not the rails). Then slowly attach the sheeting. Weigh it down and allow it to cure fully.

☐☐ **Step 30 - Wing - Sanding**

Take a few moments to sand the wing panel smooth. Make sure to also sand the trailing edge, as well as the root (R1) and tip (R9) edges flat.

☐☐ **Step 31 - Wing - T1**

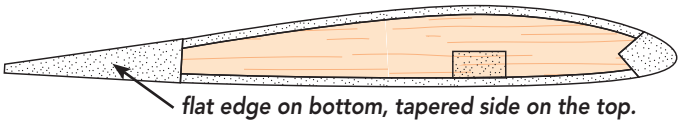
Locate T1 from LP2. Glue this in place by fully inserting the tabs in R9, and making sure it is perpendicular to the rib.

☐☐ **Step 32 - Wing - T2**

Locate five T2s from BP3. Glue three of these to the top of T1, and two of them to the bottom of T1, as shown here.

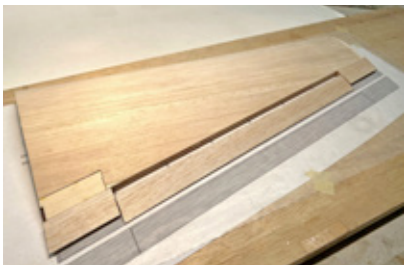
☐☐ **Step 33 - Wing - Shaped trailing edge**

Locate one of the 5/16" x 1-1/4" x 36" tapered balsa strips.
This is cut to make the final trailing edge, as well as the aileron. These cuts are noted on the plans and need to be angled, so double-check everything before cutting.
Also, make sure that you are orienting the tapered balsa the correct way. Check the diagram below.



flat edge on bottom, tapered side on the top.

When you have the cuts made, glue the two shorter pieces in place as shown in the photo. Set the aileron aside.



☐☐ **Step 34 - Wing - R1**

Now it's time to cut a square hole out of the root rib (R1). This will be between the pre-cut slots for the sheer webs and between the upper and lower spars, as shown here.

Carefully using a rotary tool to do most of the work is best, then clean up everything with a hobby knife. Do not cut into the sheer webs as you will weaken them.

☐☐ **Step 35 - Wing - Sanding**

Grab your sanding block and sand R1 and the trailing edge piece you installed so it's all flat and smooth.

Set the starboard wing half aside and begin work on the port wing half. Tape the port wing plan and fresh wax paper on your board. Then follow steps 2 through 35 to complete the port wing half. Once finished, then move on to step 36.

Note that when building the port half that many of the parts will need to be glued to the opposite side (the sheer webs, for instance). Always refer to the plans to make sure you're gluing the parts together in the correct way.

☐ **Step 36 - Wing - Dihedral brace**

Locate three DHs from LP2. These are glued together to make a single, thicker dihedral brace. There is a possibility that you'll have to sand the surfaces to "thin" it slightly as each piece of lite-ply is not necessarily uniform thickness (unfortunately).

So take some time test fitting and sanding as necessary to get a good fit in both wing halves. Don't take off too much, too fast. Carefully sand as necessary to make sure everything fits properly and the root ribs in each wing half are touching along their entire length when assembled into a single wing. Take your time and get a good fit that doesn't require a lot of force.
Remember you may have to file inside the boxes built into each wing half. Make sure they're smooth and the brace doesn't catch on any extra glue or remnants of R2.

☐ **Step 37 - Wing - Join wing halves**

Test fit the wing halves together one last time and sand as necessary for a good fit.
After test fitting, join the wing halves as follows (with 30 minute epoxy). Remove the dihedral brace and apply a good coating of epoxy into the pockets in each wing half and also coat the faces of each root rib.
Slide all the dihedral brace into one of the wing halves, then slide remaining wing half in place. Squeeze the two halves together, wipe off any excess epoxy with some denatured alcohol and use long strips of masking tape to hold wing halves firmly together.
After the epoxy has fully cured (give it several hours), remove the tape.
Remember, any twist in the alignment of the panels cannot be fixed after the epoxy cures and will lead to a poor flying model.

☐ **Step 38 - Wing - Aileron hatch cutout**

In the back of this manual is Appendix B which is a full-size template that you should use to locate and cut out the aileron pockets.
Remove that page, cutout the template and place it as shown here, on the bottom of the starboard wing panel.

The rectangular cutout is pretty close to the size, but I advise lightly cutting inside it by 1/8" or so - using just enough pressure to cut through the outer sheeting. You should now have a hole that reveals the hatch rails, similar to what's shown here (except hopefully a bit neater than my example).

An easy way to find the sides of the box is to take a piece of scrap 3/16" x 3/8" and place it directly over one of the servo rails, mark, then cut this outer edge. Do the same to find the outer edge of the other rail.

Then carefully cut away the fore and aft edges of the box so the sheeting is flush with the lower spar and the rear frame of the aileron box.
Test fit one of the servo hatches (SH, from LP4). Lightly sand the opening to allow the hatch to comfortably fit in the hatch.

When finished, flip the template over and do the same thing to cutout the aileron pocket on the port side of the wing.

This completes assembly of the One-O Nine's wing.
Now it's time to start construction of the tail surfaces.

☐ **Step 39 - Stab/Elevator**

Tape the horizontal stab / elevator plan and a fresh piece of waxed paper on your building board.

☐ **Step 40 - Stab/Elevator - E1**

Locate E1 from BP3. Pin it in place, making sure it is straight along it's entire length.

☐ **Step 41 - Stab/Elevator - E2**

Locate E2 from BP1. Glue it in place, making sure it's tabs are fully inserted into E1 and it is flat against the building board.

☐ **Step 42 - Stab/Elevator - E3**

Locate both E3s from BP1. These are glued in place to each side of E3 to form the tips. Make sure their tabs are fully inserted into E1 and they are both flat against the building board.

☐ **Step 43 - Stab/Elevator - E4, E5 & E6**

Locate both E4s, both E5s and both E6s from BP1 and BP3. These are glued in place, again making sure the tabs are inserted fully and everything is flat and flush.

☐ **Step 44 - Stab/Elevator - E7**

Locate both E7s from BP1 and BP3. These are the leading edges of the elevator and should be pinned in place.

☐ **Step 45 - Stab/Elevator - E8**

Locate both E8s from BP1 and BP3. Glue these in position, one on each E7, again flat and flush.

☐ **Step 46 - Stab/Elevator - E9**

Locate both E9s from BP1 and BP3. These are glued in place between E7 and E8 on each half of the elevator - again flat and flush.

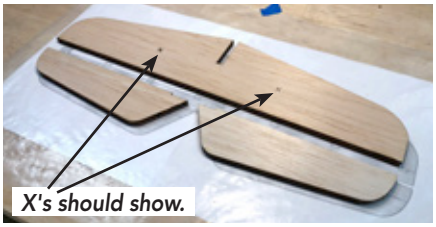
☐ **Step 47 - Stab/Elevator - ES1, ES3**

Locate ES1 from BP10 and two ES3s from BP10 and BP11. Remove any pins from the framework, lightly sand and then glue ES1 on top of the stab assembly, and one ES3 on top of each elevator half.

When the glue has cured, remove these assemblies and flip them over and lightly sand the framework to prep for the lower sheeting.

☐ **Step 48 - Stab/Elevator - ES2, ES3**

Locate ES2 from BP11 and two ES3s from BP10 and BP11.

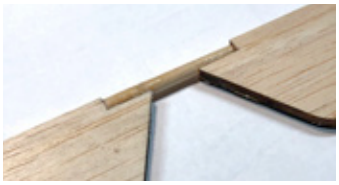


Before gluing ES2 to the stab assembly, note that it has two X's engraved. These will be important later on, so make sure you glue this piece so the X's are showing.

Also glue one ES3 on top of each elevator half.

☐ **Step 49 - Stab/Elevator - Elevator joiner**

Locate the remaining 2" length of 1/4" dowel. This is used as the joiner between the two elevator halves.



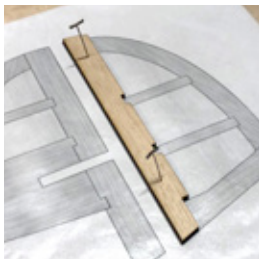
Place both elevator halves back over the plans. Glue the joiner between these two halves to form the elevator assembly. You may have to cut and sand the cutouts slightly to allow the dowel to fit properly. The dowel should also be flush with the leading edge of the elevator when properly fitted.

☐ **Step 50 - Fin/Rudder**

Tape the vertical fin / rudder plan and a fresh piece of waxed paper on your building board.

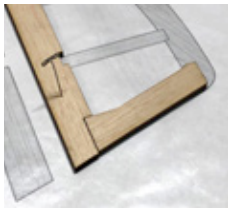
☐ **Step 51 - Fin/Rudder - VF6**

Locate VF6 from BP3. Pin it in place, making sure it is straight along it's entire length.



☐ **Step 52 - Fin/Rudder - VF7**

Locate VF7 from BP3. Glue it in place making sure it's tab is fully inserted into VF6 and it is flat against the building board.



☐ **Step 53 - Fin/Rudder - VF8**

Locate VF8 from BP2. Glue it in place to VF6 and VF7, again flat and flush.

☐ **Step 54 - Fin/Rudder - VF9, VF10**

Locate VF9, VF10 from BP3. Glue them in place between VF6 and VF8, again flat and flush.

☐ **Step 55 - Fin/Rudder - VF3**

Locate VF3 from BP3. Pin it in place.

☐ **Step 56 - Fin/Rudder - VF1**

Locate VF1 from BP3. Glue it to VF3, with it's tab fully inserted. Also flat and flush with the board.

☐ **Step 57 - Fin/Rudder - VF2**

Locate VF2 from BP3. Glue it to VF1, with it's tab fully inserted. Also flat and flush with the board.

☐ **Step 58 - Fin/Rudder - VF4**

Locate VF4 from BP1. Glue it to VF1 and VF3, with it's tab fully inserted. Also flat and flush with the board.

☐ **Step 59 - Fin/Rudder - VF5**

Locate VF5 from BP3. Glue it between VF3 and VF4, with it flat and flush with the board.

☐ **Step 60 - Fin/Rudder - VFS1, VFS2 (part 1)**

Locate both VFS1 from BP12 and both VFS2 from BP10 and BP11. One VFS1 is glued to a VFS2 forming the vertical fin's outer skin. Make sure that both pieces are flush and flat along the entire length of the joint. Make two separate skins as shown here.

☐ **Step 61 - Fin/Rudder - VFS1, VFS2 (part 2)**

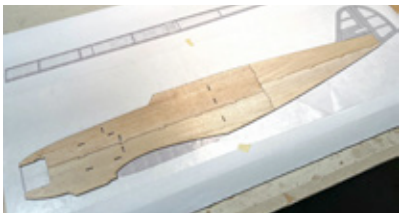
Locate both vertical fin skins from the previous step, as well as both VFS3s from BP9. Lightly sand the framework, then glue one skin and one VFS3 in place as shown. Once cured, remove these two assemblies, flip them over, lightly sand again and then glue the remaining skin and VFS3 to the opposite sides.

This completes assembly of the One-O Nine's tail surfaces. Now it's time to start construction of the fuselage.

You don't necessarily need to tape down the fuselage plan to your board, but you will need to refer to it throughout the fuselage build. However, cut off a fuselage length of waxed paper and tape that down to your board to build the fuselage on.

☐ **Step 62 - Fuselage - FS1, FS2, FS3 & FS4**

Locate both FS1 from BP5, both FS2 from BP4, and both FS3 and FS4 from BP6. These are used to form the fuselage sides.



Refer to the diagram on the fuselage plan sheet on how these notch together.

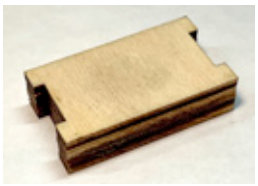
You'll use the same techniques that you used when edge gluing sheeting together for the wing and tail surfaces. The only difference being that these sheets are thicker 3/32"balsa sheets.

Start by gluing FS1 and FS2 together, making sure that the joint is flat and flush along it's entire length. Then glue FS3 and FS4 together using the same technique. Finally, glue both of these sub-assemblies together to form the completed sheet.

Make 2 completed sheets, lightly sanding both sides to make sure they're smooth and flat.

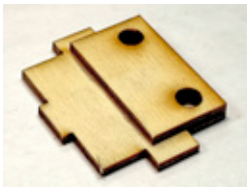
☐ **Step 63 - Fuselage - WH4**

Locate four WH4s from LP1. These are glued, one on top each other, to make a very thick WH4. Make sure they are perfectly aligned as the glue cures.



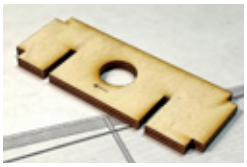
☐ **Step 64 - Fuselage - F2A, F2B**

Locate F2A and F2B from LP2. These are glued together as shown, making sure that they are perfectly aligned.



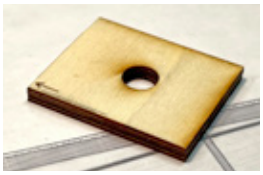
☐ **Step 65 - Fuselage - FG**

Locate both FGs from LP1. These are glued together as shown, making sure that they are perfectly aligned.



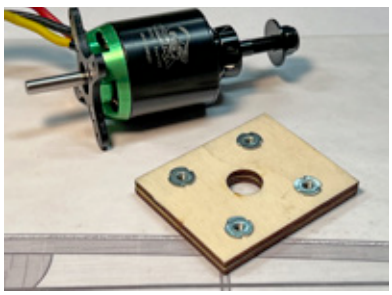
☐ **Step 66 - Fuselage - FE (electric power only)**

If you're using an electric powerplant for your One-O Nine, locate both FEs from LP2. These are glued together as shown, making sure that they are perfectly aligned.



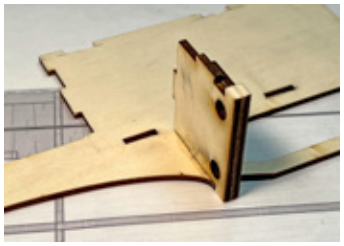
☐ **Step 67 - Fuselage - FE (electric power only)**

Also, if you're using electric to power your One-O Nine, take the time to workout how your install your motor to the FE firewall using it's hardware.



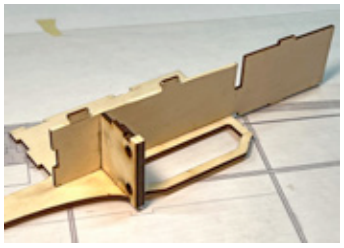
Note that there is an arrow etched into FE, designating the top and starboard side. So make sure that any t-nuts are installed from the other side, as shown here. Do this now because it will be VERY difficult to do after FE is installed.

☐ **Step 68 - Fuselage - FSP, F2A/F2B**



Locate FSP from LP1. This is the port side of the inner lite-ply structure. Place this on your board so the thin end (with the wing saddle cutout) is on the left, and the bigger end on the right. Glue the F2A/F2B assembly in place as shown here, noting it's orientation. Make sure it is 90° to FSP and it's tab is completely inserted into FSP's pre-cut slot.

☐ **Step 69 - Fuselage - BB**

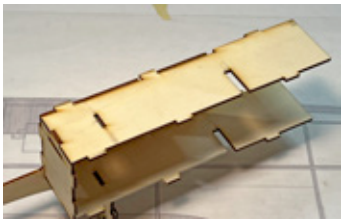


Locate BB from LP2. Test fit it in position as shown, making sure you know how all the tabs/slots fit together. Note that the tabs will extend through FSP and slightly protrude from the other side of the sheet - by design.
When satisfied on how this goes together, remove the piece, apply glue and attach it to FSP and FS2A/B.

☐ **Step 70 - Fuselage - F3**

Locate F3 from LP2. Test fit it in position as shown, making sure you know how all the tabs/slots fit together. Note that F3 has an etched circle which designates the top and starboard side. Also note that F3's tabs will also extend through FSP and slightly protrude from the other side of the part.
When satisfied on how this goes together, remove F3, apply glue and attach it to FSP and BB.

☐ **Step 71 - Fuselage - BT**



Locate BT from LP2. Test fit it in position as shown, making sure you know how all the tabs/slots fit together. Note that BT's tabs will also extend through FSP and slightly protrude from the other side of the part.
When satisfied on how this goes together, remove the piece, apply glue and attach it to FSP and F3.

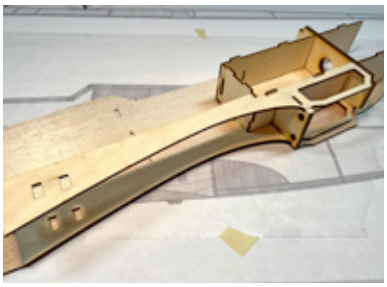
☐ **Step 72 - Fuselage - BT**

Now it's time to attach the lite-ply structure to the port side sheeting. Grab one of the fuselage side sheets you made earlier and place it so the tail is on the left, nose is on the right.
Now carefully test fit the lite-ply structure to the sheet as shown, making sure you know how all the tabs/slots fit together. This is where the extra long tabs on the lite-ply parts will aid in getting the proper alignment to the sheeting.
When satisfied that you know how this goes together, remove the lite-ply structure, apply glue, and then attach it to the sheeting. Pay close attention that the structure is completely flat against the sheeting along it's entire length, and that it is aligned properly, even in the area around the wing saddle. Apply weights as necessary to hold this in place as the glue cures.

☐ **Step 73 - Fuselage - FG**

Locate the FG assembly you made a few steps back. Test fit into position as shown here, noting the engraved arrow pointing towards the top of the fuselage. Lightly sand as necessary for a good, snug fit.
When satisfied with the fit, remove FG, mix up some 30 minute epoxy and glue this in position. Make sure it is completely inserted into the lite-ply structure as the glue cures.
If you're powering your One-O Nine via a glow engine, this piece will be the firewall that your mount will attach to.

☐ **Step 74 - Fuselage - FSS**



Locate the FSS from LP1. Test fit it in position as shown, making sure you know how all the tabs/slots fit together.
When satisfied on how this goes together, remove the piece, apply glue and attach it to BB, F3, F2A/B, and FG.

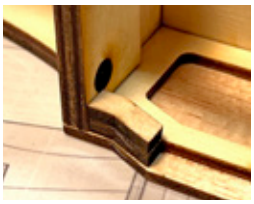
☐ **Step 75 - Fuselage - WH4**

Locate the WH4 assembly from a few steps back. This is now glued in place between FSP and FSS as shown here. Use epoxy for this step as well. Make sure to weigh down FSS while glue cures.

☐ **Step 76 - Fuselage - F1**

Locate the F1 from BP7. It is glued in place on top of BT, with F1's tabs fitting into the slots on the fuse side and on BT. *This is not a highly stressed piece, so it's made of balsa to save weight - but I will tell you I broke this piece, several times after I installed it, and on each of the prototypes. Hopefully you'll keep a lookout for it and not have the same luck.*

☐ **Step 77 - Fuselage - FS7**

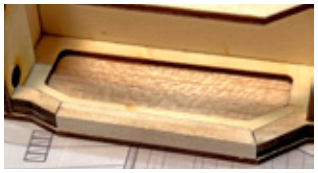


Locate two FS7s from BP2. These are glued together, stacked on top of each other, then glued in place as shown here, just forward of F2A/B.

☐ **Step 78 - Fuselage - FS6**

Locate two FS6s from BP2. These are glued together, stacked on top of each other, then glued in place as shown here, underneath BB.

☐ **Step 79 - Fuselage**



Using one of the 1/4" sq. x 36" balsa sticks, measure and cut this small piece to go between FS6 and FS7. Note the mitered angles for a proper fit. Glue this in place.

☐ **Step 80 - Fuselage - FS5**

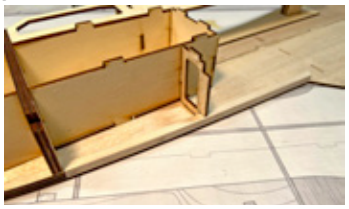
Locate two FS5s from BP2. These are glued together, stacked on top of each other, then glued in place as shown here, on top of BT.

☐ **Step 81 - Fuselage - Lower frame**

Using the same 1/4" sq. balsa stick you just trimmed a piece from, measure, cut and glue in the strip which goes along the bottom of the fuselage sheeting from the rear edge of FSP to the aft end of the fuselage. Cut this piece a 1/4" or so long.

As this piece has a gradual bend in it, glue it a little at a time as work your way from one end to the other.

☐ **Step 82 - Fuselage - Upper, forward frame**



Using the same left-over 1/4" sq. balsa stick, measure, cut and glue in the strip that runs from FG back to the angle that forms the start of the sheeting's "canopy" outline.

☐ **Step 83 - Fuselage - Upper, windscreen frame**

Using the same left-over 1/4" sq. balsa stick, measure, cut and glue in the strip that forms the front angle of the "canopy's" windscreen. Note that this will require a couple miter cuts to fit correctly.

☐ **Step 84 - Fuselage - Upper frame**

Grab another one of the 1/4" sq. x 36" balsa sticks, measure, cut and glue the strip which goes along the top of the fuselage sheeting, from the rear edge of the windscreen frame you just installed, to the aft end of the fuselage. Cut this piece a 1/4" or so long.

As this piece also has a gradual bend in it, glue it a little at a time as work your way from one end to the other.

☐ **Step 85 - Fuselage - Rear frame**

Using the same left-over 1/4" sq. balsa stick, measure, cut and glue this strip which spans the distance between the upper and lower framing at the aft of the fuse.

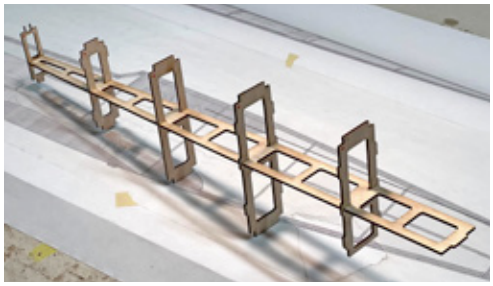
☐ **Step 86 - Fuselage - F4 - F9**

Locate F4, F5, F6, F7, F8 and F9 from BP7 and BP8.

These are all glued together to form the inner "spine" of the fuselage.

Note that F4-F8 have circles etched in them to designate the top of the formers (top of the fuselage).

It's recommend to install these one at a time, starting with F4.

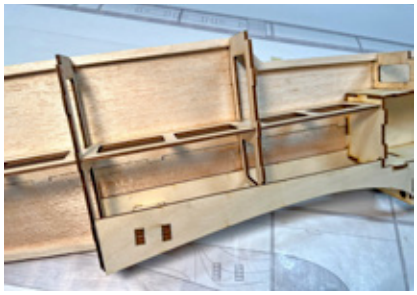


Holding F9 at an angle, insert it into the upper cutout in F4. Now move F9 so that F4 is at the first set of cutouts in F9. By slowly rotating F9 so it's horizontal in F4's cutout, you can push it down to the cross-brace of F4. F4 should be glued in place, making sure it's perfectly perpendicular F9 as shown.

Now, work your way rearwards, installing F5, F6, and F7 in the same way. Again, make sure you have them oriented the correct way.

Once you get to F8, it's simply pressed on to the tab on the back of F9, again making sure it's the right-way-up and perpendicular to F9.

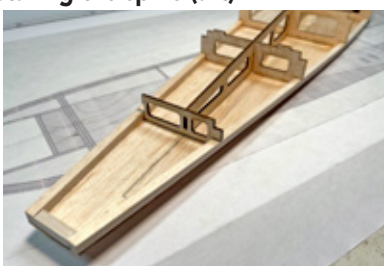
☐ **Step 87 - Fuselage - Installing the spine (fore)**



To install the spine, test fit the forward part of the spine (F4 and F5) into the fuselage side as shown here. There's a tab on the front of F9 that needs to fit into F3's cutout. Also the 1/4" fuselage's framework needs to fit into the notches cut into F4 and F5.

When you're satisfied on how this goes together, remove the spine, apply glue to the outer edges of F4 and F5, as well as the portion of F9 that runs from F5 to F3. Glue this in position making sure it's firmly inserted in all the above-mentioned places.

☐ **Step 88 - Fuselage - Installing the spine (aft)**



Once the glue has cured from the previous step, it's now time to glue the aft portion of the fuselage to the rest of the spine.

Do this little by little, working your way rearwards to give you the best chance of not introducing a twist into the fuselage.

☐ **Step 89 - Fuselage - Starboard sheeting**

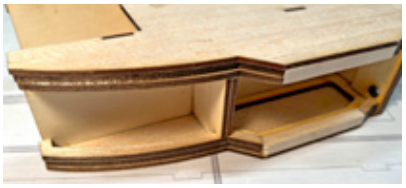
Locate the other fuselage side sheet you made way back when. It's now time to install it on the starboard side.

Focus on the front portion of the install first - the flattest portion of the fuselage, from F5 forward. Test fit the sheeting in place, making sure that all the tabs will fit into the pre-cut holes in the sheeting.

When you're satisfied with the fit, remove the sheeting and apply glue to the outer edges of the formers and plywood structure.
Take your time and again make sure everything is flat so no twists are being introduced into the fuselage.

☐ **Step 90 - Fuselage - Starboard sheeting**
Once the glue has cured, start to work your way rearwards, gluing each of the formers to the side. Again, take your time, working one former at a time and make sure you're not introducing a twist.

☐ **Step 91 - Fuselage - Forward lower framing**



Locate two FS6s and two FS7s from BP2. Just as you did for the port side, stack the like pieces together and glue them in position to the inside of the starboard sheeting. When these are in position, cut a 1/4" sq. balsa strip to go between FS5 and FS7. (You may have scrap left over for this, but if not, cut it from the end of another uncut 1/4"s x 36 balsa stick.)

☐ **Step 92 - Fuselage - FS5**

Locate two FS5s from BP2. Just as you did for the port side, glue them together and install them, mirroring on the starboard side what you did on the port side of the fuselage.

☐ **Step 93 - Fuselage - Upper, forward frame**

Using the leftover 1/4" sq. balsa strip, cut and install the framework that runs from FG back to the windscreen, then the smaller mitered piece for the windscreen. Glue these in position.

☐ **Step 94 - Fuselage - Rear frames**

Using 1/4" sq. balsa strips, cut and install the top and bottom framework for the starboard side. The top runs from the windscreen to the aft of the fuselage. The bottom piece runs from the back of the lite-ply structure to the aft of the fuse.
Also cut and install the small piece that runs between the top and bottom frames, at the rear of the sheeting.

☐ **Step 95 - Fuselage - Sanding**
Lightly sand the rear of the fuselage to remove any extra length of the framework, truing it up.

☐ **Step 96 - Fuselage - Fin cutout**

While we're at the rear of the fuse, the inner 1/4" framework should touch each other. However, a gap needs to be made to allow the vertical fin to be slotted in place, a few steps down the road. Mark and cut a gap that's 1/8" wide, removing equal amounts from either side as shown here.

☐ **Step 97 - Fuselage - Battery cutout**

On the starboard side of the fuselage, you'll need to cut away the sheeting to expose the battery pocket. Cut out the area between BB and BT (top to bottom) and FG and F3 (fore to aft).
Dont' try to do this all at once. Make a smaller hole as shown here, then carefully work your way to edges of the inner lite-ply structure. Remember, it's a heck of a lot harder to put material back on than take it off.

☐ **Step 97 - Fuselage - Top cross-frame**

Using left-over 1/4" sq. balsa strip, cut and install a cross-frame that runs between the FS5 pieces on the top side of BT. When installed, lightly sand this cross-frame so it matches the fuselage curvature.

☐ **Step 98 - Fuselage - Lower cross-frame**

Using left-over 1/4" sq. balsa strip, cut and install a cross-frame that runs between the FS6 pieces on the bottom side of BB. There are two pieces which are stacked. When installed, lightly sand this cross-frame so it matches the curvature of the nose.

☐ **Step 99 - Fuselage - FS8, FS9**

Locate both FS8s and FS9s from BP9. One FS8 and FS9 are glued together to form a longer piece, as shown here. The tab is offset so there's only one way it only fits together correctly. Make 2 pieces.

☐ **Step 100 - Fuselage - FS8, FS9 install**

The FS8/9 pieces you just made are installed next. These are used to reinforce the canopy area between F4 and F5. Although a little hard to see here, refer to plans on how these are installed on

the side sheeting, up against the 1/4" sq. balsa framework. Do this for both side of the fuse.

☐ **Step 101 - Fuselage - FS10**

Locate both F10's from BP9 and glue them on each side of the fuselage, just behind F5, up against the 1/4" sq. framework. Again, refer to plans for exact placement.

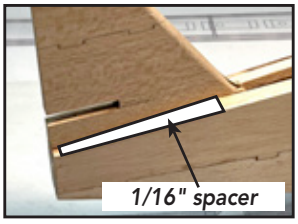
☐ **Step 102 - Fuselage - FS11**

Locate both F11's from BP9 as they are used to strengthen the area right behind the wing saddle. Glue them on each side of the fuselage, just behind F5, up against the lower 1/4" sq. framework. Again, refer to plans for exact placement.

☐ **Step 103 - Fuselage - Vertical fin spacers**

Locate some scrap 1/16" sheeting, perhaps the long scrap strips from BP10 and BP11. Cut two pieces roughly 3" long to use a spacers in the next step.

☐ **Step 104 - Fuselage - Vertical fin**



Locate the vertical fin that you assembled earlier. Test fit it in place first by sliding it into the rear of the fuselage, through the cutout that made in the rear of the fuselage. The front of the fin should fit into the cutout in the top of F8 and the rear of the fin should be aligned with the rear of the fuselage sheeting.

Use the two spacers that you cut in the last step to slide under each side of the vertical fin's outer sheeting to get the proper height. Pin (or tape) those spacers in position. With everything in position, double check that the vertical fin is perfectly straight by "eyeing" down the fuselage from the nose. If it's off a little, sand the slot you cut into the fuselage as necessary to make fine adjustments.

When satisfied, remove the fin, apply glue, then attach it to the fuselage (but not the spacers). Remove the spacers once the glue has cured and you should have gaps like these.

☐ **Step 105 - Fuselage - SR**

Locate eight of the SRs from LP1 and LP2. These are glued together in pairs to form elevator and rudder servo mounting rails. You should end up with 4 perfectly aligned rails.

☐ **Step 106 - Fuselage - Servo installation.**

This might seem like a strange time to think about where your elevator, rudder, and throttle (if glow) servos will be mounted, but actually it's the perfect time. After the top and bottom sheeting is applied, access to the inside of the fuselage is quite a bit trickier. You'll see on the plans that I've called out a few locations that are suggested servo mounting spots. The reason I chose this is that the servos are easily accessible through the wing-saddle, no extra hatches are needed, and they're easy to mount on to the lite-ply structure already in the fuselage.

So, do this for the elevator and rudder servos, glue one of the SR rails to each side of F4, so they rest up against the flat on the FSP and FSS sides (see the plans for a detailed look at what I'm on about here. From there you can use your servos to determine where the other two SRs should be mounted (making sure you leave a little "wiggle-room" so the servos can be removed. Once the SRs are glue in place, go ahead and drill the mounting holes and temporarily screw them in place.

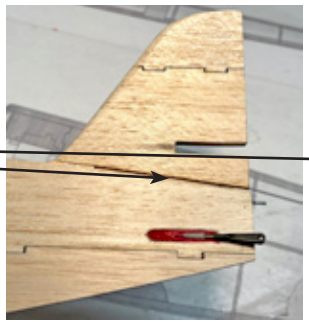
If you're going glow, the throttle servo can be mounted forward of these servos by making up another pair of SRs. It might be best to temporarily mount your engine to get an idea on how best to snake the throttle pushrod to the engine. And you'll have to drill a hole or two to make that work properly for your setup.

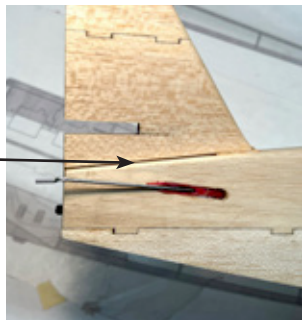
☐ **Step 107 - Fuselage - Pushrod installation.**

Since the servos are in, it's also time to mount the pushrods, as again, once the sheeting is installed, you can't get to this area.

We choose to use DuBro's 2-56 Laser-Rod system in our prototypes as the pushrods flexibility works out well in the One-O Nine.

Here are a couple of suggested exits for the pushrods. On the left is shown the rudder exit, and the elevator on the right picture. Note that the elevator is raised up because of the elevated stab and elevator control horn. (You're mileage may vary, but this should help get you close.)





Also when installing the outer sheath of these sorts of pushrods, you'll need to tack them to the fuselage structure in several places so they won't move or bend while in action.

☐ **Step 108 - Fuselage - Sanding**

Lightly sand the top and bottom of the fuselage to remove any excess glue and make sure the surfaces are level, as you'll be installing cross-sheeting in the next few steps.

☐ **Step 109 - Fuselage - Top cross-sheeting**

Locate one of the uncut 1/16" x 4" x 24" balsa sheets. You'll use

this same sheet to create all of the cross-grained sheeting for the fuselage.

This is done a piece at a time, starting at the base of the "canopy's" windscreen. Hold the 1/16" sheeting against the fuselage, making sure the grain is cross-ways. Mark, cut and glue a portion of the sheeting in position. Repeating this technique, work your way forward to the nose.

Also cut the piece needed to form the angled "windscreen". It will need a slightly mitered edge to match the sheeting you already installed. Sand that edge to achieve the correct angle.

☐ **Step 110 - Fuselage - Bottom cross-grained sheeting**

Flip the fuselage over and create the pieces needed to cover the area from the front of the wing saddle forward to the nose - again from 1/16" balsa sheeting.

It will take several pieces to properly form the "hump" and make sure you properly bevel them for the correct fit.

☐ **Step 111 - Fuselage - Rear cross-grained sheeting**

Finish sheeting the fuselage with more of the 1/16" sheeting. The top can be sheeted from the windscreen, all the way aft to the vertical fin. Then, when you reach the vertical fin, the pieces that surround it can be length-grain, rather than cross grain - and those two pieces should slide in, under the fin's outer sheeting, just like the temporary spacers did earlier.

Flip the fuselage over the complete the fuselage sheeting by starting at the rear of the wing saddle and working your way back to the rear of the fuselage.

☐ **Step 112 - Fuselage - FES (electric power only)**

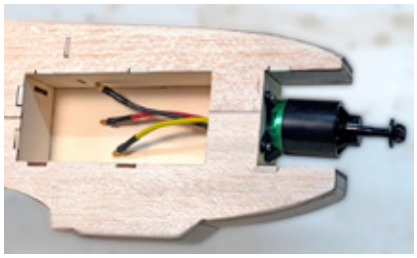
If you're powering your One-O Nine with an electric powerplant, locate both FESs from LP2. Note that they're not perfect rectangles - they're slightly quadrilateral so they'll only properly fit one way, allowing them to match the downthrust of the FG (already installed). You'll glue one of these to the inside surface of side sheeting up-against FG - on both the port and starboard sides.

Also locate the 3/16" x 12" sq. basswood strip. Cut two 2-1/4" lengths, then glue them to the edge of the FES pieces you just installed. These two pieces will give more surface area for the electric firewall to grab on to, in the next step.

☐ **Step 113 - Fuselage - FE (electric power only)**

If you're powering your One-O Nine with an electric powerplant, locate the FE made earlier in the build. This is now going to be epoxied in place as it's the firewall for your electric motor. You should have already installed the t-nuts that came with your mount, and if you remember, this piece has an engraved arrow designating the top of the firewall.

So mix up a little 30 minute epoxy and glue FE in place as shown here. Also shown is a mounted motor, with the wires running into the battery pocket, through the hole in FG. No need to mount the motor now, but use this an example when mounting your motor later on.

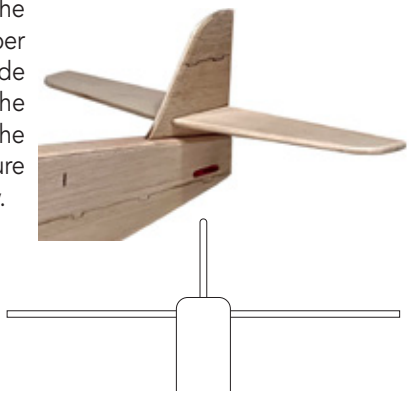


☐ **Step 114 - Fuselage - Sanding**

Before attaching the horizontal tail, take the time to sand the fuselage. The sides should obviously be smooth, but the edges of the fuse can also be rounded off nicely, due to the 1/4" inner frame-work. Don't go nuts, as there's a limited amount of rounding you can do, but you can sand in a nice looking radius on all four edges of the fuse.

☐ **Step 115 - Fuselage - Attach the stab**

Now it's time to attach the horizontal stab. Remember way back when you made the stab, there are Xs on the sheeting that designates the bottom side, so make sure you slide it in the right way.

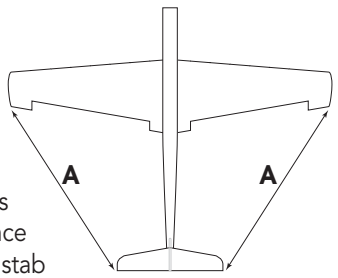


Lightly sand the opening of the stab and/or rudder to get a snug, slop-free fit. Also, make sure that the stab is perpendicular to the vertical fin - *maybe use one of those triangle things talked about back the first step of this manual*. When you're satisfied with the fit, remove the stab, apply glue and push it back in to place.

☐ **Step 116 - Fuselage - Attach the wing**

To attach the wing you'll obviously need the wing that you built earlier. If you haven't already, you'll need to do a quick sanding of the wing's leading edge, from the center of the wing out about 2 inches on either side. You'll need to round off the leading edge to the airfoil shape so it will fit correctly into the wing saddle. Also flatten the area between the two dowels, where the wing butts-up against F2A/B.

When finished, insert the wing into the fuselage, making sure the front dowels slide smoothly into the holes in F2A/B. If they don't fit as nicely as you'd like, don't mess with the dowels. Instead, file a bit on the holes until you get the dowels to slide in as they should.



To align the wing properly on the fuselage, place the wing in position, then allow the wing to rest in the wing saddle. The wing is perfectly aligned when the distance from the port wing tip to the port stab

tip is the same the distance when measured from the starboard wing tip to the starboard stab tip.

☐ **Step 117 - Fuselage - Drill wing bolt holes**

With the wing aligned, drill two 3/16" holes for the wing bolts, using the pre-cut holes in WH1 as a guide. Use caution to make sure the wing does not move until both holes are drilled.

When drilling, take your time and make sure the drill is held so the bit is in the center of the wing holes. This will guarantee that the holes drilled in WH4 will be perpendicular with the wing's sheeting. This will make it so the wing bolt goes in at an angle, but the screw's head will be flat on the wing surface. Remove the drill, remove the wing and clean up around the new holes you drilled.

Run a 1/4x20 tap through the WH4 pieces so that the wing bolts will thread into this block. A few drops of thin CA will help strengthen and secure the threads you've cut. We've found this to be a very secure way of holding the wing in place for all of our prototypes, but... if you don't want to go this way, you can also use 1/4x20 t-nuts (not included). If you go that route, you may also need slightly longer bolts, but that's something you'll have to find out for yourself.

☐ **Step 118 - Stab - Supports**

Using the leftover 3/16" sq. basswood strips, measure and cut two pieces that will be used at the supports. The full-scale 109 had these, and it's a good idea to use them here as well, to support that raised stab.

Now, after all this time, here's why there are Xs etched in the stab's bottom sheeting. These mark the two solid mounting points where the stab supports should be attached.

Both of these supports will be roughly 2-7/8" long, with bevels cut on each end so they'll fit properly against the bottom of the stab and the side of the fuselage. You'll need to adjust these to suit.

Don't glue these on now - wait until after the fuselage is covered.

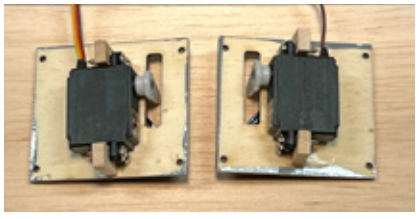
☐ **Step 119 - Servo wire exits**

If the wing is not mounted to the fuselage, quickly slip it in place and grab a couple strips of tape. What you need to do is use the tape to mark the width of the fuselage by sticking the tape onto the wing, up against the fuse sides.

Remove the wing and set the fuselage aside. You'll now need to make to cutouts in the upper surface of the wing for the servos wires to exit. But, because the fuselage is narrow, you can't make the usual, large holes. These holes will be cut on either side of the R1 ribs and they're roughly 4" back from the leading edge of the wing. Make slots that are just wide enough to comfortably pass your servo's connector through, and because of the tape, you know the absolute limits of how wide these holes could be, minus the width of the fuse sides.

☐ **Step 120 - Servo hatch**

Locate both SHs from LP4. These are the servo hatches, and the servos are mounted to the underside of them.



Using your leftover 3/16" x 3/8" basswood, cut 4 pieces that are roughly the same width as your servos. Lightly sand the ends of the rails to true them up.

Now take one SH and place your servo on it as shown. Make sure that the servo arm is centered in the slot in both directions. Now carefully glue one of the standoffs you just created to SH, on each side of the servo - as shown in the photo. Take care not to glue the servo to these pieces, or to SH.

So the same for the other hatch, but make sure it's a mirror image of the first one.

You can then mount your servos to these rails using whatever hardware was supplied the servos - and drilling the appropriate sized mounting holes into the rails.

Now fit the servo hatches into position on the bottom of the wing. Using the holes pre-cut into SH as a guide, drill four 3/32" mounting holes into the basswood rails you installed. Harden the wood with a bit of thin CA and you can use the supplied 2-56 x 3/4" self tapping screws to secure the hatches in place.

☐ **Step 121 - Sanding**

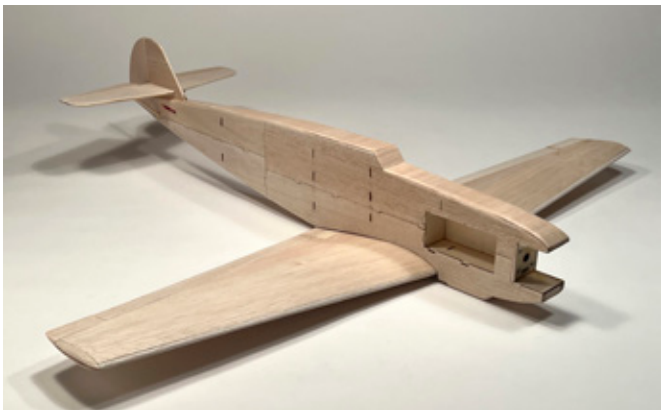
It's final sanding time and the time to get quite familiar with the sanding tools of your choice. Take the time to perform a good sanding, rounding the wing's leading edge and blending it into the wingtips. Go over the entire wing, making sure the sheeting is smooth and the trailing edges are blended into the tips. Pound out the extra time on those wing tips to make sure they are smooth, perfect works of art and match each other exactly.

Go over the fuselage one more time making sure everything is smooth

Round the leading edge of the stab as well as the trailing edges of the elevator and rudder. Sand bevels into the leading edge of the elevator halves, the rudder, and the ailerons.

The idea is to spend some time caressing this awesome airframe you've created, smoothing the rough edges until it's something so slippery that it will cut through the air like a knife through melted butter.

What you should end up will be thing of beauty - something that looks pretty darn close to this.



This completes assembly of the One-O Nine airframe.

☐ **Tank / Battery compartment fuel proofing**

If you're using a glow engine, it is strongly recommended that you fuel proof the inside of the tank compartment. As you know, fuel has a nasty way of penetrating wood, causing it to disintegrate over time. Spray (or brush) this on, also remembering to protect the firewall.

☐ **Control horns, servo & pushrod installation**

Although you can install the servos and control hardware after covering your One-O Nine, we find it easier to temporarily mount everything in place before covering. This way you have unblocked access inside the fuselage and wings to get the servos, extensions, and pushrods in place.

Shown in the following photos are an examples of the radio gear's installation in one of the One-O Nine prototypes.

Take a bit of time to plan things out.

Covering

Now it is time to cover the One-O Nine. Remove the powerplant, pushrods, and any other components that would get in the way of applying the covering.

Double check that all surfaces are smooth and ready to cover. Sand as necessary, then cover the entire airframe with the covering/finish of your choice.

When the covering is complete, re-attach all the components you removed earlier in this step.

Logos, numbers, etc.

This is where you really get to be creative. There are seemingly hundreds of different color schemes that were used on the full scale 109's - well maybe not hundreds, but you get the idea. And since this isn't a model that will be part of any scale competition, feel free to mix and match details from any of them to get the look that's right for you.

If you want to use some great pre-made, vinyl-cut graphics, Old School Model Works has teamed up with Callie Graphics as a supplier for pre-cut vinyl. Callie has been our go-to-girl for all our vinyl graphics. She's a very well known provider of custom graphics for R/C models and can work with you to design just what you need, as I've have supplied her with full-size outlines of the OSMW One-O Nine to work from.

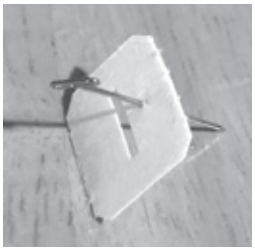
You can order straight from her, choosing the colors that work for you. Contact Callie Graphics at this link: https://callie-graphics.com or scan the QR code.

Note that Callie Graphics is not affiliated with Old School Model Works, nor does Old School Model Works generate any income from this partnership.

Attach the Control Surfaces

Now is the time to attach all the control surfaces to the airframe, by gluing the hinges in position with thin C/A. We've noted suggested hinge locations for each of the control surfaces on the plans.

When using the CA hinges, first push a pin through on side, at the center of the hinge as shown here. This will keep the hinge centered as it's pushed into the surfaces. When you've got all the hinges for a surface in place, then remove the pins and glue the hinges.



Make sure that you attach the elevator first, then the rudder.

Optional 3" Spinner

All full-scale 109's had a spinner. It wasn't the typical spinner as it had a "flattened", blunt profile. I've duplicated that on our prototypes using a standard DuBro 3" plastic spinner. I've also made a short tutorial video on how we did it. You can view it at this link:

https://youtu.be/MJMmRsVrCxgClick

This completes the assembly of the One-O Nine. Now you'll need to adjust the control throws and check for balance.

Recommended C.G. setting:

An important part of preparing the aircraft for flight is properly balancing the model. This is especially important because of the various motor/battery combinations that can be used.

CAUTION! DO NOT SKIP THIS STEP!

The recommended Center of Gravity (CG) location for the One-O Nine is 2-15/16" from the leading edge of the wing, as measured at where the wing contacts the fuselage, and you'll see this marked on the fuselage plan with this symbol.

C.G. BALANCE POINT

If necessary, move the battery, receiver, and/or add weight to either the nose or the tail until the correct balance is achieved. Stick-on weights are available at your local hobby store and work well for this purpose.

Recommended Control Throws:

The amount of control throw should be adjusted as closely as possible using mechanical means, rather than making large changes electronically at the radio.

By moving the position of the clevis at the control horn toward the outermost hole, you will decrease the amount of control throw of the control surface. Moving it toward the control surface will increase the amount of throw. Moving the pushrod wire at the servo arm will have the opposite effect: Moving it closer to center will decrease throw, and away from center will increase throw. Work with a combination of the two to achieve something relatively close to these throws that are good for everyday sport flying. If competing in pattern, you'll probably want to dial these down a bit to give a smoother appearance to your maneuvers.

Aileron 3/8" up/down (35% expo)

Elevator 1/2" up/down (25% expo)

Rudder 1-1/4" left/right (20% expo)

(Expert tip: Once the control throws have been set, cut a few pieces of medium silicone fuel tubing (or heat shrink tubing) to go around each of the clevises. This will keep them from opening during flight.)

Preflight:

Charge both the transmitter and receiver pack for your airplane. Use the recommended charger supplied with your particular radio system, following the instructions provided with the radio. In most cases, the radio should be charged the night before going out flying.

Check the radio installation and make sure all the control surfaces are moving correctly (i.e. the correct direction and with the recommended throws). Test run the engine and make sure it transitions smoothly from idle to full throttle and back. Also ensure the engine is tuned according to the manufacturer's instructions, and it will run consistently and constantly at full throttle when adjusted.

Check all the control horns, servo horns and clevises to make sure they are secure and in good condition. Replace any items that would be considered questionable. Failure of any of these components in flight would mean the loss of your aircraft.

Range check your radio before flying

Before each flying session, range check your radio. This is accomplished by turning on your transmitter with the antenna collapsed. Turn on the radio in your airplane, but do not attach the arming switch.

With your airplane on the ground, you should be able to walk 30 paces away from your airplane and still have complete control of all functions.

If not, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

Warranty Information

Old School Model Works guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any parts damage by use or modification. In no case shall **Old School Model Works'** liability exceed the original cost of the purchased kit.

If you find any damaged or missing parts, contact us within 60 days from purchase to receive replacement(s).

Further, **Old School Model Works** reserves the right to change or modify this warranty without notice.

In that **Old School Model Works** has no control over the final assembly or material used for the final assembly, no liability shall be assumed nor accepted for any damage of the final user-assembled product. By the act of using the product, the user accepts all resulting liability.

Limit of Liability

In the use of this product, our only obligation shall be to replace such quantity of the product proven to be defective. The user shall determine the suitability of the product for his or her intended use and shall assume all risk and liability in connection therewith.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and un-opened condition.

As of this printing, you are required to register with the FAA if you own this product.

For up-to-date information on how to register with the FAA, visit https://registermyuas.faa.gov .

For additional assistance on regulations and guidance of UAS usage, visit knowbeforeyoufly.org .

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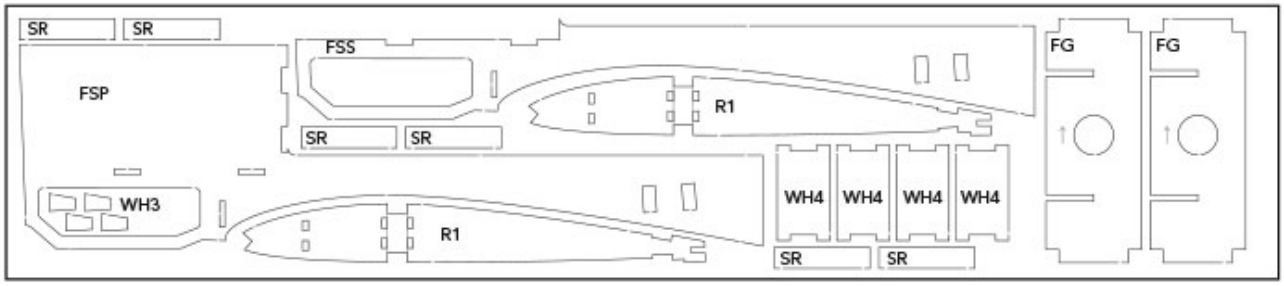
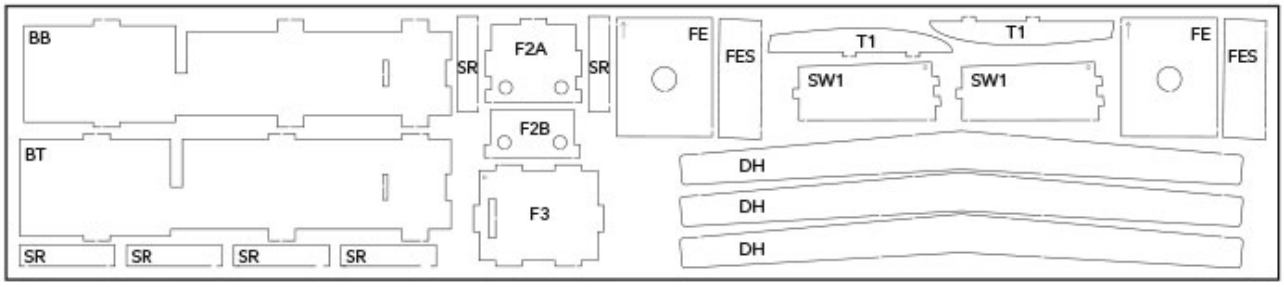
Twitter: www.twitter.com/oldschoolmodels

See photos of our kits and customer builds on Flickr: https://www.flickr.com/photos/oldschoolmodelworks/

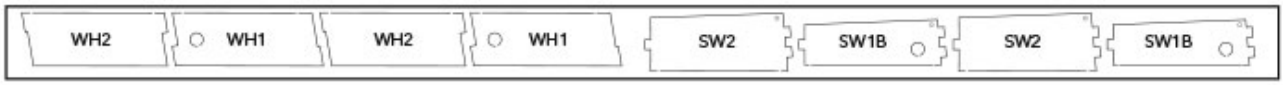
LP1
1/8" Lite Ply



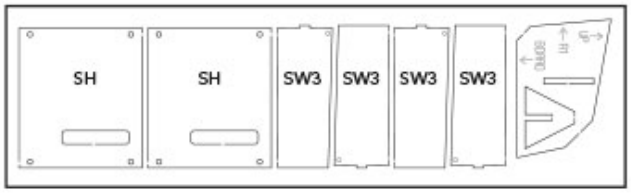
LP2
1/8" Lite Ply



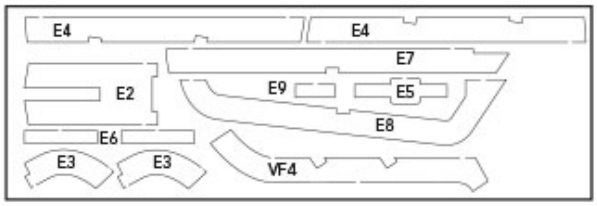
LP3
1/8" Lite Ply



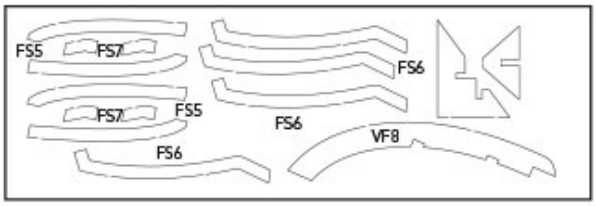
LP4
1/8" Lite Ply



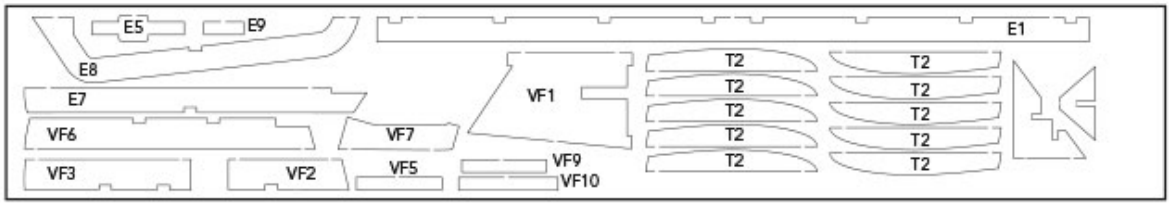
BP1
1/8" Balsa



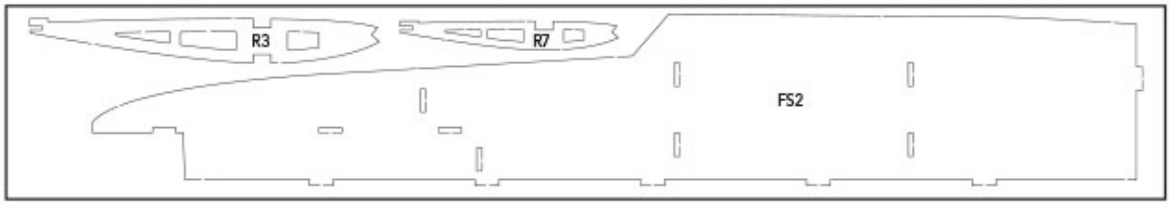
BP2
1/8" Balsa



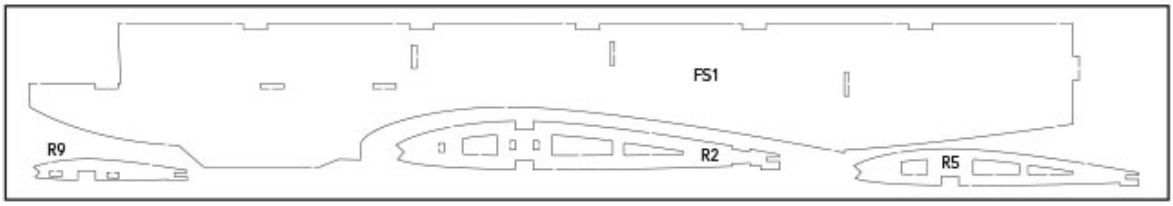
BP3
1/8" Balsa



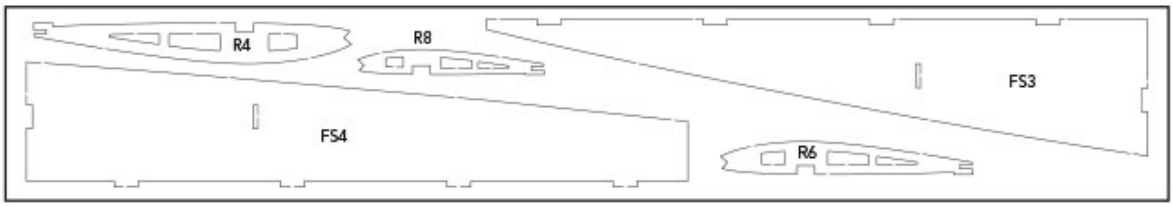
BP4
3/32" Balsa



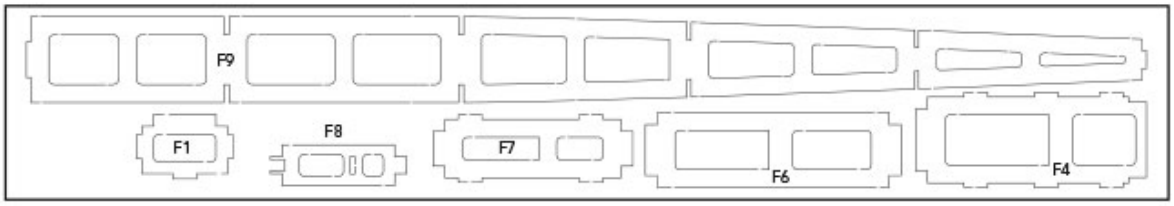
BP5 3/32" Balsa



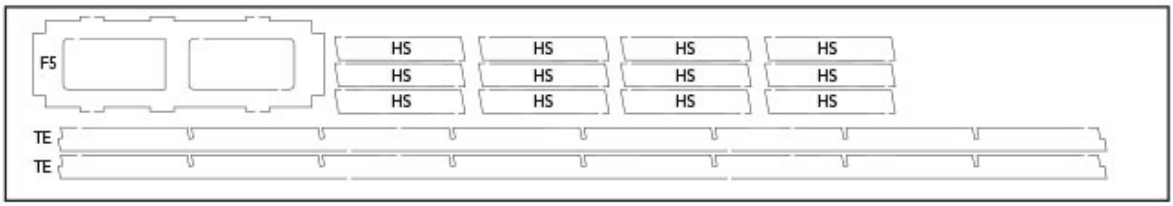
BP6 3/32" Balsa



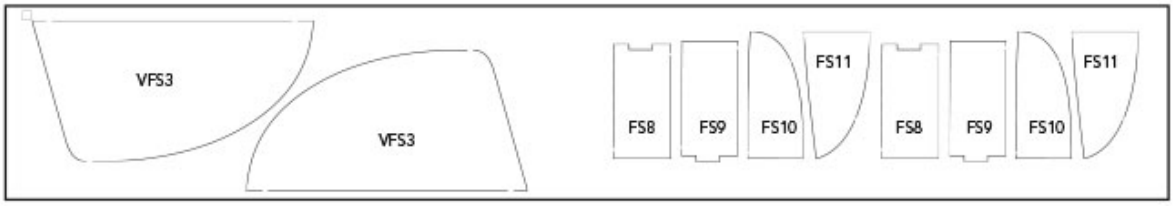
BP7 3/32" Balsa



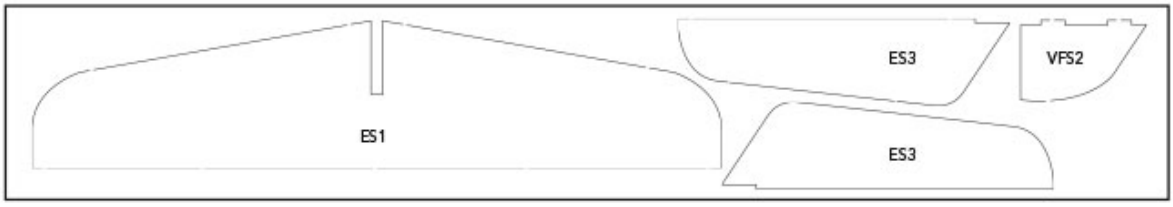
BP8 3/32" Balsa



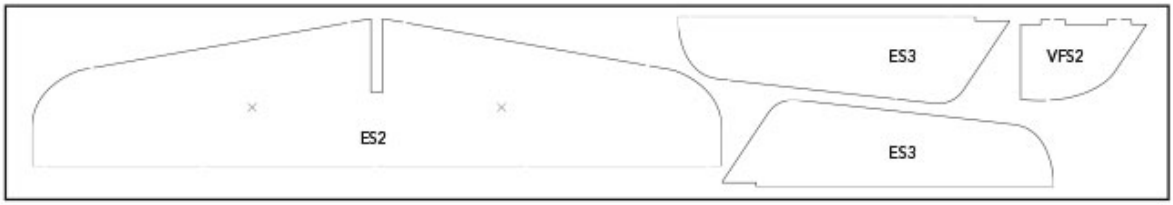
BP9 1/16" Balsa



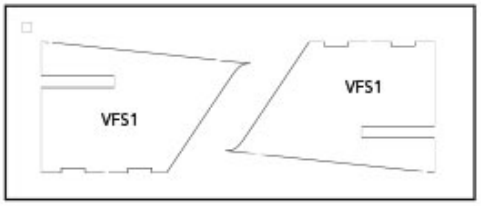
BP10 1/16" Balsa



BP11 1/16" Balsa



BP12 1/16" Balsa



One-O Nine Aileron Hatch template