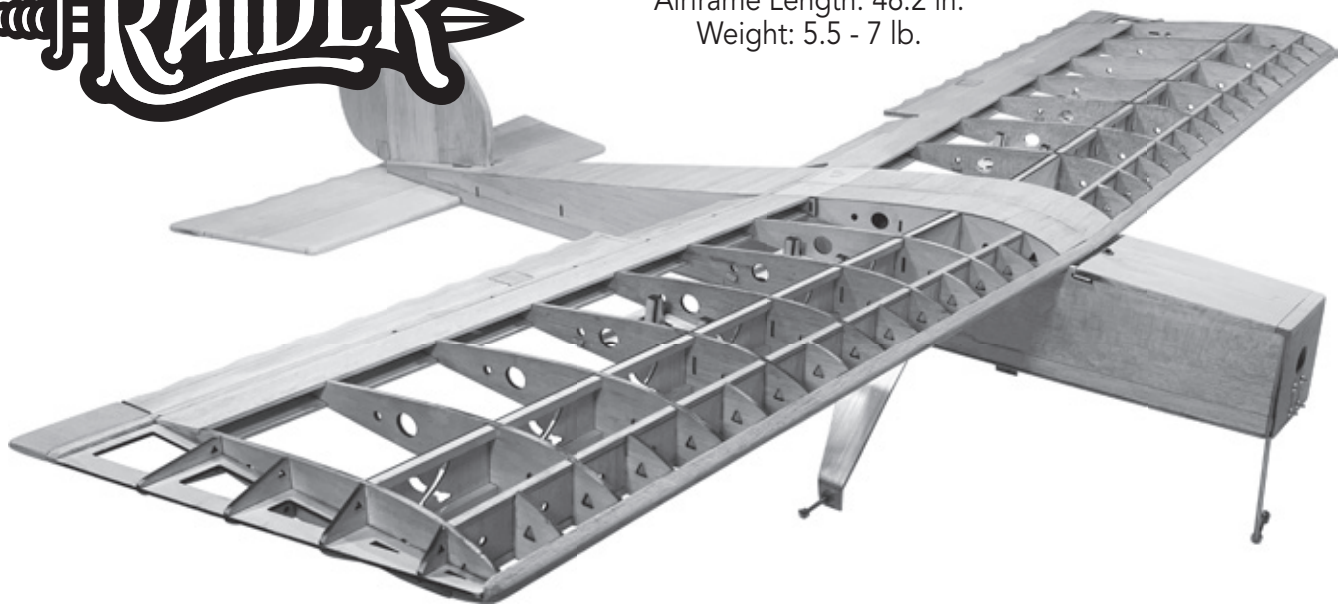
RAIDER

Specifications:
Wingspan: 70 in.
Wing Area: 720 sq in.
Airframe Length: 46.2 in.
Weight: 5.5 - 7 lb.



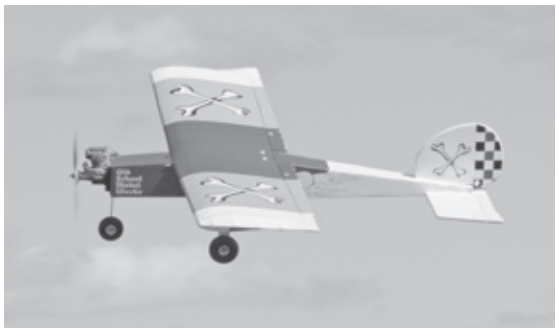
CONSTRUCTION MANUAL

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 checkbox (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 left and right wing halves, these steps must be performed at two different 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 an 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.

WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

INCLUDED ITEMS

Wood parts included in this kit:

- 2 LP1 - laser cut 1/8" x 5" x 24" lite ply
- 2 LP2 - laser cut 1/8" x 5" x 24" lite ply
- 2 LP3 - laser cut 1/8" x 2" x 24" lite ply
- 1 LP4 - laser cut 1/8" x 5" x 24" lite ply
- 1 LP5 - laser cut 1/8" x 5" x 24" ply
- 1 LP6 - laser cut 1/8" x 3" x 24" ply
- 1 LP7 - laser cut 1/16" x 3" x 6" ply
- 1 D1 - laser cut dihedral brace - 1/4" ply
- 1 F1 - laser cut firewall - 1/4" ply

- 2 BP1 - laser cut 1/8" x 4" x 24" balsa
- 2 BP2 - laser cut 1/8" x 4" x 24" balsa
- 1 BP3 - laser cut 1/8" x 4" x 24" balsa
- 1 BP4 - laser cut 1/8" x 4" x 24" balsa
- 1 BP5 - laser cut 1/8" x 4" x 24" balsa
- 1 BP6 - laser cut 1/8" x 4" x 24" balsa
- 1 BP7 - laser cut 1/8" x 4" x 24" balsa
- 1 BP8 - laser cut 1/8" x 4" x 24" balsa
- 1 BP9 - laser cut 1/8" x 4" x 12" balsa
- 1 BP10 - laser cut 1/8" x 4" x 12" balsa
- 1 BP11 - laser cut 1/8" x 4" x 24" balsa
- 1 BP12 - laser cut 1/8" x 4" x 12" balsa
- 1 BP13 - laser cut 1/8" x 4" x 24" balsa
- 1 BP14 - laser cut 1/8" x 4" x 24" balsa
- 2 BP15 - laser cut 3/32" x 4" x 12" balsa
- 2 BP16 - laser cut 3/32" x 4" x 12" balsa
- 4 BP17 - laser cut 1/16" x 4" x 12" balsa
- 2 BP18 - laser cut 1/16" x 4" x 12" balsa
- 2 BP19 - laser cut 1/16" x 4" x 12" balsa
- 1 BP20 - laser cut 1/16" x 4" x 24" balsa
- 1 BP21 - laser cut 1/16" x 4" x 24" balsa
- 2 BP22 - laser cut 1/16" x 4" x 12" balsa
- 2 BP23 - laser cut 1/16" x 4" x 12" balsa
- 2 BP24 - laser cut 1/16" x 4" x 12" balsa
- 2 BP25 - laser cut 1/16" x 4" x 12" balsa
- 2 BP26 - laser cut 1/16" x 4" x 12" balsa
- 1 BP27 - laser cut 1/4" x 4" x 24" balsa

- 4 1/4" x 1/4" x 36" basswood strips
- 1 3/16" x 3/8" x 36" basswood strip
- 2 1/16" x 4" x 36" balsa sheets
- 4 1/16" x 4" x 12" balsa sheets
- 3 1/8" x 4" x 12" balsa sheets
- 4 1/4" x 1/4" x 36" balsa strips
- 4 3/16" x 3/16" x 36" balsa strips
- 2 5/16" x 5/16" x 36" balsa strips
- 2 1/2" x 1/2" x 36" balsa strips
- 2 1/4" x 36" dowels

Hardware parts included in this kit:

- 4 4-40 x 1" socket head cap screws
- 3 4-40 x 1/2" socket head cap screw
- 5 #4 washers
- 5 4-40 t-nuts
- 16 2-56 x 1/2" self tapping screws
- 12 2-56 x 3/4 machine screws
- 2 5/32 axle shafts w/lock nuts
- 2 5/32" wheel collars
- 2 wheel collars set screws
- 6 large control horn
- 2 1/4-20 x 2" wing bolts
- 19 CA hinges
- 1 pre-bent main gear
- 1 nose gear assembly

Other items included in this kit:

- 3 - Rolled plans (fuselage and 2 wing)
- 1 - Construction Manual
- 1 - OSMW sticker sheet

ITEMS NEEDED

Hardware needed (not included in the kit)

For some of these items there is more than one option which will require a bit of decision making 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: 900+ watt electric, 5-6s lipo, 90+ amp ESC (or .45-.61 2-stroke glow engine)
- Propeller
- Engine/Motor mount and mounting hardware
- Fuel tank and fuel tubing (if glow)
- Transmitter - (4 channel minimum, 5 if using flaps)
- Receiver - (4 channel minimum, 5 if using flaps)
- Servos: 4 standard-sized (electric), 5 (glow) - high quality, 60+ in/oz of torque or higher servos are recommended.
- Servo extensions: 2 for aileron servos (8-12")
- Y harness for ailerons (another for flaps if used)
- Pushrods - two 5.5" for ailerons, two 28" for elevator & rudder, one 16" for nose gear, one 18" for throttle, (if glow powered), (two 5.5" for flaps if used)
- Clevises for the pushrods.
- Wheels: two 2.75" for mains, one 3" for nose *(Du-Bro Chromies look great - hint, hint).*
- Covering: If you're using simple color scheme, two or three rolls of iron-on covering will be enough. You will need more if applying a more complicated livery.

Additional Required Building Tools and Adhesives

- Drill & assorted drill bits
- Hobby knife and new 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), brushes and mixing sticks
- Wood adhesives of your choice. We use medium viscosity CA (cyanoacrylate) , but aliphatic resin and/or carpenter's glues (used correctly) will work just as well and give longer working time.
- Thin CA for attaching the included hinges

We advise the following:

Closely inspect the supplied laser-cut parts for damage. If you find any damaged or missing parts, contact us within 60 days of purchase (not your dealer).

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 sharp 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. Some steps (building the wing) have two boxes - this means the step will be done twice - once now and once later (when told to repeat) for each wing half (or other part).

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 Raider 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/raider/

IF YOU READ NOTHING ELSE IN THIS MANUAL, PLEASE READ THESE FIVE POINTS.

#1 - We've done everything we can to make the Raider a fun and easy-to-assemble kit. That being said, THIS IS NOT A BEGINNER KIT. If you've never built this type of balsa kit before, you will probably experience many challenges along the way. This manual is not written for beginners; it is assumed that the builder has the skills and techniques needed for these steps.

#2 - PLYWOOD HAS SLIGHT BOWS IN IT 93.48% OF THE TIME. We don't like it, but that's the way plywood is. Because of this, we engineered the Raider to eliminate these warps whenever possible - we'll make recommendations on how to overcome them as we go along.

#3 - BALSA HAS SLIGHT BOWS IN IT 81.53% OF THE TIME. We don't like it, but that's the way balsa is. We'll make recommendations on how to overcome them as we go along.

#4 - It is very important that you assemble the Raider 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.

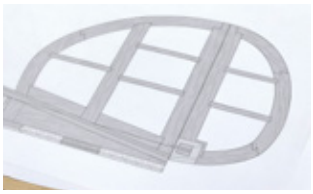
5 - Save ALL of the wood scraps as you build - ends of sticks, left over sheets, punchouts, etc. You will use some of this in assembly, and can use other parts if you need repairs.

☐ **InstaCAddy**

Throughout this manual, you'll see photos with our InstaCAddy on the bench. This is a unique collection of Bob Smith C/A glues, accelerator, and pipettes. What makes this special is the box, as it has cutouts that make it the perfect tool to hold everything in one spot - ***and the glue won't spill!*** If you're needing C/A, consider our InstaCAddy!

Let's begin construction by building the vertical fin & rudder of your Raider.

☐ **Prepare your work area**



Position the part of the fuselage plans with the vertical fin on your flat building surface and tape it into position. Tear off a length of waxed paper long enough to cover that portion and tape it over the plan.

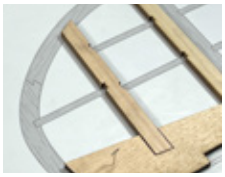
☐ **Step 1 - Vertical Fin Assembly (VF1)**

Locate VF1 from BP27 and pin this in place over the plans as shown here.

☐ **Step 2 - Vertical Fin Assembly (VF2)**

Locate both VF2s from BP10. These are glued in place, one on top of the other, as shown here. Make sure the rear tab of both VF2s are fully inserted into VF1 and the VF2s are perfectly aligned.

☐ **Step 3 - Vertical Fin Assembly (VF3)**



Locate both VF3s from BP5. These are glued in place, one on top of the other, as shown here. Make sure of the orientation of these pieces. Insert the bottom of both VF3s fully into VF1 and make sure the VF3s are perfectly aligned.

☐ **Step 4 - Vertical Fin Assembly (VF4)**

Locate both VF4s from BP2. These are glued in place, one on top of the other, as shown here. Make sure of the orientation of these pieces. Make sure they are properly inserted into VF1 and VF3, and that both VF4s are perfectly aligned.

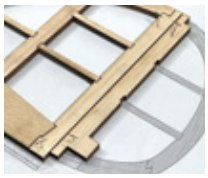
☐ **Step 5 - Vertical Fin Assembly (VF5)**

Locate both VF5s from BP5. These are glued in place, one on top of the other, as shown here. Make sure of the orientation of these pieces. Make sure they are properly inserted into VF2 and VF4, and that both VF5s are perfectly aligned.

☐ **Step 6 - Vertical Fin Assembly (VF6)**

Locate six VF6s from BP3 and BP4. These are glued in place as pairs, one on top of the other, as shown here. Then each thicker VF6 is glued in place to form the inner structure of the vertical fin, as shown here.

☐ **Step 7 - Rudder Assembly (VF7)**



Locate VF7 from BP27 and pin this in place over the plans as shown here.

☐ **Step 8 - Vertical Fin Assembly (VF8)**

Locate both VF8s from BP4. These are glued in place, one on top of the other, as shown here. Make sure the front tab of both VF8s are fully inserted into VF7 and the VF8s are perfectly aligned.

☐ **Step 9 - Vertical Fin Assembly (VF9)**

Locate both VF9s from BP7. These are glued in place, one on top of the other, as shown here. Make sure the front tab of both VF9s are fully inserted into VF7 and the VF9s are perfectly aligned.

☐ **Step 10 - Vertical Fin Assembly (VF10)**

Locate both VF10s from BP8. These are glued in place, one on top of the other, as shown here. Make sure the top tab of both VF10s are fully inserted into VF9 and the bottom tabs are fully inserted into the VF8s.

☐ **Step 11 - Vertical Fin Assembly (VF11 & VF12)**

Locate both VF11s and VF12s from BP10. Both VF11s make up the upper span, and the VF12s make up the lower - as shown here. Make sure these are fully inserted into their respective slots.

☐ **Step 12 - Vertical Fin Assembly (sanding)**

Remove all pins from the vertical fin and rudder frames you've just assembled. You can leave it on the board, as it's probably tacked in place to the waxed paper.
Lightly sand these port faces to make sure it's completely flat.

☐ **Step 13 - Vertical Fin Assembly (sheeting)**

Locate one VF13 from BP20 and one VF19 from BP18.
These are glued to the framing as shown here. Start with VF13 first, making sure it's perfectly aligned with the outer edge of the vertical fin's frame. Make sure it's pressed down completely while the glue dries.
Then attach F14, butting up against VF13 and aligning it along the top edge of the framing. Again, make sure it's perfectly flat while the glue cures.

☐ **Step 14 - Rudder Assembly (sheeting)**

Locate one VF15 from BP20 or BP21.
This is glued to the rudder frame - making sure it's aligned and flat against the framing.

☐ **Step 15 - Vertical Fin & Rudder Assembly (sheeting)**

Remove the frames from your building surface. Flip them over and lightly sand the starboard sides. Then locate another VF13 from BP20 and one VF14 from BP19. Glue these in place, just as you did on the port side in the previous step. Again, make sure both sheets are perfectly aligned and flat against the framing.

☐ **Step 16 - Fin Assembly (VF16)**

Locate both VF16s from LP7. One is glued to each of the notches in the lower corner of the rudder's sheeting, as shown here.

This completes the vertical fin & rudder assembly. Set these pieces aside and remove the fin plans from your building board.

Now it's time to build the horizontal stab and elevator of your Raider.

☐ **Prepare your work area**

Tape the horizontal stab plan over your building surface and cover it with waxed paper.

☐ **Step 17 - Horizontal Stab Assembly (E1)**

Locate E1 from BP27. Pin this down in place over the plans and use a long straight-edge to guarantee E1 is straight along it's entire length as you do this.

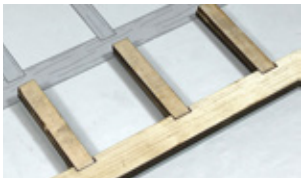
☐ **Step 18 - Horizontal Stab Assembly (E2)**

Locate four E2s from BP6 and BP7. Glue the first two E2s in place as shown here, up against E1.
Then glue the second set of E2s on top of the first two, perfectly aligned.

☐ **Step 19 - Horizontal Stab Assembly (E3)**

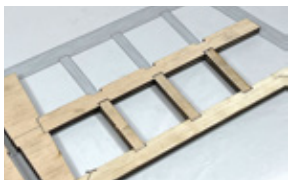
Locate both E3s from BP6 and BP7. Glue the first E3 in place as shown here, up against the E2s you just installed.
Then glue the second E3 on top of the first, as shown here.

☐ **Step 20 - Horizontal Stab Assembly (E4)**



Locate 12 E4s from BP6, BP7 and BP8. Glue the first six E4's in place, making sure they are fully inserted into the six pre-cut slots in E1.
Then glue the remaining six E4s in place, on top of the E4s you just installed, perfectly aligned as shown.

☐ **Step 21 - Horizontal Stab Assembly (E5)**

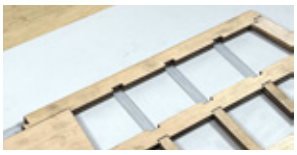


Locate four E5s from BP8. Glue the first two E5s in place, one on each side of E2/E3, making sure they are fully inserted into their pre-cut slots and each of the E4s are fully inserted into E5's pre-cut slots.
Then glue the remaining two E5s in place on top of the E5s you just installed - as shown here.

☐ **Step 22 - Horizontal Stab Assembly (E6)**

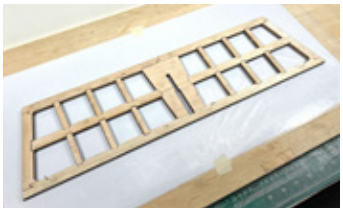
Locate four E6s from BP11. Glue the first two E6s in place, one on each side of end of the stab, making sure they are fully against E1 and E5.
Then glue remaining two E6s in place, on top of the E6s you just installed - as shown here.

☐ **Step 23 - Horizontal Stab Assembly (E7A, E7B)**



Locate four E7As and four E7Bs from BP9 and BP11. Note the notches pre-cut in these pieces, allowing one E7A and one E7B to make a longer E7 assembly.
Glue one E7A on the elevator frame to form the port leading edge.
Then glue E7B to form the starboard leading edge.
Then, glue the remaining E7A and E7B pieces on top of those just installed.

☐ **Step 24 - Horizontal Stab Assembly (E4)**



Locate the remaining twelve E4s from BP6, BP7 and BP8. Glue the first six E4's in place, making sure they are fully inserted into the six pre-cut slots in E1.
Then glue the remaining six E4s in place, on top of the E4s you just installed, perfectly aligned as shown.

☐ **Step 25 - Horizontal Stab Assembly (Sheeting)**

Remove all pins from the stab assembly you've just assembled. You can leave it on the board, as it's probably tacked in place to the waxed paper.
Lightly sand this face to make sure it's completely flat.

☐ **Step 26 - Horizontal Stab Assembly (E8, E10)**

Locate two E8s from BP24 and two E10s from BP25.
The E8s are glued on the front half and the E10s are glued to the rear half.
Make sure they are perfectly aligned with the outer edge of the framing and are pressed down completely while the glue dries.

☐ **Step 27 - Horizontal Stab Assembly (tailwheel mount)**

Remove the frame from your building surface. Flip it over and lightly sand exposed framing. Now locate the 3/16" x 3/8" basswood strip. Measure and cut a 2" length. Glue this in place into the rear

slot between the E2 pieces installed earlier, as shown here.

☐ **Step 28 - Horizontal Stab Assembly (E9, E11)**

Remove the frame from your building surface. Flip it over and lightly sand exposed framing. Then locate two E9s from BP22 and two E11 from BP23. Glue these in place, just as you did in the previous step. E9 against the leading edge, E11 against the trailing edge.
Again, make sure both sheets are perfectly aligned and flat against the framing.
Make sure they are perfectly aligned with the outer edge of the framing and are pressed down completely while the glue dries.

This completes the horizontal stab assembly. Set this aside as work now begins on the elevator.

But first, you need to make a decision.

The Raider can be made with the traditional Ugly Stik scalloped trailing edges on the elevator and ailerons. Or, it can be made with more modern straight trailing edges. Either way works just fine - just a different look. But now is the time to make that decision, as you're about to glue pieces together that can't be un-done if you change your mind.

☐ **Step 29 - Elevator Assembly (E19)**

Locate E19 from BP27. Pin this down in place over the plans and use a long straight-edge to guarantee E1 is straight along it's entire length as you do this.

☐ **Step 30 - Elevator Assembly (E11)**

Locate two E11s from BP14. Glue one of these in place, up against the E19 you just pinned down. Make sure it is flat to the board along its entire length and up against E19, as shown here.
Then glue the other E11 on top of the E11 you just installed, making sure it is perfectly aligned.

☐ **Step 31 - Elevator Assembly (E12)**

Now is where your scalloped/straight decision starts to come into play.
Locate two E12s from BP14. Glue one of these in place, into the long slot in the rear of E11 - either exposing or hiding the scalloped edge. Make sure it is flat to the board along its entire length and up against E11, as shown here.
Then glue the second E12 on top of the first, making sure it's matched up and flat along its entire length.

For the purposes of this manual, you'll see the scalloped edges, as shown here.

☐ **Step 32 - Elevator Assembly (E13)**

Locate one E13 from B21. This is glued on top of the elevator assembly, up against the leading edge and perfectly aligned with the port outer edge.

☐ **Step 33 - Elevator Assembly (E14)**

Locate one E14 from B26. This is glued on top of the elevator assembly, up against the leading edge and perfectly aligned with the starboard outer edge.

☐ **Step 34 - Elevator Assembly (E15 or E17)**

If you're going with straight edges, locate one E15 from BP26.
If scalloped edges, locate one E17 from BP26.
Glue whichever you chose so it is up against the back edge of E14, and that the cutout is aligned with the tab in E14.

☐ **Step 35 - Elevator Assembly (E16 or E18)**

If you're going with straight edges, locate one E18 from BP26.
If scalloped edges, locate one E16 from BP21.
Glue whichever you chose so it is up against the back edge of E13.

☐ **Step 36 - Elevator Assembly (CH)**

Locate one of the CHs from LP7. Glue this into the cutout in the sheeting as shown here.

☐ **Step 37 - Elevator Assembly**

Remove the elevator assembly from the board and flip it over. Now you'll attach the sheeting pieces to this side, in the same way, but... All the pieces need to be assembled mirrored to the first side so that the CH pieces will be aligned with each other.

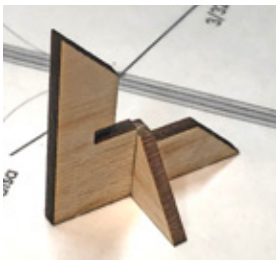
E13 first - applied to the starboard side this time.
E14 next - applied to the port side this time.
E15 or E17 - matching scalloped or straight.
Then E16 or 18 - matching scalloped or straight.

This completes the elevator assembly.
Set this aside as work now begins on the fuselage.

☐ **Prepare your work area**

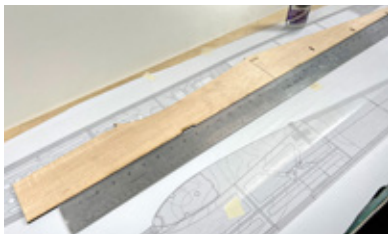
Tape the fuselage plan over your building surface and cover it with waxed paper.

☐ **Alignment triangles**



Pre-cut into LP5 are two 90° triangles that can be used to vertically align any of the upcoming parts in the construction of your Raider. LP5 also includes a pair of "feet" pieces that can be used with these triangles to hold them hands-free, vertically.

☐ **Step 38 - Fuselage Assembly (FS1, FS3)**

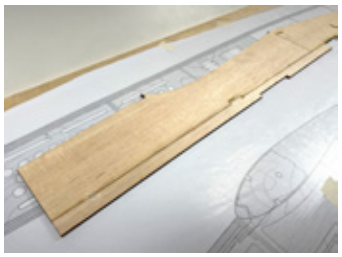


Locate both FS1s from BP3 and BP6. Also locate both FS3s from BP4 and BP7. Glue one FS1 to one FS3, as shown, to create the top of the fuselage sheeting. There's only one way in which the two pieces will correctly fit together. Once you're sure how they go together, apply glue along the edges where the two pieces will touch, then attach the two together into a single sheet. Make sure the pieces are flat along the entire joint. It's also advisable to use a straight edge along the bottom edge to make things are super-duper-straight. Make two matching FS1/FS3 assemblies.

OK, it's decision time again.

The Raider can be made with a traditional tri-cycle gear or a more modern tail-dragger gear.
Either way works just fine - they both handle grass or paved surfaces just fine. But now is the time to make that decision as you're about to glue pieces together than can't be un-done if you change your mind.

☐ **Step 39 - Fuselage Assembly (FS2)**



Now, locate both FS2s from BP5 and BP8. Note the cutout on what is the bottom of that sheet. Depending on how you glue this to the FS1/FS3 sheeting, determines where the main gear will be mounted.
Gluing it with the cutout further rearward gives you proper placement for a tricycle gear. With the cutout further forward, it gives you the taildragger option.
Whatever your decision, glue this piece to the bottom of FS1, making sure that FS2's tab is completely inserted into the cutout of FS1 and the joint between the two sheets are perfectly flat along their entire length.
Make two matching FS1/FS2/FS3 assemblies.

☐ **Step 40 - Fuselage Assembly (FS4)**

Now, locate both FS4s from BP5 and BP8. There's only one way FS4 will correctly fit. Once you're sure how it goes together, apply glue along the edges where the two pieces will touch, then attach FS4 to complete the side sheet. Make sure the pieces are flat along the entire joint.

Make two matching FS1/FS2/FS3/FS4 assemblies.

☐ **Step 41 - Fuselage Assembly (TR2, F3)**

Locate TR2 from LP4 and F3 from LP5.
Take a look at TR2 and notice that it's symmetrical, with the exception of the horizontal servo cutout - the throttle servo.
If you're going with I.C.E. power, then you'll need to visualize which side of the fuselage that your throttle control will be. Usually it will be on the right side of the fuselage, but make sure.
If it's on the right side, then you'll assemble F3 into TR2 as shown in the photo. If it's on the other side, flip TR2 over.
In either case make sure F3 is fully inserted to TR2 rests on it's cross-brace and that the two pieces are perpendicular to each other. ***Remember that 90° triangle?***

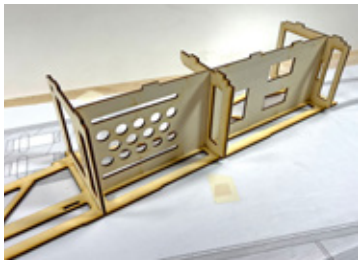
☐ **Step 42 - Fuselage Assembly (F2)**

Locate F2 from LP4. This is attached to the front of TR2, as shown here, with the tab in TR2 fully inserted into F2's cutout. Make sure it's perpendicular to TR2 as well.

☐ **Step 43 - Fuselage Assembly (F4)**

Locate F4 from LP5. This is attached to the rear of TR2, as shown here, with the tab in TR2 fully inserted into F4's cutout. Make sure it's perpendicular to TR2 as well.

☐ **Step 44 - Fuselage Assembly (FS5)**

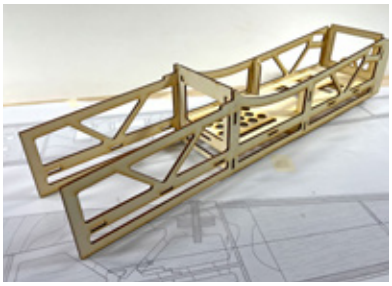


Locate one of the FS5s from LP1. Now the TR2 assembly will be attached to LP1. It's best to dry fit this first.
Lay FS5 flat on your building surface, then carefully fit the TR2 assembly in place - noting how all of the tabs fit into the pre-cut slots in FS5. There's lots to fit here, so take your time and make sure you're comfortable with how it all fits before you glue things.
When ready, remove the TR2 assembly - apply glue, and then attach it to FS5.
Make sure this is all perfectly flat on the board as you do this.

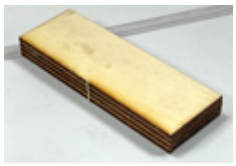
☐ **Step 45 - Fuselage Assembly (FS5)**

Locate the other FS5 from LP1. This is now glued to the other side of the assembly you've just created. Use the same dry-fitting techniques before any glue comes out. Also, make sure that it is

flat against the board until all the glue has cured. When finished, you have something that looks a whole lot like this.

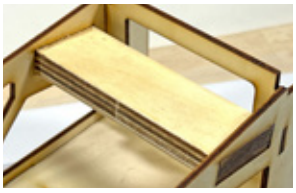


☐ **Step 46 - Fuselage Assembly (WH4)**



Locate four WH4s from LP1 and LP3.
These are glued, one on top of the other to make a thicker WH4, as shown here.
We recommend epoxy for this step, as this will be the block that holds the rear of the wing in place.
Make sure all four pieces are perfectly aligned, and you might want to clamp this all together until the glue cures completely.

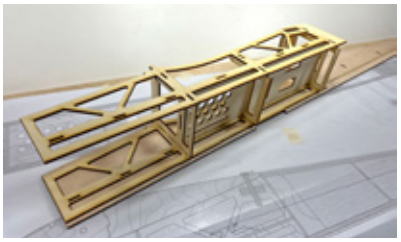
☐ **Step 47 - Fuselage Assembly (WH4)**



Once the glue has cured on the WH4 stack, you'll probably need to sand it a bit to make sure all the edges are nice and clean.
You'll now need to test-fit this into the large rectangle cutouts in the FS5 pieces. Sand as needed to get a good fit, then epoxy this into place as shown here. Clean off any excess epoxy with some denatured alcohol to keep things clean.
Make sure that WH4 is perfectly centered as well.

☐ **Step 48 - Fuselage Assembly (Starboard fuse sheeting)**

Now it's time for one of the more important steps - attaching this inner box to the starboard side sheeting.
***IT IS VERY IMPORTANT THAT THESE PIECES ARE PROPERLY ALIGNED**, as any mis-alignment can result in a fuselage that won't assemble properly, could be warped, and require a lot of trim to fly properly.*



First, lightly sand both outer sides of the inner plywood box to remove any excess glue.
Grab one of the balsa fuselage sheets that you created earlier, with the nose to the left, as shown in this photo.
Now dry-fit the plywood box to the sheet and note how it lines up. The left edges should align, and curved edges that make up the wing cradle should also be aligned. This will give a 1/4" gap along the bottom edge, which we'll take care of later.
Once you're sure, it's time to glue it in place. Place glue on each surface of the plywood box that touches the side sheeting. We recommend a slower curing glue for this step to give you working time.
Weigh the plywood box down to the sheeting to make sure it is flat while the glue cures.

☐ **Step 49 - Fuselage Assembly (Port fuse sheeting)**

Once the glue has cured from the previous step, locate the other fuselage sheet and lay it down on your building surface.
Time to attach it to the fuselage assembly using the exact same steps as you just used.

Carefully align the parts, apply glue, and weigh it down while the glue cures. Again - alignment is critical here. Both side sheets should be perfectly aligned to each other - and you can check that by pinching the rear edges together to make sure they match.

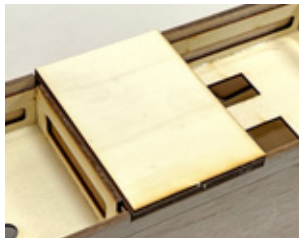
☐ **Step 50 - Fuselage Assembly (Top view)**

If you remember reading in the opening part of the manual, I mentioned to keep all of the scraps, punch-outs, etc., as they might be used later on in the build. This is just such an example.
In the photo you'll see a long punch-out of lite-ply from the FS5 pieces (you should have two). These make great "tools" for holding the fuselage in place over the plans during the next couple of steps.
Position the fuselage over the fuselage top view. With it aligned, pin these punch-outs up-against the fuselage using the dotted-outline as a guide, as shown here.

☐ **Step 51 - Fuselage Assembly (F5, F6, F7)**

With the fuselage securely held in place, it will free your hands to make sure that the fuselage sides are properly aligned with attaching these next three formers.
Locate F5 from BP3, F6 from BP4, and F7 from BP5. Paying attention to the orientation of each former, start by gluing F5 in position, EQUALLY pinching in the fuselage sides as needed.
Then do the same for F6, and then finally F7. You should have a fuselage that has a symmetrical taper, ***please no bananas!***

☐ **Step 52 - Fuselage Assembly (LG1)**



Locate three LG1s from LP1 and LP5. These are glued, one on top of the other, to make a thicker LG1. We recommend epoxy for this step, as this will be the block that holds the main gear in place.
Make sure the three pieces are perfectly aligned, and you might want to clamp this all together until the glue cures completely.
When cured, now epoxy this into the bottom of the fuselage, into the position you chose earlier (tail-dragger or tri-cycle as shown here.)

☐ **Step 53 - Fuselage Assembly (1/4" stringers)**

Locate two of the 1/4" sq. balsa strips. These are cut to length, running from the LG1 you just installed on the bottom of the fuselage, back to the start of the horizontal stab cutout.

Make sure these are pushed completely into the notches of each former and glued to the outer sheeting.

☐ **Step 54 - Fuselage Assembly (tail surfaces)**

Move the fuselage aside as we have to do one piece of housekeeping first. Grab the vertical fin, horizontal stab, and one of the 90° triangles.

It's time to glue the fin to the stab. Place the stab so the hardwood tailwheel mount is against the board (not-seen).

Test fit these pieces, then sand as necessary to get a good, slop-free fit. When you're satisfied, apply glue where the two pieces touch, then attach the fin, using the triangle as a guide to make sure it is perfectly perpendicular.

☐ **Step 55 - Fuselage Assembly (tail surfaces)**

Place the fuselage back on the top view of the fuselage, held by the punch-outs.

Then, test fit the tail surfaces into position, as shown here. It should slide completely into the pre-cut notch in the fuselage, up against F6.

Sand as necessary for a good, slop-free fit. Then when satisfied, apply glue where the pieces touch and permanently attach the tail surfaces to the fuselage, as shown here.

☐ **Step 56 - Fuselage Assembly (1/4" stringers)**

Locate more of the 1/4" sq. balsa strips. These are cut to length, running from the rear of the wing saddle, to the rear of the fuselage.

It's ok to piece these together, as they're not structural.

You'll also need to sand the width slightly to fit around the vertical fin.

Make sure these are pushed completely into the notches of each former and glued to the outer sheeting.

☐ **Step 57 - Fuselage Assembly (FS6)**

Locate FS6 from BP4. Trim the support from the opening at the narrow end.

Now CAREFULLY test fit this around the vertical fin, so it lays against the fuselage and stringers you just installed. Sand as necessary for a good, slop-free fit. Then, when satisfied, apply glue where the pieces touch and glue it in place.

☐ **Step 58 - Fuselage Assembly (FS6)**

Here's another spot where you need to do some of that thinking and planning stuff.

If you're using a flexible pushrod system, such as Dubro's Lazer rods, now is a good time to route the outer housings through the fuselage and glue them in place.

You'll note that there are small pre-cut circles in each of the F5, F6, and F7 formers, as well as cutouts in FS6, on each side of the vertical fin. These are the areas where you will slide the outer tubing through. Make sure you glue them to each of the formers so they won't move and/or rotate over time.

☐ **Step 59 - Fuselage Assembly (top sheeting)**

Well, I do declare, it's now time to sheet the bottom of the fuselage - *cross sheeted, that is.*

With the fuselage still held in place and nicely symmetrical, locate some of the un-cut 1/8" balsa sheeting.

Now you'll use this to start the sheeting on the top of the fuselage.

Start at the rear of the fuse, up against the front edge of FS6, and work your way forward to the rear of the wing saddle, as shown here - a piece at a time.

☐ **Step 60 - Fuselage Assembly (rear, bottom sheeting)**

Now, flip that fuselage over, and continue your cross-sheeting exercise. Start at the rear of the LG1 block and work your way back to the leading edge of the stab - a piece at a time.

☐ **Step 61 - Fuselage Assembly (1/4" stringers)**

While the fuselage is up-side-down, use more of the 1/4" sq. balsa strips to form the stringers that run from the LG1 block to the front of the fuselage.

Just as before, make sure these are pushed completely into the notches of each former and glued to the outer sheeting.

Again, remember you can piece these together from smaller scraps.

☐ **Step 62 - Fuselage Assembly (1/4" stringers)**

Let's finish up the 1/4" stringer madness by flipping the fuselage right-side-up. Now cut and fit the pieces to form the left and stringers that run from the nose, back to the cutout just in front of F2, as shown here.

☐ **Step 63 - Fuselage Assembly (F1)**

Locate F1 - the 1/4" thick piece cut from beautiful plywood. Note a couple things - those being the two pre-etched lines on what will be the inner surface.

Locate the nose-gear assembly from the hardware bag. What you'll need are the 4 mounting screws, the 4 washers, 4 lock washers, and the 4 t-nuts. *Forget about the gear wire and the other parts for now. We'll worry about them later on in the build.*

Use the two etched lines to aid in the location of mounting the nose gear block. Position the block so it's flush with the bottom of the firewall, and so the mounting holes are lined up with the etched firewall lines. Mark the position of these 4 holes and drill through the firewall. Mount the block to the ***SAME*** side of the firewall as the etched lines - using the 4 mounting screws, t-nuts and washers from the nose gear bag.

☐ **Step 64 - Fuselage Assembly (F1)**

Before attaching the firewall to the fuselage, sand the front of the fuselage smooth, removing any excess stringers and/or glue.

Then mix up some epoxy and attach the firewall to the fuselage. Use good quality epoxy here - not 5 minute. This joint is pretty important.

Note that the nose gear block is INSIDE the fuselage.

☐ **Step 65 - Fuselage Assembly (TR3)**

Locate both TR3s from LP1 and two 4-40 t-nuts from the hardware bag.

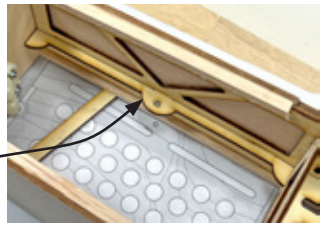
Place the TR3s flat on your building surface, mirrored, as shown here.

Fully tap one t-nut into each TR3. You might also want to carefully put a few drops of glue around the outside of the nuts, to make sure they stay attached to the TR3s.

Just be careful not to get any glue into the threads of the t-nuts. That won't be good for anyone.

☐ **Step 66 - Fuselage Assembly (TR3)**

Now you can install the TR3s into the fuselage. There's only one way where they correctly fit, so take your time and dry fit them in place, with the t-nut facing down. When you're satisfied, glue these in position, making sure they stick straight out from the fuselage sides.



☐ **Step 67 - Fuselage Assembly (1/4" firewall support)**

Locate two of the 1/4" sq. x 36" basswood strips. You're trimming just a little off each of these - not all from one strip - *an equal amount of each.*

Refer to this photo and you'll see there's two lengths on each side. The lower two pieces are roughly 7/8" long, and the upper two pieces are roughly 1-3/4" long.

Now mix up more of that epoxy stuff and attach these to the corners where the firewall and plywood frame meet.

☐ **Step 68 - Fuselage Assembly (front, bottom sheeting)**

Now, flip that fuselage over, and finish sheeting the bottom of the fuselage, Start at the front of the LG1 block and work your way forward to cover F1 - a piece at a time.

When finished, take a little time to mark and drill the hole for the gear wire to exit the bottom of the fuselage.

☐ **Step 69 - Fuselage Assembly (F2A)**

Locate F2A from LP5. This is glued to the front face of F2 to strengthen its top. Make sure it is perfectly aligned and that none of the glue seeps into the three cutouts.

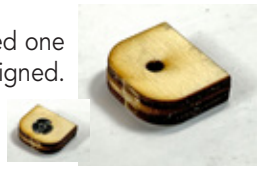
Epoxy is best here, and make sure to clamp this in place while the glue cures.

☐ **Step 70 - Fuselage Assembly (H5)**

Locate two H5s from BP11. These are glued on top of F1 and the sides of the fuselage, as shown here. Glue one H5 in place, then the other H5 on top of it, perfectly aligned.

☐ **Step 71 - Fuselage Assembly (H4)**

Locate two H4s from LP1. These are glued one on top of the other so they are perfectly aligned. Keep glue out of the pre-cut, center hole. Also locate one of the 4-40 t-nuts from the hardware bag and tap it into the hole one side.



☐ **Step 72 - Fuselage Assembly (H4)**

Glue the completed H4 assembly by pushing it into the pre-cut slot in F2A. Make sure that it is straight and that the t-nut is facing down.

☐ **Step 73 - Fuselage Assembly (H1, H2)**

Locate H1 and H2 from BP27. These are glued together to form the outer portion of the hatch, as shown here. Make sure the joint is flat along its entire length.

☐ **Step 74 - Fuselage Assembly (H3)**

Locate H3 from LP5. This is the framing that helps hold the hatch in position while also strengthening it. You might notice pre-etched lines on the bottom of the H1/H2 assembly. This will help you align H3. You'll see that the front of H3 protrudes a bit, and the "ears" on the back side also protrude on the sides.

Don't adjust your sets - that's the way it should be.

☐ **Step 75 - Fuselage Assembly (Hatch)**

Take a little time to test fit the hatch into the fuselage. Lightly sand as necessary to get a good fit. Don't worry about the outer edges, as you'll sand those later. Just adjust as necessary so the hatch fits properly on the fuselage.

☐ **Step 76 - Fuselage Assembly (H3)**

Locate one 4-40 x 1" hex head screw and one washer from the hardware bag. This is used to hold the hatch in position.

Don't over-tighten this and compress the wood.

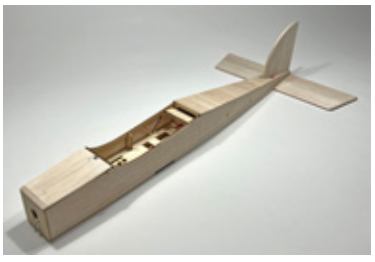
☐ **Step 77 - Fuselage Assembly (sanding)**

Yup, it's fuselage sanding time. Before I let you lose with your sanding tools, note that the edges of the fuselage can be rounded up to about a 1/4" radius. It's your call. Maybe you want the squared off look, maybe just a hint of curvaceousness, or maybe you want the beautiful, maximum roundness.

So, all that being said, get out your best sanding tools and go at it. Using a heavier grit to start (80-100) then working your way to finer grits (150-220) usually works best.

Remember, it's always easier to take the wood off than it is to put it back on - so patience and a little time are the best methods here.

This completes the major assembly of the fuselage. There's still stuff to do, but let's take a moment to look at what you've done. What you should have is a nicely crafted fuselage that looks a lot like this one. Well done.



Set the fuselage aside as work now begins on the wing panels.

☐ **Prepare your work area**

Tape the port wing plan over your building surface and cover it with waxed paper. The wing panels are built up-side-down, so although it looks like the starboard side, it's the port.

☐ **Step 78 - Wing Assembly (J2 end jigs)**

Locate two J1s from LP1 and LP5, two J2s from LP3, and four J3s located in LP1 and LP2.

Glue two J2's into each J3 as shown here. Then glue one J1 to each assembly to complete both of the wing's J2 end jigs. Make sure the pieces are firmly pushed together to make a 90° bracket.

☐ **Step 79 - Wing Assembly (J4 jig)**

Locate one J1 from LP1 or LP5, one J4 from LP6, and two J3s located in LP1 and LP2. Glue two J3s into J4, then glue J1 to this assembly to complete the wing's J4 center jig. Make sure the pieces are firmly pushed together to make a 90° bracket.

Refer the photo in the previous step for reference.

These wing jig supports are designed to be used by pushing thumbtacks through the tiny pre-cut holes to hold them in place.

Wick some thin C/A into the "cupped' areas in the top of each of these jigs. THIS IS VERY IMPORTANT! When these are used in the upcoming steps, they are designed so the 1/4" dowels will have a slight "snap" to help lock them in place. Without wicking in thin C/A to harden these areas, they could splinter when removing the dowels.

☐ ☐ **Step 80 - Wing Assembly (position jig supports)**

Place the jig supports in position over the wing plan. There are three spots, which are noted by a dotted line on the plan. The two J2 jigs are placed on the ends, with their flat surface facing the ribs. The center J4 jig is placed roughly midway, and make sure that the large cutout is positioned towards the wing's leading edge; that way it won't interfere with the wing's spars.

Note that the placement of the outer J2 jig will be up-against the R6 rib, as shown on the plans.

One other note on the jigs. There are a lot of these 1/2-circular pieces all over the lite-ply sheets. I didn't name them to keep the laser etching time to a minimum. These can be used as "clamps" to help hold the ribs in place on the jig's two dowels.

Wick thin C/A into any of these 1/2-circular pieces you use first, then snap them on to the dowel and use them as "stops" on each side of every rib. ***WHEN YOU USE THESE, DO NOT GLUE THEM IN PLACE*** *- they are meant to be removable - and re-positionable.*

☐ ☐ **Step 81 - Wing Assembly (R2)**

Locate three R2s from LP2 and LP6. These are glued, one on top of the other to make a thicker R2, as shown here *(yes I know only two are shown here).*

Make sure all three pieces are

perfectly aligned, and that no glue goes into the pre-cut holes and notches of the finished R2 assembly.

Ribs, now with 100% more Tabs!

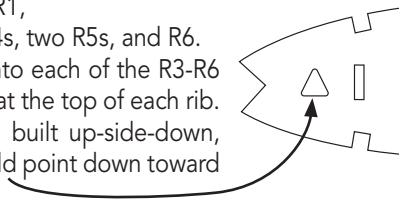
On the subject of wings, you're going to be building the wing panels upside-down, as I mentioned earlier. Each of the ribs has rear tabs that you DO NOT want to break off - as they're important. These tabs hold the trailing edge in place when the time comes.

☐ ☐ **Step 82 - Wing Assembly (R1-R6 ribs)**

Locate one complete set of ribs, (R1 through R6) for this wing panel. The R1 and R3 ribs will be in the LP sheets, the others in the BP sheets.

We recommend laying them out in order to guarantee you have them positioned correctly. Left to right, you'll have R1, the R2 assembly, R3, four R4s, two R5s, and R6.

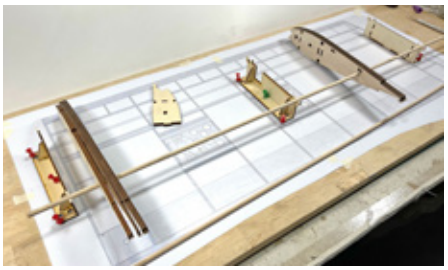
Also note the triangle cut into each of the R3-R6 ribs. This triangle points up at the top of each rib. So since the wing is being built up-side-down, each of these triangles should point down toward your building surface.



R1 has an etched triangle that points towards its top. The R2 assembly's "protrusion" (the wing hold peg) is on the bottom, so the curved side is its top surface.

☐ ☐ **Step 83 - Wing Assembly (rear 1/4" dowel)**

Locate one of the 1/4" x 36" dowels, as it is used as the rear portion of the wing jig. Using this photo as a guide, you'll slide the ribs onto this dowel ***IN ORDER, making sure each one is up-side-down. THIS IS VERY IMPORTANT.***



Check and double check.
Walk away and grab a fizzy beverage.
Then come back and triple check that you have these all in the right order, and they are all up-side-down.
You'll see that the ribs are "grouped" into two sections in the photo - I found that doing this just made the ribs easier to slide on the dowel, than doing them one at a time.

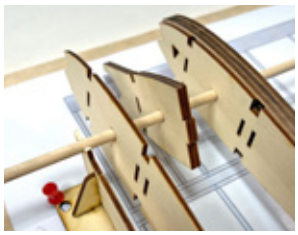
When all the ribs are on, snap the dowel on the three jigs.

☐ ☐ **Step 84 - Wing Assembly (forward 1/4" dowel)**

Locate the other 1/4" x 36" dowel for the forward portion of the wing jig.

Slide the dowel in through the ribs - and make sure to fit F2 in place, between F1 and F3 - ***up-side-down as previously over-emphasized in a step just prior to this step you find yourself on right now.***

Snap the dowel into the jigs, then space the ribs out to match the spacing on the plans. Use those semi-circular "clamp" pieces I mentioned earlier to help hold them in place.



☐ ☐ **Step 85 - Wing Assembly (rib quadruple check)**

Just to be totally redundant, double-check that you have the ribs in the correct order and that they are all up-side-down. Because things are about to get real in the next step. So it's my last warning to make sure you have everything correct.

☐ ☐ **Step 86 - Wing Assembly (lower spar)**

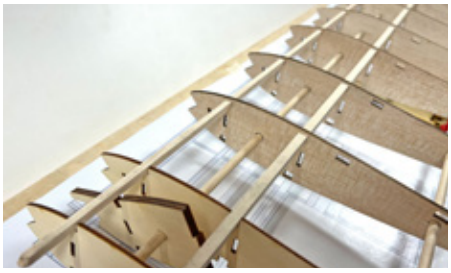
Locate one of the 1/4" sq. x 36" basswood sticks. This will be used as the lower spar. Measure and cut it to length, leaving an extra 1/4" or so on each end - just to be safe.

Starting with the tip rib (R6), carefully slide it through the larger, pre-cut square hole. Then continue to work your way inward through all of the other ribs - ***care is needed here, not speed.***

When the spar is in place, make sure that all of the ribs are aligned with the plans, and they are all vertical. Then glue this spar in place to all of the ribs - except R1 and R2 - no glue on those yet.

☐ ☐ **Step 87 - Wing Assembly (lower sub-spar)**

Locate one of the 3/16" sq. x 36" balsa sticks. This will be used as the lower sub-spar. Measure and cut it to length, leaving an extra 1/4" or so on each end - just to be safe.



Starting with the tip rib (R6), carefully slide it through the smaller, pre-cut square hole. Then continue to work your way inward through all of the other ribs - ***again, care is needed here, not speed.***

When the sub-spar is in place, make sure that all of the ribs are aligned with the plans, and they are all vertical. Then glue this sub-spar in place to all of the ribs - except R1 and R2 - still no glue for those yet.

Enter the WEB-LOCK construction

You'll have a bunch of these webs on BP10, BP18, and several of the LP sheets. You'll use these along with the ribs over the next few steps. Webs add massive strength to a wing, with very little weight. These webs do three things at the same time.

1. They give you proper rib spacing with tabs that lock into the rib's pre-cut slots (our exclusive WEB-LOCK construction).
2. They hold each rib perfectly vertical without needing tools.
3. The cutouts allow airflow between the different chambers

of the wing. This is very helpful in keeping covering from bubbling up when you're applying covering later on and when the Raider is at the field in the boiling sun.

Yup, another bright idea from the warped minds of those who work at the OSMW Development Center.

☐ ☐ **Step 88 - Wing Assembly (SW7, SW8)**

Locate six SW7s from BP18 and BP19, as well as six SW8s from BP15. These form the forward and center sheer webs. The SW8s are all symmetrical, so it doesn't matter which way they are installed.
The SW7s have the same crossed swords etched into them. It doesn't matter which way they go, but you'll probably want to make sure you have them all in the same direction.
Starting at the tip, fit one SW7 and one SW9 into R6. Make sure that the web's tabs are fully inserted into R6's pre-cut slots. Then fit the other side of the webs into the R5 rib - again making sure everything is fully inserted.
When satisfied, glue two webs in position - and make sure to glue them to the spar and sub-spar. Then move on to the next bay of the wing and install another set of webs, then another, etc. Work your way down to R3, then stop.

☐ ☐ **Step 89 - Wing Assembly (SW6A, SW6B)**

Locate two SW6As from LP5 and LP6, as well as one SW6B from LP5.
Same sort of installation here, except there's one SW6A on each side of the main spar.
Glue these pieces in place between R4 and R3.
Also make sure that these pieces are glued to the spars.

☐ ☐ **Step 90 - Wing Assembly (SW2)**

Locate SW2 from LP3. Note the etched circle in the corner. This will be side touching R1 - the root rib, with the circle towards the building surface (the top edge of the wing).
I tried several ways of doing this step, but found the best way was to remove R2 from the jig by sliding the front dowel enough to allow it to come out. I glued SW2 to R2, then slid this assembly back into the wing, with it's tabs fully glued into R3's pre-cut slot and the spar. Then I slid the front dowel back into place.

Don't glue this to R1 just yet, as you'll need to be able to move R1 over the next few steps.

☐ ☐ **Step 91 - Wing Assembly (SW3)**

Locate SW3 from LP3. Note the etched circle in the corner. This will be side touching R1 - the root rib, with the circle towards the building surface (the top edge of the wing).
Glue SW3 to R2 and the spar, but not to R1 just yet.

☐ ☐ **Step 92 - Wing Assembly (SW4)**

Locate SW4 from LP3. Note the etched circle in the corner. This will be side touching R1 - the root rib, with the circle towards the building surface (the top edge of the wing).
Glue SW4 to R2, but not to R1 just yet.

☐ ☐ **Step 93 - Wing Assembly (SW5)**

Locate SW5 from LP2. Note the etched circle in the corner. This will be side touching R1 - the root rib, with the circle towards the building surface (the top edge of the wing).
Glue SW5 to R2, but not to R1 just yet.

☐ ☐ **Step 94 - Wing Assembly (SW1A, SW1B)**

Locate one SW1A and one SW1B from LP2. Note the etched circle in SW1A which should be up against R1, just as in the other pieces. SW1B is installed between R3 and R2. Then SW1A is installed between R2 and R1.
Glue these pieces in place as shown here.

☐ ☐ **Step 95 - Wing Assembly (R1)**

Now it's time to glue R1 to all of the SW pieces you've just installed. R1 will be slightly angled as it has dihedral designed into all the SW pieces. Make sure that all of the SW's tabs are fully inserted into R1's pre-cut slots, and that R1 is straight along it's entire length. Use a straight-edge to guarantee this.

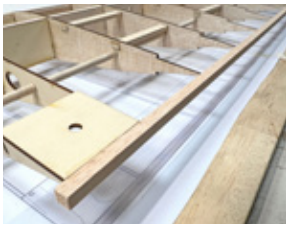
☐ ☐ **Step 96 - Wing Assembly (WH1)**

Locate one WH1 from LP3. Note the etched circle which should be up against R1, over SW5.
Glue this in place as shown here.

☐ ☐ **Step 97 - Wing Assembly (servo hatch rails)**

Locate the 3/16" x 3/8" basswood strip you used earlier. You'll now cut four 4" lengths. Two of these will be glued into the pre-cut slots of the first pair of R4s, the other two will be used in the second pair of R4s.

☐ ☐ **Step 98 - Wing Assembly (trailing edge)**



Locate a 5/16" sq. x 36" balsa strip to use as the trailing edge. Mark and cut this to length, leaving a 1/4" or so past the R1 rib, and 1/4" past where the wing tip will be (once installed).
You will glue this in place to the rear of each rib, making sure that the ribs are

straight when you do this. The trailing edge will rest on each of the rib's rear tabs (that you've been so careful not to break off, right?). Also, make sure the trailing edge is glued to the rear of WH1.

☐ ☐ **Step 99 - Wing Assembly (R7)**

Locate seven R7s from BP16. These are glued in place into the center slot of each SW8s and the SW6B you just installed a few steps ago.
Also note the triangles - these should point down to the building surface.
Make sure all of these are aligned correctly when glued in place. *(Yup, I know the leading edge is shown here, but you'll put that on in the next step.)*

☐ ☐ **Step 100 - Wing Assembly (leading edge)**

Locate a 1/2" sq. x 36" balsa strip to use as the leading edge. Mark and cut this to length, leaving a 1/4" or so past the R1 rib, and 1/4" past where the wing tip will be (once installed).
Glue this into the pre-cut notch of each rib, as shown here.

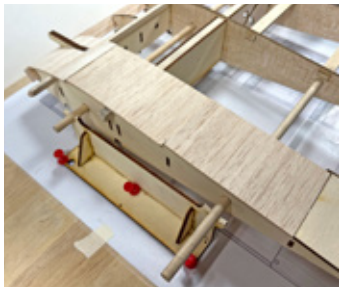
☐ ☐ **Step 101 - Wing Assembly (R3A)**

Locate an R3A from BP10. This is glued to the outside face of R3. Make sure that it pushed completely on to the SW5 tab protruding from the R3 rib as shown here.

☐ ☐ **Step 102 - Wing Assembly (rear sheeting)**

Locate one of the 1/16" x 4" x 36" uncut balsa sheets.
Measure and cut a 26" piece and set the other 10" length aside to use in the next step.
Now with the 26" length, measure and cut two 1-3/4" x 26" lengths to use as the rear sheeting. You'll use one of those now, and the other when we flip this panel over in a few steps.
Glue the rear sheeting in place on the rear of each rib overlapping R2A, all the way out to R6, making sure it slips into the groove cut into each rib. It should be flat along it's entire length and also glued against the trailing edge strip.

☐ ☐ **Step 103 - Wing Assembly (rear sheeting)**



Using the 10" piece of 1/16" from the previous step, you'll now cut pieces to form the center sheeting, covering the R1, R2, and R3 ribs, as shown here.
Take note of the grain, as you'll be cutting individual strips that are roughly 2.25" x 4".
Glue the first piece against the leading edge of WH1, installed earlier. Then, continue along to cover the rest of those ribs.

Note you will have to carefully measure and cut a section to go around R2's protrusion, as shown here.

☐ ☐ **Step 104 - Wing Assembly (flip the panel)**

Once all the glue has cured from the previous step, it's time to work on the other side. To flip the wing over, carefully apply a touch of upward pressure where the jig's dowels snap into the jigs. You should find that the dowels pop out, and you're left with an assembly that can be flipped over. Before popping the dowels back into the jigs, you'll need to move the center jig so it can not interfere with the webs you've installed - so it's positioned between the set of R4 ribs.
Once you've snapped the dowels back in place, remove any/all of the semi-circular "clamps" you might have used to hold ribs in place. If you don't remove those now, some could get trapped inside the wing after sheeting is applied.

☐ ☐ **Step 105 - Wing Assembly (WH3)**

Locate two WH3s from LP1. These are glued to the inside of WH1, on either side of the pre-cut hole, as shown here.

☐ ☐ **Step 106 - Wing Assembly (remove rear tabs)**

Time to carefully remove rear tabs from all of the ribs. Also take the time to cut-away the tiny ledges from the rear of each rib that supported the trailing edge. Be sure that when cutting, you're removing just enough material to continue the curvature of each rib.
Blobs of glue normally form around these areas, so take the time to remove them all as they need to be clean to install the rear sheeting pieces in the following steps.

☐ ☐ **Step 107 - Wing Assembly (WH2)**

Locate one WH2 from LP3. Note the etched circles, which should be up against R1 over SW5.
Glue this in place as shown here, making sure it's glued to of the pieces it touches.

☐ ☐ **Step 108 - Wing Assembly (rear sheeting)**

Locate the 1-3/4" x 26" strip of 1/16" sheeting you cut earlier. This is now glued in place as the top surface's rear sheeting.
Make sure it's flat along its entire length; it is glued to each and every rib, and it is up against the WH2 you just installed.

☐ ☐ **Step 109 - Wing Assembly (upper sub-spar)**

Locate one of the 3/16" sq. x 36" balsa sticks. This will be used as the upper sub-spar. Measure and cut it to length, leaving an extra 1/4" or so on each end - just to be safe.
Starting with the tip rib (R6), carefully slide it through the smaller, pre-cut

square hole. Then continue to work your way inward through all of the other ribs - ***again, care is needed here, not speed.***
When the sub-spar is in place, make sure that all of the ribs are aligned with the plans, and they are all vertical. Then glue this sub-spar in place to all of the ribs.

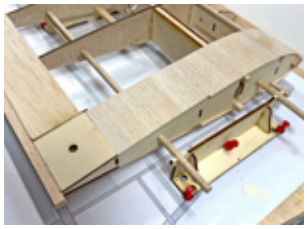
☐ ☐ **Step 110 - Wing Assembly (dihedral box)**

Now it's time to cut away the center of R1 and R2. Before you do this, make sure that these ribs are secured to all of the webs and spars - from outside the dihedral box, not inside.
Make sure that the area inside this box is completely clean and smooth, as later on this will be a channel where the dihedral brace will slide through. The cleaner it is now, the easier it will be to slide in the brace when it's time.
Take your time and use a gentle touch in this step, as you don't want to cut more than you should, nor do you want to damage the sheer webs in these spots, as it could weaken the wing or cause a misalignment.

☐ ☐ **Step 111 - Wing Assembly (top spar)**

Locate one of the 1/4" sq. x 36" basswood sticks. This will be used as the upper spar. Measure and cut it to length, leaving an extra 1/4" or so on each end - just to be safe.
Starting with the tip rib (R6), carefully slide it through the larger, pre-cut square hole. Then continue to work your way inward through all of the other ribs - ***care is needed here, not speed.***
When the spar is in place, glue this spar in place to all of the ribs - but take care not to get any extra glue inside the dihedral box you just created.

☐ ☐ **Step 112 - Wing Assembly (center sheeting)**



Locate one of the un-cut pieces of 1/16" x 4" x 12" balsa sheets as you'll use this for the center sheeting, covering the R1, R2, and R3 ribs, just as you did on the underside.
Take note of the grain, as you'll be cutting individual strips that are roughly 2.25" x 4".
Glue the first piece against the leading edge of WH2, installed earlier. Then, continue along to cover the rest of those ribs..

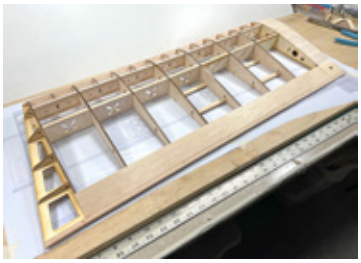
☐ ☐ **Step 113- Wing Assembly (tip)**

Before installing the wing tip pieces, you'll need to cut a notch in the leading edge strip, as shown here. This is just past the R6 rib, and this clearance is cut so the tip piece can be installed.

☐ ☐ **Step 114 - Wing Assembly (tip assembly)**

Carefully remove/sand/file any of the spar material that sticks out past R6 - ***but don't remove any of the leading or trailing edges.***
When smooth, locate T1 from LP2, and one T2, T3, T4, and T5 from BP2. Check the plans to see the order that T2-T5 fit on to T1.
Dry fit these on to T1 first, then fit this entire assembly on to R6, as shown here.
When all of the tabs are fully inserted into the pre-cut slots, apply glue along the edges to lock all of these pieces in place - both on the top and bottom of the wing.

☐ ☐ **Step 115 - Wing Assembly (sanding)**



Remove the wing panel from the jig and remove the dowels. Now take some time to go over the wing panel to remove any extra lengths of wood from the tips and root ribs. Also sand the face of R1 flat.
You should now have a wing panel that looks a whole lot like this.

Set the port wing panel aside and begin work on the starboard wing panel. Tape the starboard wing plan and fresh wax paper on your board. Then follow steps 80 through 115 to complete the starboard wing half. Once finished, then move on to step 116.
Note that when building the starboard panel that many of the parts will need to be glued to the opposite side. Always refer to the plans to make sure you're gluing the parts together in the correct way.

☐ **Step 116 - Wing Assembly (D1)**

Locate the pre-cut 1/4" ply dihedral brace (D1). Note that this is hand-cut, so there can be slight variances in each one. That being said, they're also slightly undersized to help aid in fitting. There is a possibility that you'll have to sand the surface to "thin" it slightly, as each piece of wood is not necessarily of uniform thickness.
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 also will have to file in the boxes built into each wing half. Make sure they're smooth and the brace doesn't catch on any extra glue or protruding R2.

☐ **Step 117 - Wing Assembly (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 permanently with 30 minute epoxy. Remove the dihedral brace and apply the 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 the remaining wing half in place. Using a couple of clamps (or tape), hold wing halves firmly together. Wipe off any excess epoxy and remove the clamps only after the epoxy has fully cured.

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 118 - Wing Assembly (SH2)**

Locate 24 SH2s from LP1. You'll glue these together in groups of three to form thicker SH2s, as shown here. Make sure they are all perfectly aligned and tightly held together as the glue cures. Keep glue out of the notch on the bottom side.

You'll end up with eight matching sub-assemblies when finished.

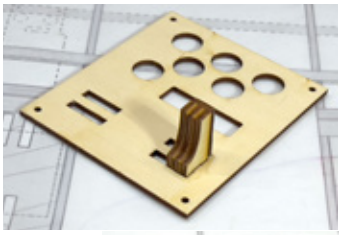
☐ **Step 119 - Wing Assembly (SH3)**

Locate 8 SH3s from LP1. You'll glue one of these to each SH2 sub-assembly you just made. They are glued to the flat side up, aligned to the thinner end, as shown here.

☐ **Step 120 - Wing Assembly (SH1 - aileron hatches)**

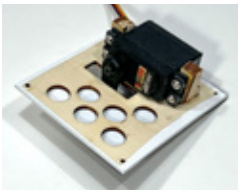
Locate two SH1s from LP2. Note the longer rectangular cutout. This is the opening where the servo's arm will exit through. Because of the opposite nature of the way ailerons work, you'll need to make MIRROR images of these two hatches.

Start by grabbing one of your aileron servos and two of the SH2 assemblies.



Position your servo in place so that the arm is halfway in the cutout. Then dry fit the SH2s in place, on each side of the servo, fully pushed into SH1s pre-cut grooves, up against your servo's case. Mark the position of these SH2s.

Now remove the servo and the SH2s, apply glue to the base of the SH2s and attach them to SH2, similar to what's shown here.



When finished you should have a complete aileron hatch, that looks something like this third photo, just without the covering. Now using the other SH1 and SH2s, make the other aileron hatch - again making sure it's mirrored from the first one.

OK, it's decision time again.

The Raider can be made with ailerons only, or with flaps and ailerons. Now is the time to make that decision. If you are NOT going to use flaps, skip this next step as you won't need flap servo hatches.

☐ **Step 121 - Wing Assembly (SH1 - flap hatches)**

Locate two SH1s from LP2. You'll now use these two, along with the remaining four SH2 assemblies to make the flap hatches. Use the same techniques as you did for the aileron hatches - EXCEPT - THESE ARE NOT MIRRORED - THEY ARE MATCHING. Just the way flaps work, so be sure they match!

☐ **Step 122 - Wing Assembly (hatches)**

Temporarily mount the servos hatches. Place them on the rails, built on the underside of the wing. Using the pre-cut holes as a guide, drill four 1/16" mounting holes into the basswood mounting rails. 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 123 - Wing Assembly (A1)**

Now it's time to build an aileron.

Locate one A1 from BP12 and note the etched circle on one end. This designates the inboard end of the aileron, (its slightly thicker here). It also designates the hinge edge of the aileron.

Using a straight-edge, pin A1 to your building surface, making sure that circle is up against the straight-edge. The straight edge will help make sure A1 arrow straight as you pin it down.

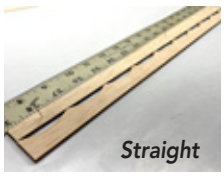
☐ ☐ **Step 124 - Wing Assembly (A2)**

Now it's time to build an aileron.

Locate one A2 from BP12 - and it's time for another decision. Actually, this decision you've already made - scalloped or straight control surfaces. But I guess you could mix things up if you want.

So, you need to decide this now for the ailerons (and flaps if you're using those too).

If you're going the straight edge way, glue A2 to A1 so the scalloped tips touch A1 - nice, straight and flat along the entire length.



If you're going the scalloped edge way, glue A2 to A1 so the flat edge touches A1 - nice, straight and flat along the entire length.

For the purposes of this manual, you'll see scalloped edges from here on out.

☐ ☐ **Step 125 - Wing Assembly (A4 or A5)**

Locate one A4 (scalloped) or A5 (straight) from BP17. Glue it over the trailing edge of A2 so it matches over it's entire length.

Make sure this is flat and perfectly aligned along its entire length.

☐ ☐ **Step 126 - Wing Assembly (A3)**

Locate one A3 from BP17. Glue it over A1 and up against the A4/A5 piece you just installed. However, note that this piece is slightly shorter by design. A few things to note when gluing this in place:

A3 is shifted towards the outer edge of the aileron.

A3's square cutout should be closer to the etched circle of FL1.

Also, the open part of A3's cutout should be towards the hinged side, as shown here. Check the plans to see what I'm on about.

Then glue this in position, making sure A3 is flat and perfectly aligned along its entire length.

☐ ☐ **Step 127 - Wing Assembly (CH)**

Locate one of the CHs from LP7. Glue this into the square cutout in the A3.

☐ ☐ **Step 128 - Wing Assembly (A3, A4/A5, CH)**

Now remove the aileron assembly from the board and flip it over.

Locate A4 (scalloped) or A5 (straight) from BP17 and glue it in place.

Then locate A3 and glue it in place, making sure that it is positioned so the cutout aligns with the cutout you just installed.

Finally, locate another CH from LP7 and glue it in position.

☐ ☐ **Step 129 - Wing Assembly (FL6 - flaps only)**

If you are using/creating/making flaps, you'll also need to locate two FL6s from BP17. These are glued to each side, filling the gap created by the shorter A3 piece, as shown here.

Set this aileron aside and follow steps 123 through 129 to complete the second aileron. Once finished, then move on to step 130.

Even if you are choosing not to use flaps, you will need to build the flaps, as they are then attached to the ailerons to make the full-length aileron.

☐ ☐ **Step 130 - Flap Assembly (FL1, FL2)**

Locate one FL1 and one FL2 from BP13. Pin FL1, noting the position of the etched circle (inner flap side and hinge edge).

If you're going the straight edge way, glue FL2 to FL11 so the scalloped tips touch FL1 - nice, straight and flat along the entire length.

If you're going the scalloped edge way, glue FL2 to FL1 so the flat edge touches FL1 - nice, straight and flat along the entire length.

☐ ☐ **Step 131 - Flap Assembly (FL4 or FL5)**

Locate one FL4 (scalloped) or FL5 (straight) from BP17. Glue it over the trailing edge of FL2 so it matches over it's entire length. Make sure this is flat and perfectly aligned along its entire length.

☐ ☐ **Step 132 - Flap Assembly (F3)**

Locate one FL3 from BP17. Glue it over FL11 and up against the FL4/FL55 piece you just installed. However note that this piece is slightly shorter by design. A few things to note when gluing this in place:

FL3 is shifted towards the inner edge of the flap.

FL3's square cutout should be away the etched circle of FL1.

Also the open part of FL3's cutout should be towards the hinged side, as shown above. Check the plans to see what I'm on about.

Then glue this in position, making sure FL3 is flat and perfectly aligned along its entire length.

☐ ☐ **Step 133 - Wing Assembly (CH)**

Locate one of the CHs from LP7. Glue this into the square cutout in the FL3.

☐ ☐ **Step 134 - Wing Assembly (FL3, FL4/FL5, CH)**

Now remove the flap assembly from the board and flip it over.

Locate FL4 (scalloped) or FL5 (straight) from BP17 and glue it in place.

Then locate FL3 and glue it in place, making sure that it is positioned so the cutout aligns with the cutout you just installed.

Finally, locate another CH from LP7 and glue it in position.

☐ ☐ **Step 135 - Wing Assembly (FL6 - flaps only)**

If you are using/creating/making flaps, you'll also need to locate two FL6s from BP17. These are glued to each side, filling the gap created by the shorter FL3 piece, as you did with the ailerons.

☐ ☐ **Step 136 - Wing Assembly (A6 - ailerons only)**

If you are only using ailerons, you will now join the flap to the aileron to make a full-length aileron. Note that because of the taper, these pieces only match correctly one way. Glue them to each other, then locate two A6s from BP17. Glue these into the sheeting gap on each side, covering the joint.

Set this flap (or the full-length aileron aside and follow steps 130 through 136 to complete the second flap (or full-length aileron). Once finished, then move on to step 137.

☐ **Step 137 - Wing Assembly (T6)**

Locate one T6 from BP12 and one from BP13. It is important that you get one from each sheet, as one is cross-grained from the other. Glue these two pieces together to form a thicker T6, then this piece is glued to the outer end of the trailing edge to complete the wing tip, as shown here. Do one for both wing tips.

☐ **Step 138 - Sanding**

Now is 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 rear sheeting, continuing the curvature of the wing. Pound out the extra time on those wing tips to make sure they are smooth, perfect works of art and match each other exactly.

Smooth out the edges of the fuselage. Because of the 1/8" sheeting and the 1/4" balsa longerons installed around the fuselage's perimeter, you can be a little more aggressive in rounding the corners.

You should have done this, already, but I'll mention you need to 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, the rudder, the ailerons and flaps if you're using those. And spare some time for the rear of all those control surfaces, rounding off the trailing edges with a nice radius.

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 with will be a thing of beauty - something that looks pretty darn close to this (but without the landing gear, which I haven't told you to install yet.)

☐ **Step 139 - Fuselage Assembly (wing mounting)**

Now it's time to offer up the wing to the fuselage.

Insert the wing into the fuselage, making sure the front pegs slide smoothly into the holes in F3. If they don't fit as nicely as you'd like, don't mess with the pegs too much - just likely sand them to make sure they are smooth. But spend more time on the F3 holes until you get the pegs 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 as the distance when measured from the starboard wing tip to the starboard stab tip.

☐ **Step 140 - Fuselage Assembly (drill wing bolt holes)**

With the wing aligned, drill two 3/16" holes for the wing bolts, using the pre-cut holes in WH1 and WH2 as a guide. Before powering up, position the drill down through these holes and only then turn on the power to drill down through WH4 assembly in the fuselage.

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.

This completes assembly of the Raider airframe.
These next few steps can be done in most any order - up until it's time to cover.

Whether you're hinging, mounting, gluing, sanding, soldering, or installing, chances are we've got a video tip to make the task easier.

OSMW has created a series of videos to help you not only build your aircraft, but build it better. These Bright Idea videos can come in handy for some of the following steps.

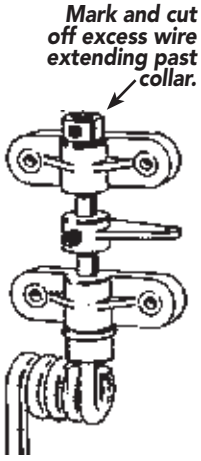
Check them out today - they're FREE and we're adding to them all the time!

Visit oldschoolmodels.com/tips.htm or scan this QR code.

☐ **Nose gear assembly (if tri-cycle gear)**

Everything you need to assemble the nose gear is in one package. Push the nose gear wire partially up through the block. Slip the steering arm in place, then push the nose gear wire all the way through the block and the arm.

With the nose gear positioned so the coil is towards the rear of the plane, position the steering arm at a 25-30° angle, then tighten the set-screw in the steering arm just tight enough so it should make a mark on the nose gear wire. Also, mark where the wire should be trimmed off, above the top collar.



Loosen the screw and remove the wire. Grind a small flat on the nose gear where the screw made a mark, and trim the excess top wire, then re-attach. Use a touch of thread-locking compound on the screw to make sure it doesn't vibrate loose later on down the road (or more to the point - down the runway).

☐ **Main Gear mounting**

Locate the pre-bent aluminum landing gear, four 4-40 x 1" hex-head screws, four #4 washers, and four 4-40 t-nuts from the hardware bag.

Center the main gear on the LG1 block you mounted in the bottom of the fuselage. Make sure it's aligned straight and true. Then mark the 4 mounting holes and drill these four holes through LG1 with a 1/8" drill bit.
Attach the gear to the fuselage with the four hex-bolts, securing them on the inside with the four t-nuts.

☐ **Main Gear axles**

Locate the two axle shafts and their matching nuts from the hardware bag. These are attached to each side of the main gear as shown here. Make sure they are nice and tight, but don't over-tighten and strip the threads.

☐ **Tailwheel (if taildragger)**

Way back when you first started the Raider, there was a hardwood piece installed in the bottom of the stab. This is a mounting point for your tailwheel (not included), or you could also install a simple wire tailskid (also not included).
Drill into this piece as needed to mount things in place.

☐ **Tank / Battery floor (TR1)**

You don't need to install this now, but TR1 (LP4) serves as the floor for the tank/battery compartment. It's held in with two 4-40 x 1/2" hex screws. The reason for the screws is to make it removable. You might need to locate something under this floor to aid in C.G. later on.

☐ **Tank / Battery compartment fuel proofing**

If you're using a glow engine to power your Raider, it is strongly recommended that you fuel-proof the inside of the tank/battery 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 underside of the hatch.

☐ **Power System**

Installing your power system of choice is up next. Note that these are suggestions only, as you might want to do things a bit differently with your power system.

Glow Power

Mounting the engine is a fairly simple thing. It would typically mount either upright or sideways (with the muffler under the fuselage). Use the thrust lines on the fuselage plans as a general guide. With the nose gear block in place, things are a little tight, so plan this out before drilling any holes.
You'll also want to trim the nose gear block mounting screws so they don't stick out as far past the firewall.

8 ounce tanks work well and give a nice flight time, although you might be able to squeeze some larger tanks in. Again, plan this out before committing to anything permanent.

Electric Power

There's a lot of choices out there for electric power, but we've reached out to Innov8tive Designs for their recommendations on power. You'll see those on our website for both their Cobra and BadAss brands.

Because of the way the Raider is designed, you will need to cut out a few extra cooling holes in the firewall. You'll also need to cut a few exit holes on the bottom of the fuselage for the hot air to exit the fuselage - between F6 and F7.
Also, we're big believers in having an arming switch/plug when using electric powerplants of this size. There's plenty of options out there, and it's something to think about. Remember, in case of an accident, your fingers probably don't grow back!

All that's left is the rest of it.

☐ **Servo & Pushrod installation**

Although you can install the servos and control hardware after covering your Raider, 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 here is an example of the radio gear's installation in one of the Raider prototypes. Simple and neat.
Take a bit of time to plan things out, including how you'll run the throttle and nose gear steering pushrods.

When mounting the rudder and elevator (and throttle, if glow) servos, we've included TR4s (LP1) to double-up the ply where the elevator and rudder servo's

mounting screws will attach to the tray. For the throttle servo, use the pair of TR5s from LP5. You can see these in use in the photos on the previous page.

Before installing the aileron and flap servos, you'll need to make two cutouts in the center sheeting of the wing, on the bottom side, so the servo wires can exit into the fuselage. Refer to the plan for suggested placement of these two holes.

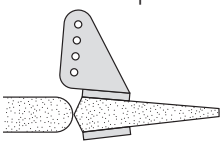
Mount your servos to the aileron and flap hatches, using whatever hardware came with your servos. Now fit the servo hatches into position on the bottom of the wing, running the servo wires through the cutout in R2 and through the holes in the center sheeting.

Finish the layout of your radio gear by adding the receiver, flight pack battery, and the switch. We mounted the receiver to the tray by using a bit of self-adhesive hook-and-loop (not included). If you're going glow, the radio's switch should be mounted to the opposite side of the muffler (to help keep the goop out of it).

☐ **Control Horn installation**

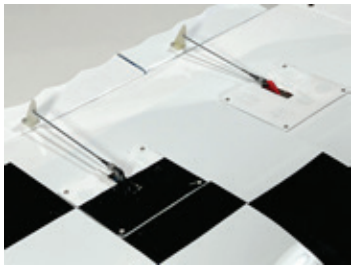
Now it's time to mount all of the control horns - one for each control surface. A control horn consists of the horn, it's plastic backer plate and two 2-56 machine screws. You'll find all of that in the hardware bag.

Each control horn should be mounted so it's in-line with the pushrod opening, and the holes in the control horn should be in-line with the hinge, as shown in this diagram.



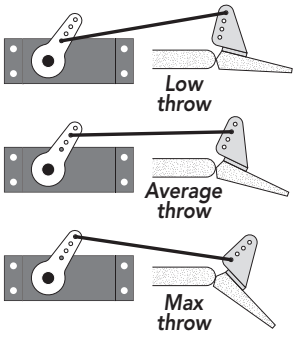
You'll need to carefully mark and drill the mounting holes using the control horn as a guide. Then you insert the screws and thread them into the backer plate from the other side. Tighten the screws to firmly hold the control horn in place, but not crush the wood of the control surface.

As for the pushrods, we're not going to go in-depth on how they work, as that's covered in their included instructions. Basically, you'll measure and cut the pushrods to length, taking into account the length of any clevises on the end of the pushrods.



We typically have one end of the pushrod (the exposed end for the rudder) that has an adjustable clevis. The other end is usually a simple z-bend that attaches into the servo horn. Doing it this way allows fine adjustment at the field without having to get inside the plane, taking things apart.

Also, when setting up the pushrods, the various holes in the servo arm and the control horns can drastically change the amount of throw that the surfaces will have. Here's a rudimentary diagram that shows how you can remove or add throw to a surface mechanically - simply by changing the holes used.



☐ **Covering**

Now it is time to cover the Raider. Remove the power-plant, main gear, nosewheel assembly, 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.

If you want to use graphics similar to the ones we used, Old School Model Works has teamed up with Callie Graphics as a supplier for pre-cut vinyl. They are a very well known provider of custom graphics for R/C models.

We have supplied them with the artwork needed to cut the correct size logos. You can order straight from them, 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.

☐ **Attach Wheels**

Use the included 5/32" i.d. wheel collars to hold your wheels (not included) on the axles. For a maintenance free installation, file a small flat on the axle where the set screw of the wheel collar touches. Also use a touch of thread-locking compound to keep the screw from loosening over time.

.

This completes the assembly of the Raider. Now you'll need to adjust the control throws and check for balance.

Recommended Control Throws:

Aileron 3/4" up/down

Elevon 1/2" up/down

Rudder 1" left/right

However, I chose a different path that I enjoyed much more. I installed Dubro's longer servos arms and chose to have maximum throws on all surfaces with heavy expo to calm down

the responsiveness near neutral. It made the Raider much more responsive when I needed it, but smooth and controllable when landing, cruising, etc.

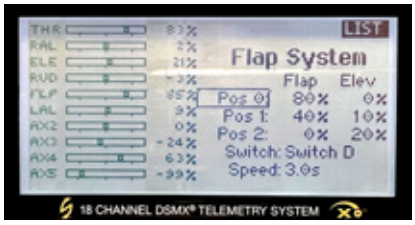
Full throw expo recommendations:
Aileron - 25% , Elevator 40% , Rudder 15%

Again, your mileage may vary.

☐ **Flap setup**
Flaps are meant to be used at slower speeds to increase the lift dramatically - and allowing for higher rates of climb and much slower flight. ***DON'T DEPLOY THESE AT SPEEDS OVER 1/2 THROTTLE, as you could damage them.***

Also, when deploying them, the Raider will tend to climb, and sometimes climb significantly, so you'd need to hold more down-elevator to keep it flying level. This is not unique to the Raider - it's the way flaps effect most designs - but if your radio allows, you can add some mixing to automatically add down elevator when the flaps are deployed.

We found it best to use flaps on channel with a 3 position switch. When retracted completely, no need for elevator trim. When the flaps were half-way extended, we mixed in 10% down elevator. With full flaps, we mixed in 20% down elevator.
You're mileage may vary, but these are good starting points.



A shot of our DX18 transmitter's flap setup for the Raider.

(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.)

Please, please, please!

Check the direction that each control surface moves.

Then double check the directions.

Walk away for a while, then come back and check the directions again.

The number one cause of a crash of any brand new airplane on its maiden flight is having the wrong throw for one (or more) of the control surfaces.

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!

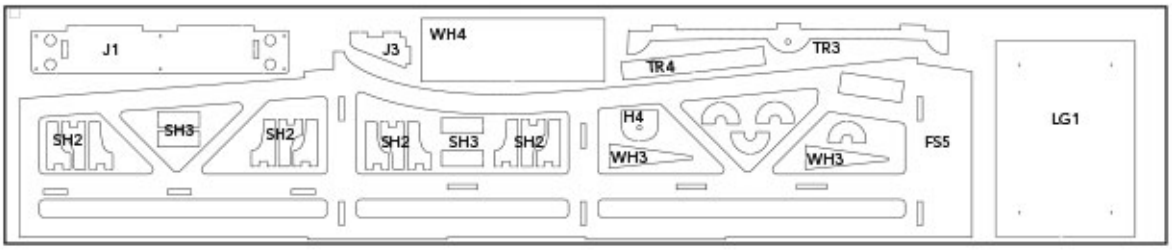
The recommended Center of Gravity (CG) location for the Raider is 4.4" - 4.6" from the leading edge of the wing, as measured at where the wing contacts the fuselage, and you'll see this marked on the fuselage plan with this symbol.

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.

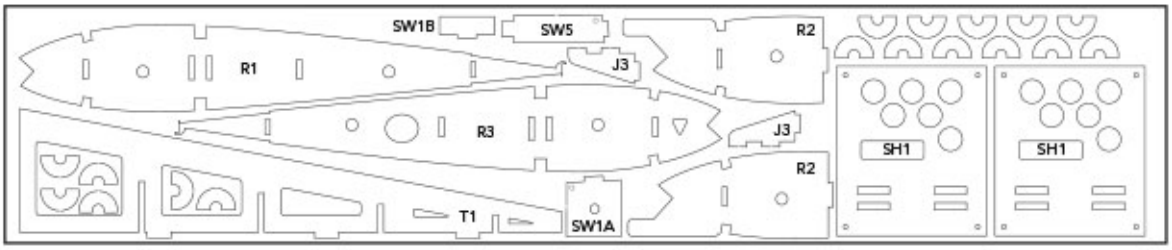
Preflight:
Charge both the transmitter and receiver pack for your airplane. Use the recommended charger supplied with your particular radio system, following the instructions provided with the radio. In most cases, the radio should be charged the night before going out flying.
Check the radio installation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

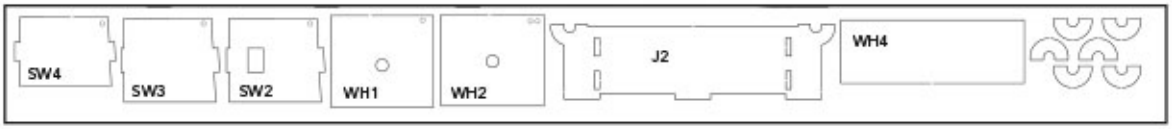
LP1
1/8" Lite Ply



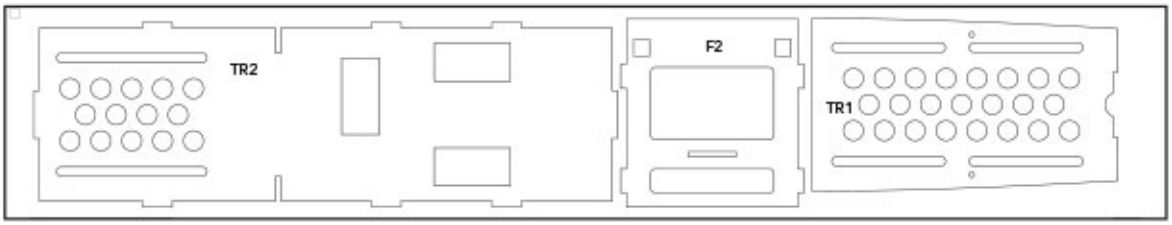
LP2
1/8" Lite Ply



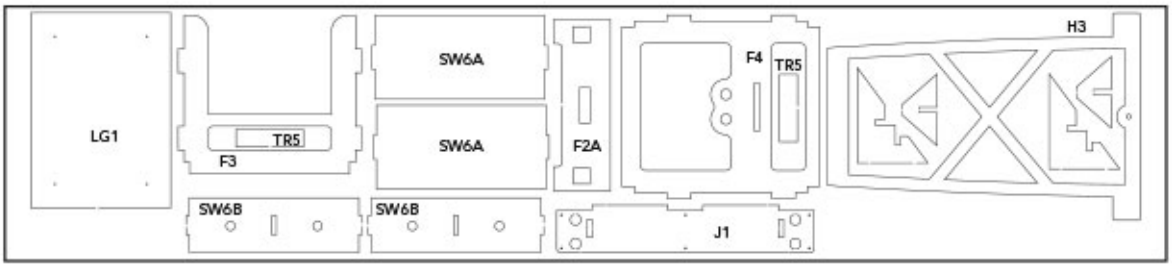
LP3
1/8" Lite Ply



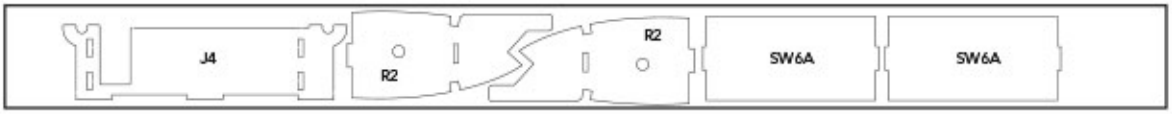
LP4
1/8" Lite Ply



LP5
1/8" Lite Ply

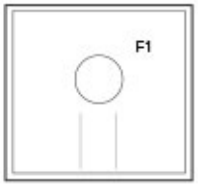


LP6
1/8" Ply



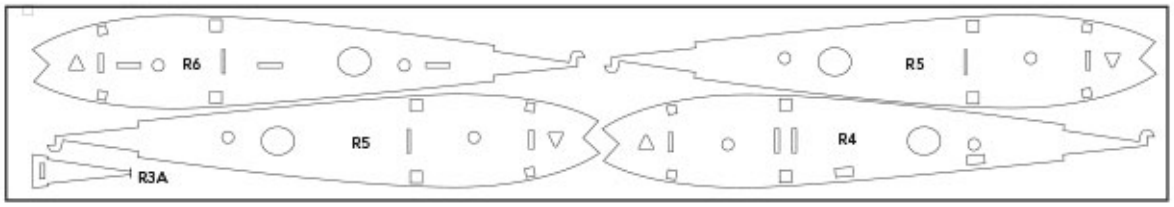
LP7
1/16" Ply

F1
1/4" Ply

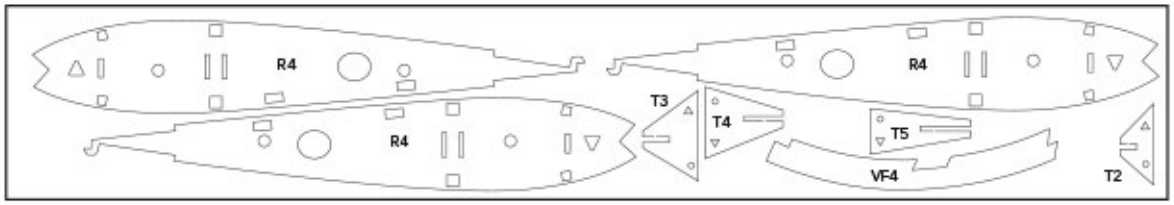


D1
1/4" Ply

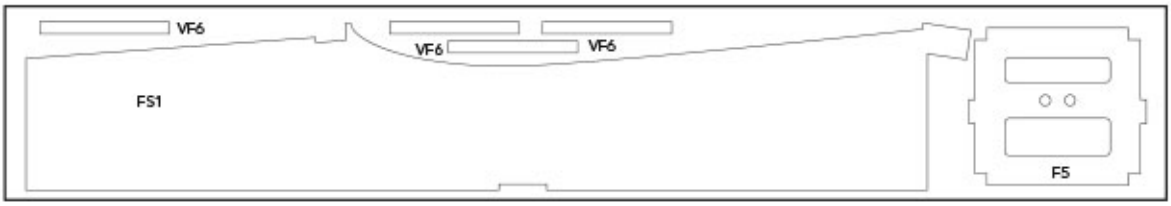
BP1
1/8" Balsa



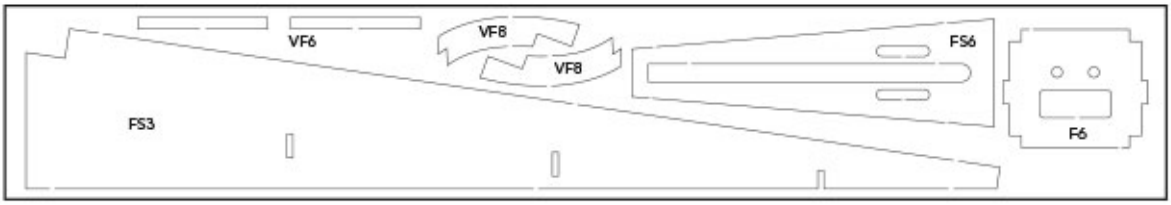
BP2
1/8" Balsa



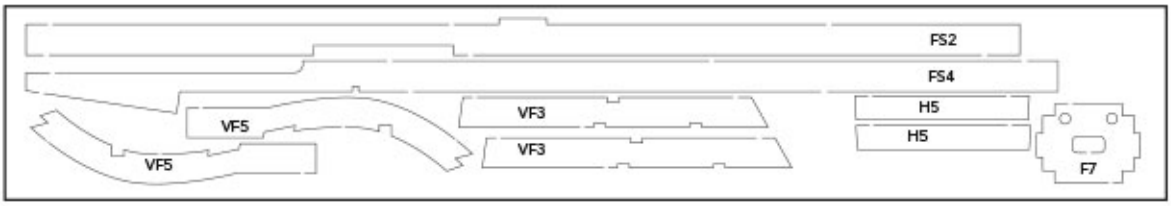
BP3 1/8" Balsa



BP4 1/8" Balsa

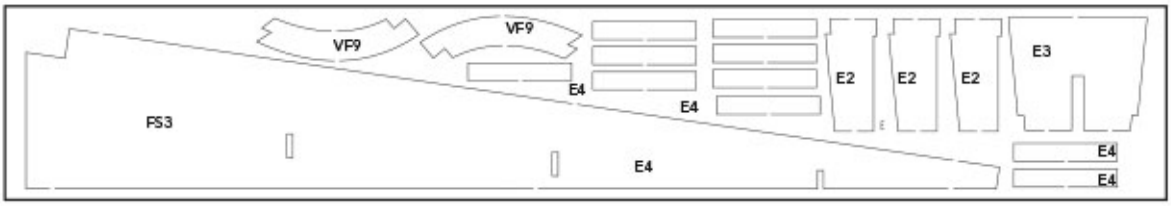


BP5 1/8" Balsa

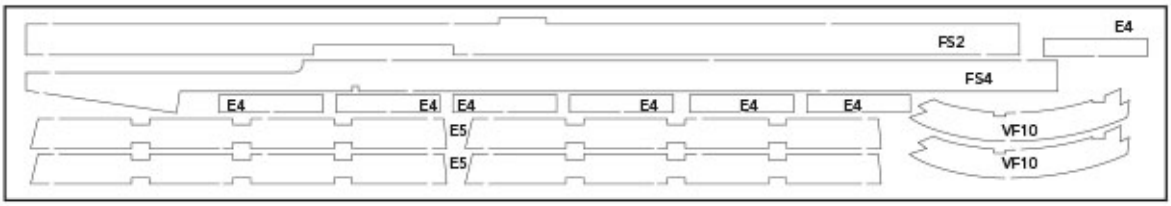


BP6 1/8" Balsa

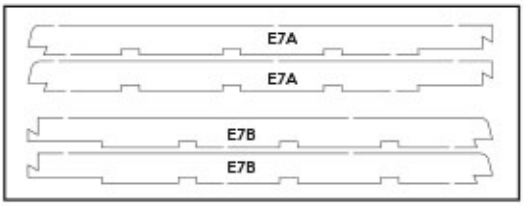
BP7 1/8" Balsa



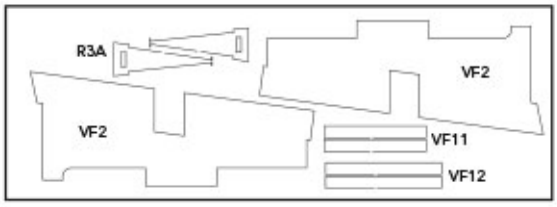
BP8 1/8" Balsa



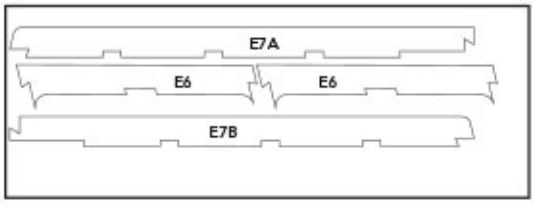
BP9 1/8" Balsa



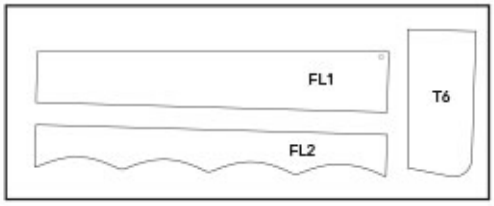
BP10 1/8" Balsa



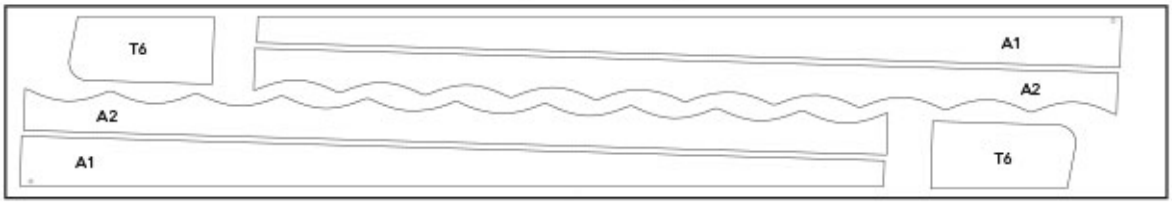
BP11 1/8" Balsa



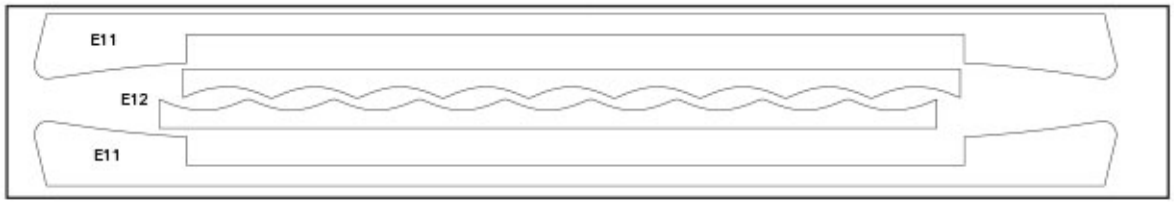
BP13 1/8" Balsa



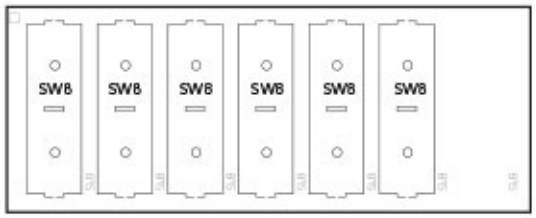
BP12 1/8" Balsa



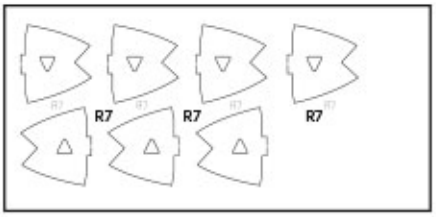
BP14 3/32" Balsa



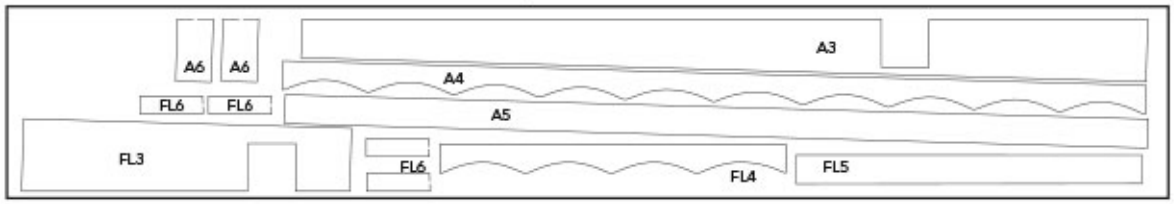
BP15 3/32" Balsa



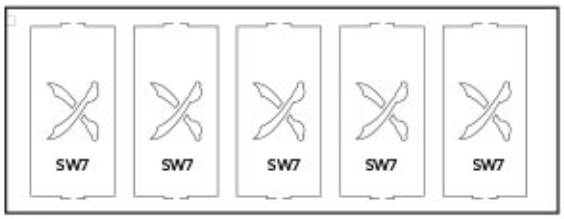
BP16 3/32" Balsa



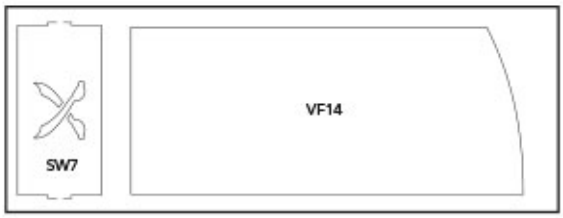
BP17 1/16" Balsa



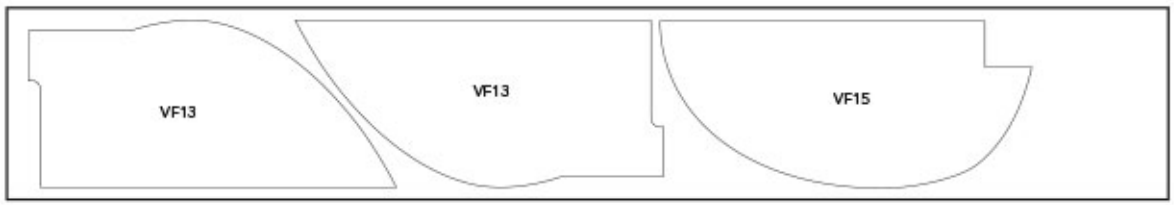
BP18 1/16" Balsa



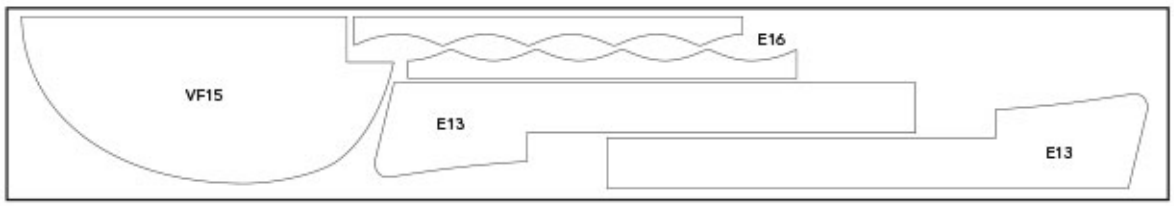
BP19 1/16" Balsa



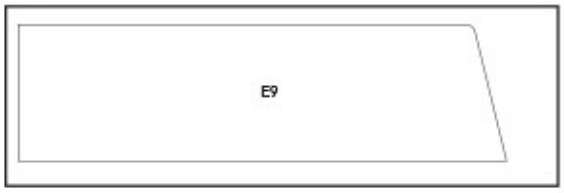
BP20 1/16" Balsa



BP21 1/16" Balsa



BP22 1/16" Balsa

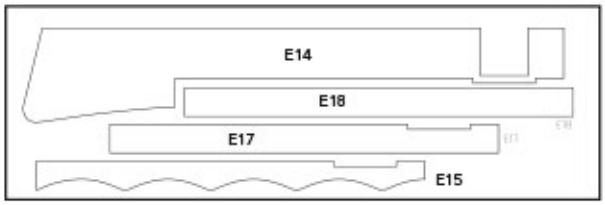


BP23 1/16" Balsa

BP24 1/16" Balsa

BP25 1/16" Balsa

BP26 1/16" Balsa



BP27
1/4" Balsa

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 unopened 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: http://www.knowbeforeyoufly.org .

For more information on all of our other products, as well as the latest news from Old School Model Works:

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