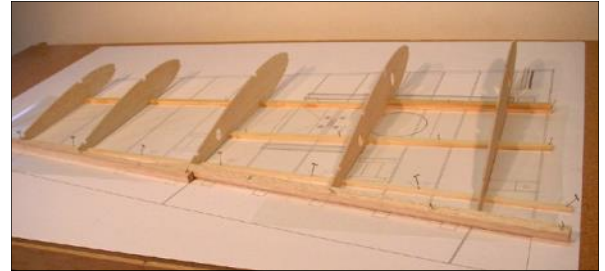


2

WING PANELS

It cannot be stressed highly enough that a flat building board is essential to building a warp-free wing. If you haven't done it lately, take the time to check your board with a long straight edge and make any tweaks that may be needed to make it perfectly flat. It's time well spent!

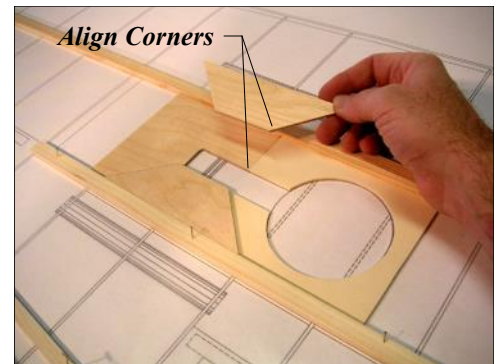
☐☐ Start by pinning the bottom main spar assembly to the plan with the beveled edge facing forward. Use five ribs (W-2, W-5, W-8, W-11, and W-13) as guides to position the bottom stub spar (1/4" x 1/2" x 19-1/2" spruce), the bottom rear spar (3/16" x 3/8" x 36" balsa), and the trailing edge assembly. Don't worry if you have any discrepancies with the plans - trust the parts! Pin the spars and TE firmly in place, then remove the ribs.



☐☐ Glue in the plywood retract mount and the lite-ply wheel well frame.

☐☐ Add two plywood retract mount doublers. Make sure they are glued well to the spars.

☐☐ Glue in wing ribs W-2 through W-7. Use a triangle or the 90° corner of the lite-ply shear web to make certain all of the ribs are perpendicular to the building board. **Note:** You will save yourself trouble later if you keep glue away from the area near the dihedral brace slots.



☐☐ Install the servo lead tubes. The front tube is rolled from a full sheet of 8-1/2" x 14" paper. For the rear tube, cut a piece of paper to 8-1/2" x 6-3/8". Use medium CA to glue the tubes to the ribs.

☐☐ Glue in ribs W-8 through W-14.



Ribs W-2 through W-14 are now in place. I like to use thin CA during initial construction when there is a tight fit between the parts. Later on, all of the wood joints will be given a second coat using medium CA.

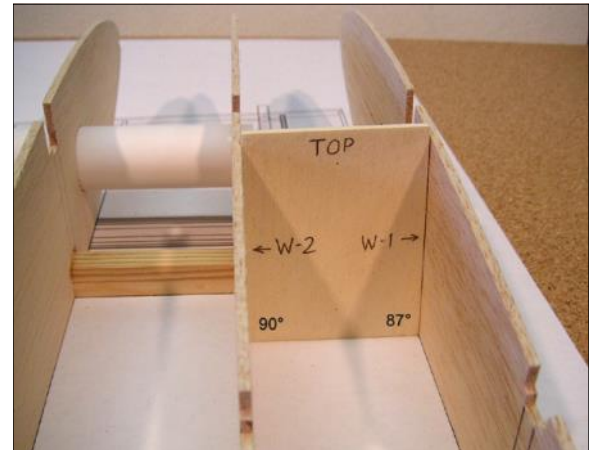
About The Wing Design

One of the design goals of the R54 was to be able to fly into and out of a short field, like we have at my local club. That requires a light wing loading, which means lots of wing area! The airfoil is a very unscientific shape I've used on many sport models in the past, which puts a priority on building ease over pure aerodynamic efficiency. The flat portion on the bottom helps keep things straight and simplifies the retract installation. In flight, the airfoil is close enough to symmetrical that it flies through outside maneuvers as easily as inside.

☐☐ Glue in the root rib, W-1, this time using the 87° corner of the shear web/dihedral gauge. Slide the dihedral gauge back and forth as you glue to make sure the W-1 rib is angled properly along its entire length.

☐☐ Add the top main spar assembly, the top stub spar, and the top rear spar to the ribs. Be sure to check the angle of W-1 to make sure it hasn't shifted.

☐☐ Glue the quarter-round balsa leading edge to all the ribs. Once again, use the dihedral gauge to check W-1.



☐☐ Go ahead and glue the lite-ply shear web/dihedral gauge in its place between W-1 and W-2. Thick CA works well for this; apply it to the shear web where it will contact the spars and push it in place. Don't worry about gluing the sides of the webs to the ribs right now; it will be easier to do later when the wing is lifted from the building board.

☐☐ Add 3/32" balsa shear webs to the front spars (nine places) and the stub spars (four places). Remember, the balsa grain must be vertical. One sheet of balsa should provide plenty of shear web material for one wing panel. I suggest you trim the balsa sheet (selected earlier) to a width of 2-29/32", then slice off webs for the wider rib bays. Once those are done, you can trim the remaining balsa to fit the narrower rib bays. **Note:** The shear web between ribs W-7 and W-8 needs a 1-1/4" diameter hole to pass servo wires and air lines.



☐☐ Locate the 3/4" balsa triangle material provided in the kit, and cut four pieces 1-7/8" long. These braces are meant to reinforce the joint between the W-6Ds and the retract mount doublers. In a perfect world, the retract mount doublers would be perfectly even with the spars, but in real life they are probably slightly off. Take the time to notch the ends of the triangle braces for a perfect fit, then glue them firmly in place.

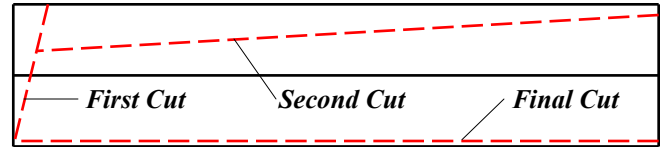
☐☐ Glue in the lite-ply hatch rail, the aileron servo mount, and the flap servo mount. These items should all be pushed firmly against the board so they are flush with the bottom of the ribs.

☐☐ The balsa wing bolt block needs some final trimming before installation. Trial fit the block between W-1 and W-2 (you will have to spread the top of the ribs apart so it will fit). Carefully mark the contour of the ribs on each end of the block, remove the block, then draw lines on the front and back of the block connecting the lines on the side.

Now use a band saw, scroll saw, coping saw, or razor saw to hack away the top of the block, using the lines as a guide. It is critical that this block bridges the space between the top and bottom wing skins to prevent crushing when the wing is bolted to the fuselage. When you are satisfied with the shape of the block, glue it in place.



☐☐ Select one of the leading edge sheets you assembled earlier, and trim it to fit. Start at the wingtip end, cutting away a wedge that matches the angle of W-14. Now, hold the rear edge of the sheet flush with the rear edge of the spar, mark the sheet at each end where it contacts the LE, and make the cut using the marks as a guide. Finally, trim the rear edge of the sheet so it will overlap halfway (1/4") onto the main spar. Glue the LE sheeting in place and allow to dry (see sidebar for details on a good method).



☐☐ **Optional:** If you are building a fully-sheeted wing, add a 3/32" x 3/8" capstrip to the top of rib W-13.

☐☐ Trim a piece of wingtip sheeting to fit and glue it in place. Thick CA works well for this step. You will need a tiny scrap of 3/32" balsa to finish off the rear, inboard edge of the sheeting.

☐☐ Prepare a piece of 3/32" x 3" x 36" balsa to be used for trailing edge sheeting by roughly trimming it to shape, then glue it in place. Use yellow glue on the tops of the ribs



and thick CA along the rear spar and TE. The sheeting should overlap 1/4" onto the rear spar, leaving about 1/8" of the spar exposed.

☐☐ Add 3/32" x 3/8" balsa capstrips to ribs W-10, W-11, and W-12 (skip this step if you are building a fully-sheeted wing).

☐☐ Even though there is no photo, this is a critical step. Remove the wing from your building board and go over every glue joint with medium CA. That means every joint on both sides, if possible. I like to use just enough glue so you can see a small fillet formed between the parts. Use accelerator sparingly; it weakens the cured strength of CA.

Bruce's Method of Gluing on Leading Edge Sheeting

Adding LE sheeting to a wing is always a stressful step for me, probably because I've botched it badly on previous models. The wood always seems to be fighting me! Over the years I've settled on a method that works pretty well and I'd like to share it with you.

1. Prepare your tools. I use yellow glue, thick CA, medium CA with a long applicator, and CA accelerator.
2. Prepare your sheeting. The sheeting needs to be trimmed accurately along the front and rear edge. The front edge needs to fit solidly with the LE along its entire length.
3. Apply yellow glue to the top of the ribs. I like yellow glue for this step because it dries slowly and gives you time to perform the next step.
4. Push the sheet against the LE and apply medium CA to the joint from underneath. This is where the long spout helps.
5. Apply accelerator to the LE joint from above. Avoid getting any spray on the spar, because you don't want accelerator residue there when you apply CA. The idea is to permanently glue the sheet along the front edge so it can be lowered onto the ribs with no worry of it popping up.
6. Apply thick CA to the spar where the sheet will make contact.
7. Lower the sheet onto the ribs, and stroke it from the LE towards the spar in an attempt to pull it tight against the ribs.
8. Continue stroking the sheet until the thick CA begins to grip. Press the sheet down against the spar firmly, using accelerator if necessary.
9. Now the sheet is attached at the front and rear, but the yellow glue is still drying. Use lots of weights like the shot-filled bean bags shown here to hold the sheeting against the ribs while it dries. Be sure the wing is pinned down firmly so the weights don't distort the structure.



☐☐ Block sand any irregularities off the bottom of the wing, then pin it upside-down to the building board. Pin it firmly at the trailing edge so the TE sheeting is flat against the building board. The front portion of the wing needs to be supported near the main spar. I suggest using two pieces of 1/4" balsa sheet (provided in the kit). Stack the sheets then slide them rearward until they contact the balsa LE sheeting. The idea is to support the wing without causing any twists or distortions. Pin the supports in place so they won't shift around later.



☐☐ Use thick CA to glue the wing dowel support assembly in place.

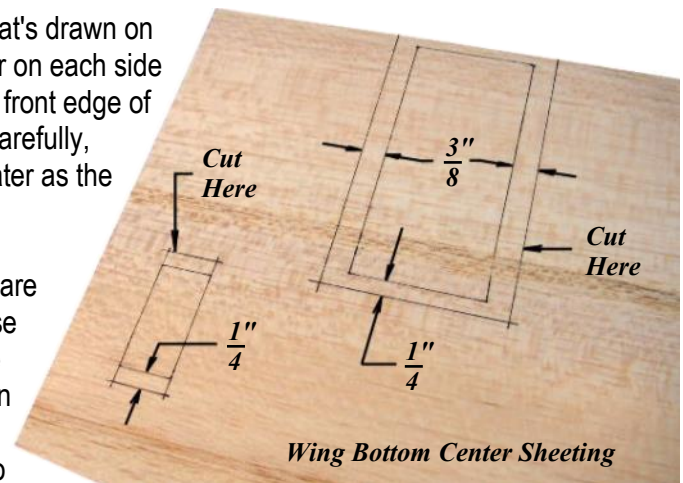
☐☐ Add LE sheeting, wingtip sheeting, TE sheeting, and capstrips to the bottom of the wing just as you did for the top of the wing.

☐☐ Carefully trim the bottom center sheeting to fit snugly between the LE and TE sheeting. Temporarily tape the center sheeting in place, then remove the wing from the building board. Working from the top, mark the outline of the hatch opening, the flap servo opening, and the aileron servo opening. Also mark the retract mount area (don't worry about the wheel well - you will cut it out later). Remove the center sheeting.



☐☐ Let's start with the servo cutouts. The actual cutouts in the sheeting need to extend an extra 1/4" at both the front and the back to make room for the servo mounting flanges. Ultimately, the servos must sit on the lite-ply mounts, not the balsa sheeting. Draw the extended outlines on the sheeting, then neatly make the cutouts.

☐☐ The wing hatch is actually larger than the opening that's drawn on the sheeting. Carefully draw a hatch outline that is 3/8" wider on each side and 1/4" wider at the rear. The front edge of the hatch is the front edge of the sheeting, so no cut is required there. Cut the hatch out carefully, keeping in mind that the cutout is not scrap - it will be used later as the hatch cover.



☐☐ Cut the retract mount area away using the lines that are on the sheeting. Place the sheeting back on the wing and use an actual retract unit (or the paper template included with the kit) to mark the cutout area for the mounting flanges. Position the retract with the mounting holes equally spaced on either side of W-6. Remove the sheeting, then make the cutouts so that there will be about 1/32" clearance all around the mounting flanges.

☐☐ Trial fit the center sheeting one last time, and mark the wing structure through the cutouts you just made. The marked areas will indicate "no-glue" zones. Remove the sheeting, then apply yellow glue to the wing structure, being careful to avoid the no-glue zones. Put the sheeting in place, then weight down the wing on your building board (use wax paper!) right-side up so that the center sheeting is flat against the board. ◀R54▶

