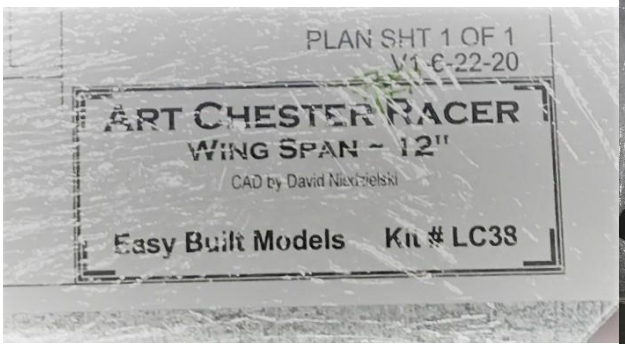
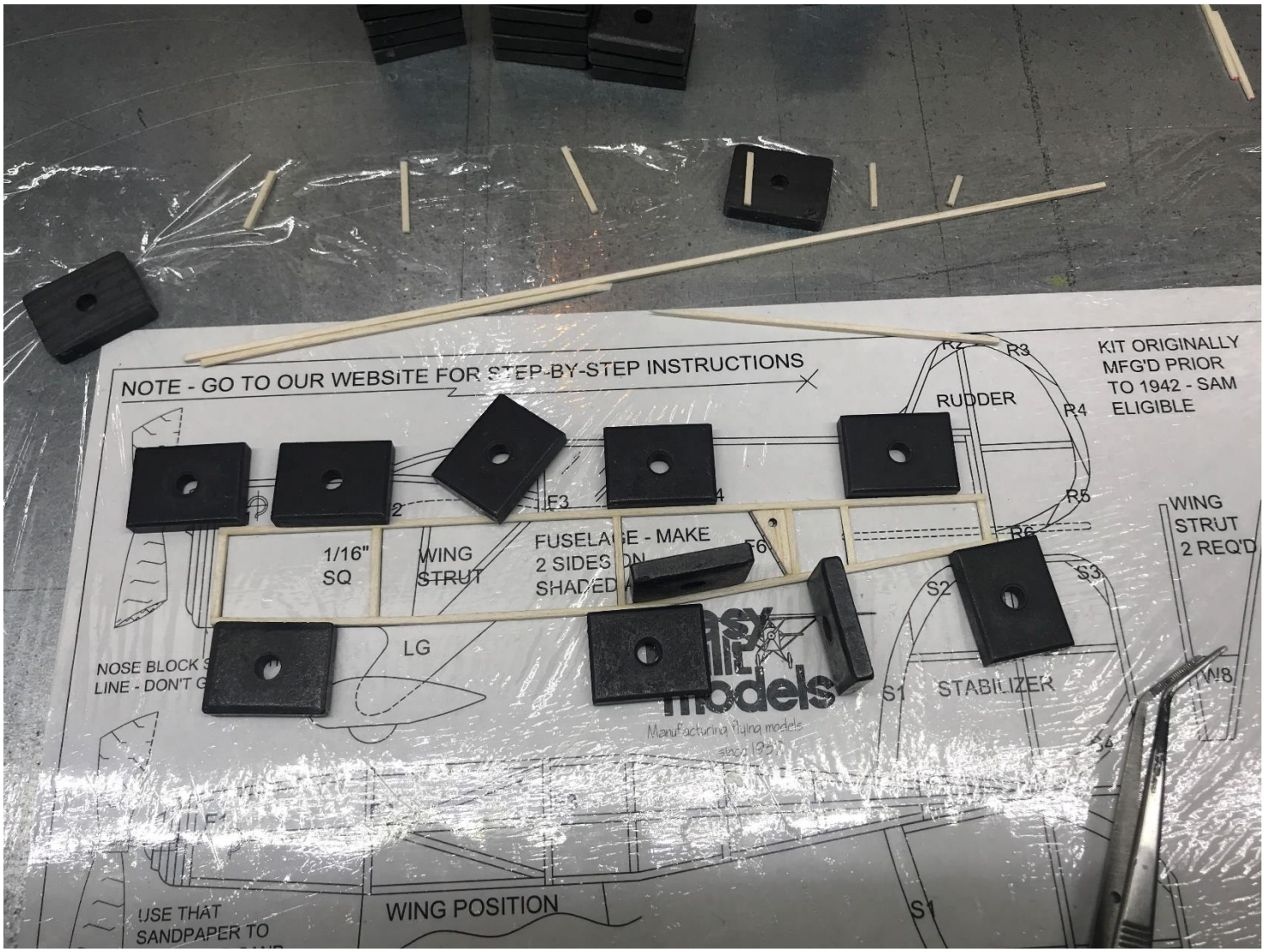
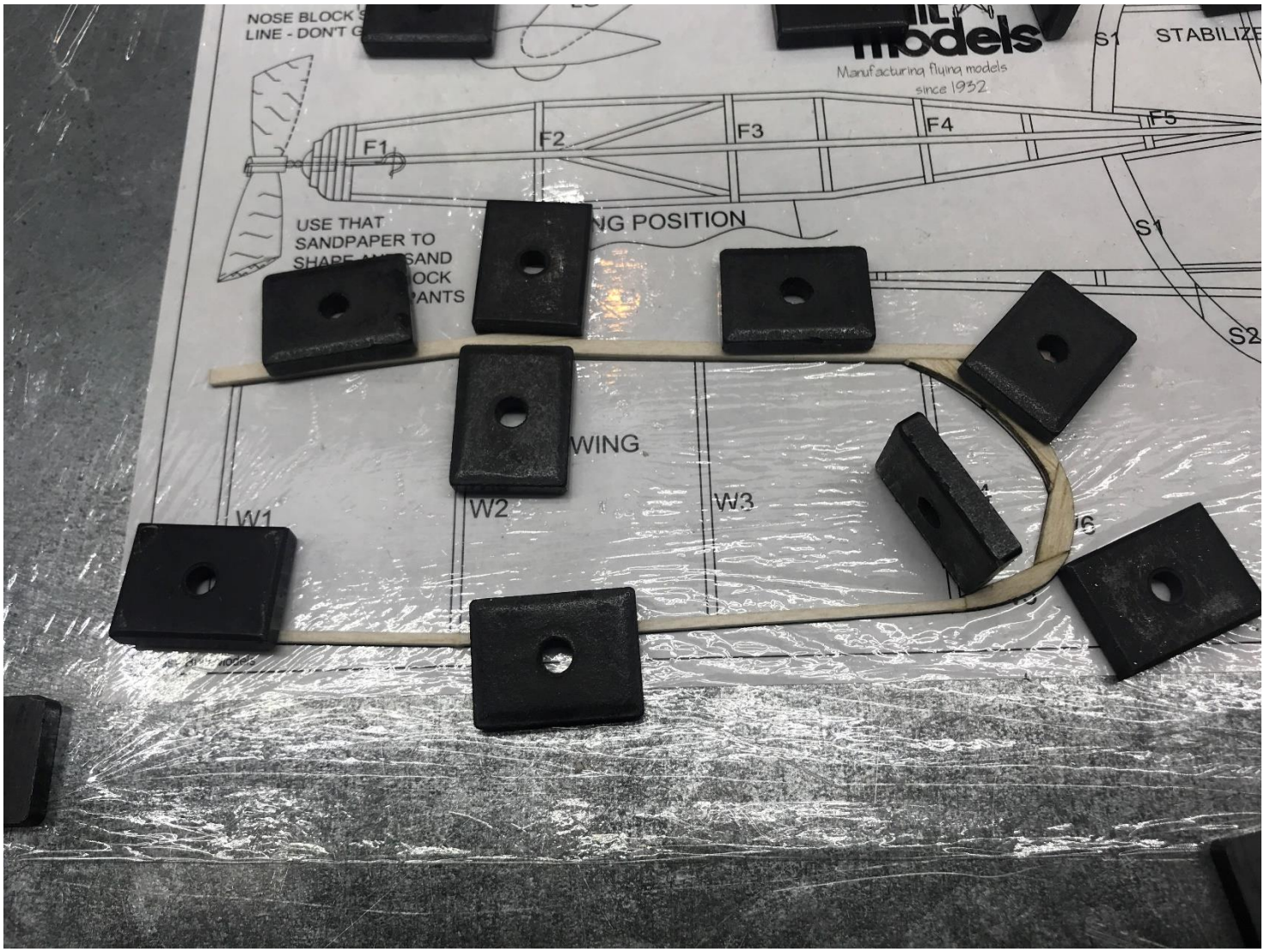


1. This instruction document is for the LC38 Art Chester Special Race Plane kit from Easy Built Models. This is a kit from before 1942 and cost a nickel at the time. We've updated the kit to include some additional features than normal for a nickel kit but kept the flavor of the simple construction. During my build from the kit, I made a couple oops along the way and will show you how I fixed. I encourage you to use the kit as the basis for the build but to also personalize your build to reflect you and your interests. Maybe you are good at carving, then consider making a pilot. Maybe you use it but make your own markings for one of the Jeep variations of the race plane. Start by laying out the plan and covering with wax paper or a plastic wrap so that the glue doesn't stick to the plan.

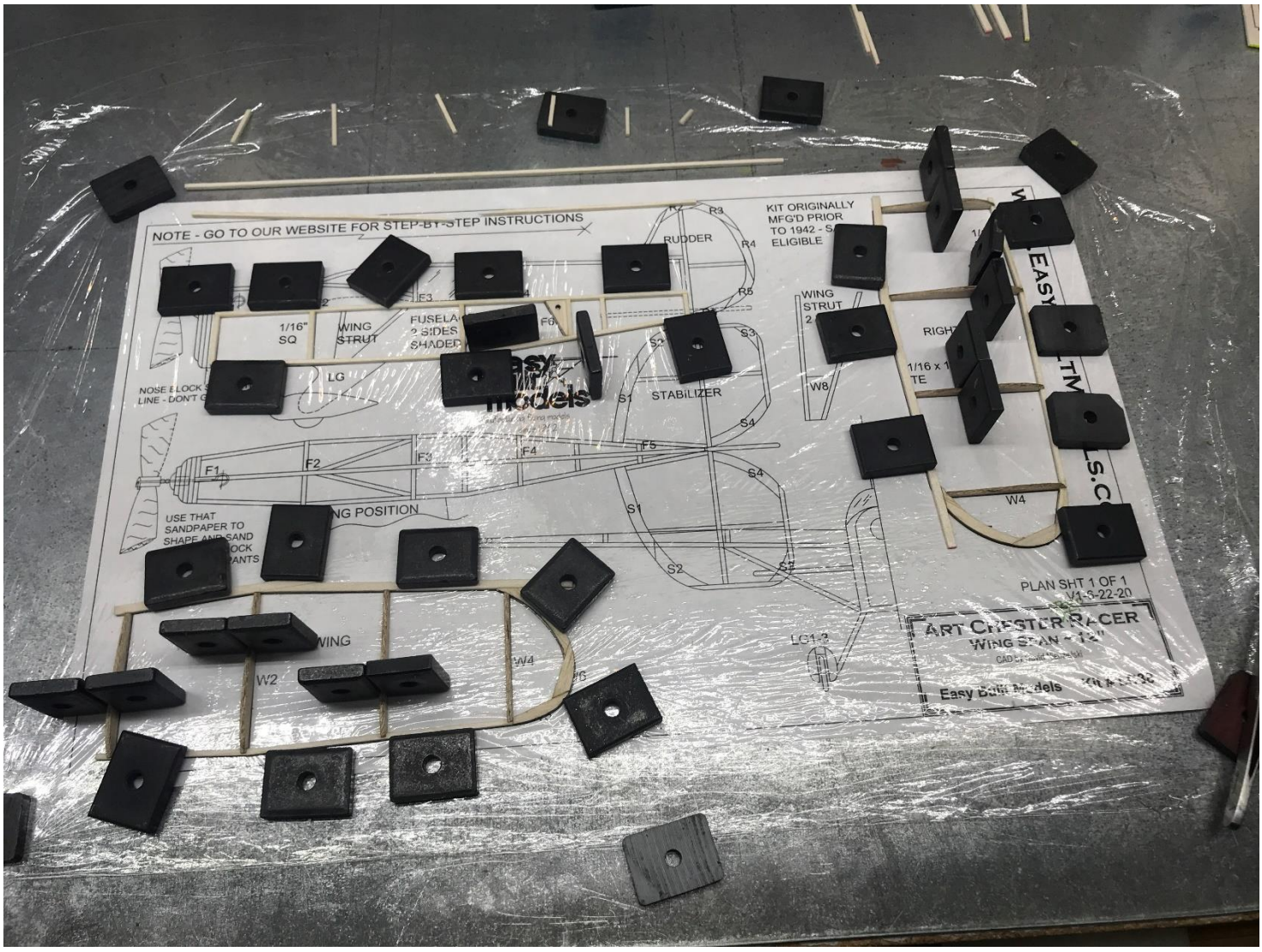
2. Before you start pulling any parts out of the laser cut sheet, now is an easy time to run a sanding block with 220 grit paper on the back and remove some of the soot marks created by the laser cutting process. Not necessary but it just looks nicer.



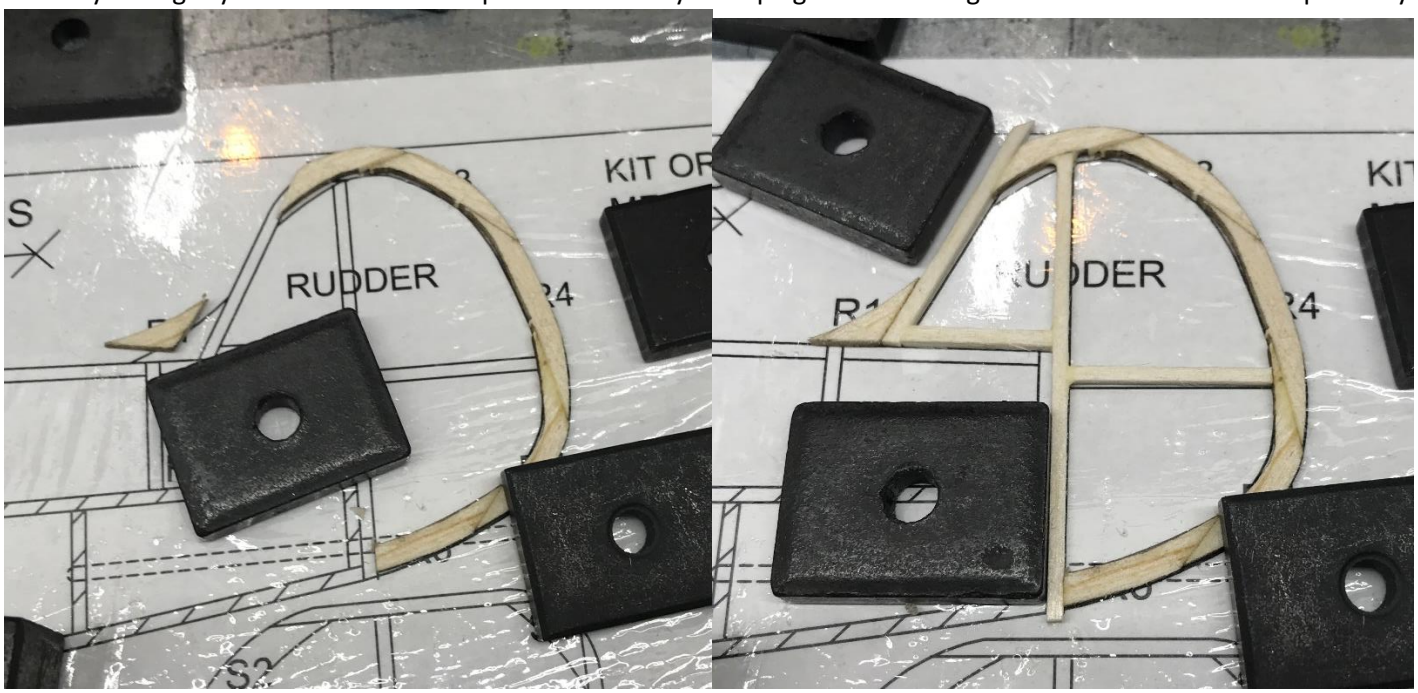
3. So, let's get started. This plane is based on a flat sided box constructed fuselage of 1/16" square balsa. We are going to build 2 identical sides of the fuselage over the parts marked with hash lines. Before I start positioning, I like to cut out all the parts in advance in pairs. Here you can see the parts for the second half laid out just above the plan in position to where they will go. This seems to me to be the easiest way of getting the sides to be identical as much as possible. I don't worry about making the longerons longer than needed. I let them stick out and will sand down after the glue has dried. Sand paper is one of the most important tools to have in your tool selection. It is also one of the most misused and underused tools in the tool box. I glue some of different grits to blocks and keep them readily at hand. When I cut the pairs of cross pieces, make them oversize, tap on table to even one end, sand that end square, then sand the other end to length. As in this case where there are several cross pieces of the same length, I group them and do the same. Makes for very repeatable sized pieces. **Note**, on the very first run of kits we found an error and added a small sheet of parts for the nose block. These move the centerline of the prop a little lower so that the shaft can spin freely with lower risk of hanging up inside due to the small nature of the nose. This was corrected in subsequent kits and the similar parts eliminated.



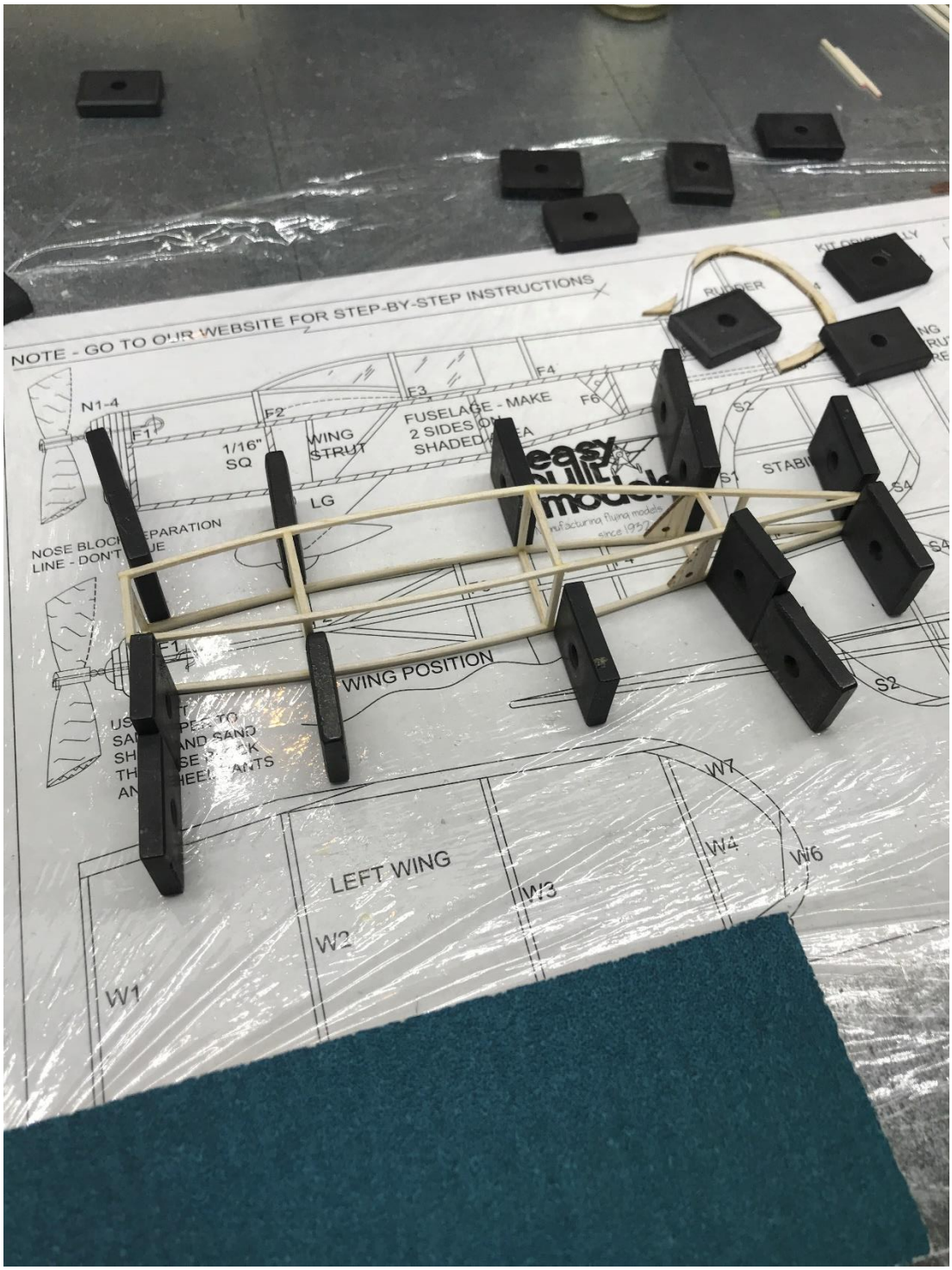
4. I usually make the wing tips first gluing all the pieces together over the plan getting the outer edges aligned as close as possible. Next, I bring in the leading and trailing edges (LE & TE) and glue these into position. I do not worry about adding washout at this time, that happens during the covering process. Again, you can see where I let the LE and TE run long and will trim/sand once the glue has dried allowing a smooth blend with the wing tips and root ribs.



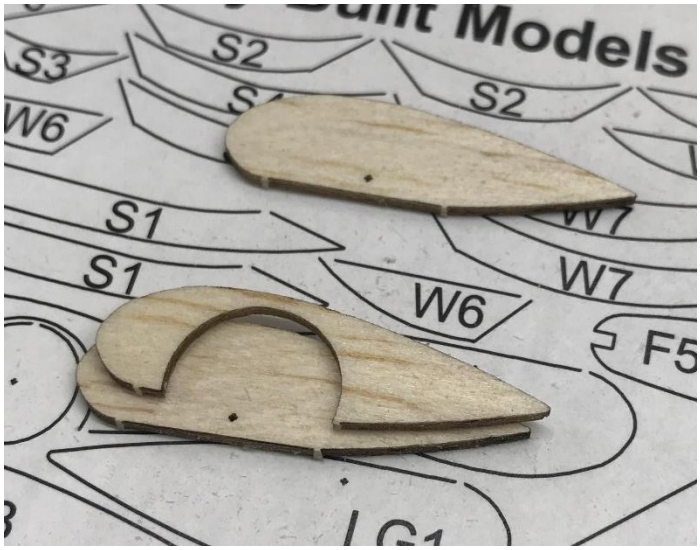
5. Here is a picture showing several structures assembled and allowing the glue to dry. While one is drying, I move on to the next. Now I'm using magnets to hold the ribs perfectly vertical and aligned with the plan while the glue dries. The ribs may be slightly oversize or fit into a place where they but up against at an angle so I will sand these to fit perfectly.



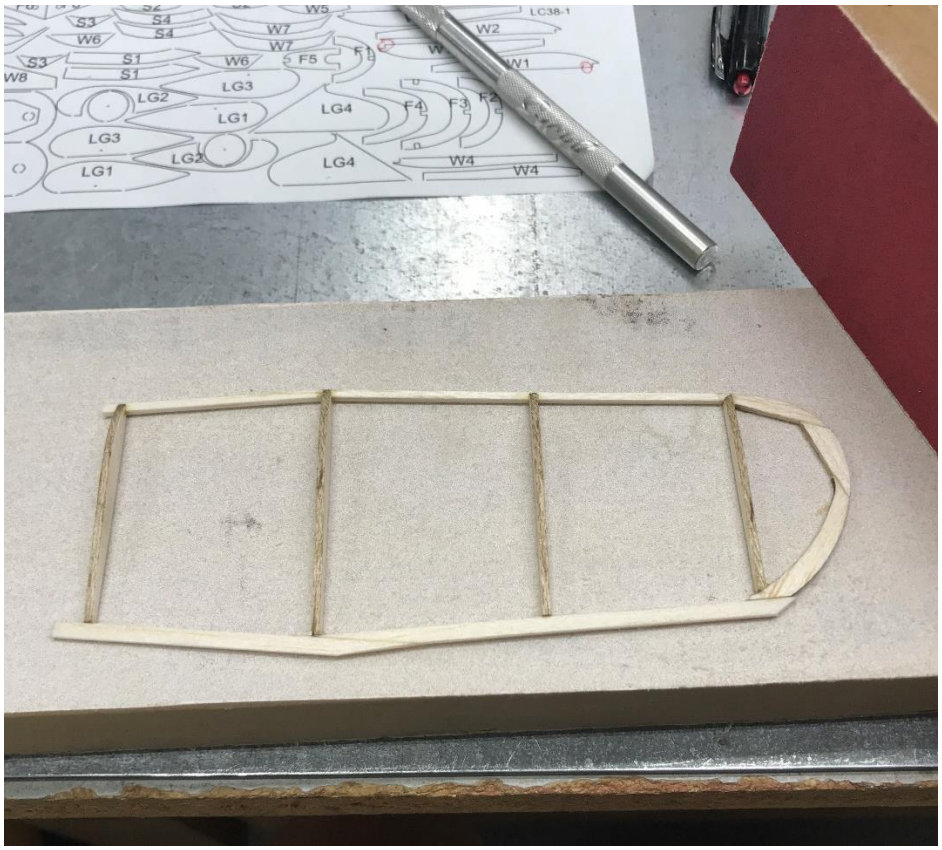
6. I do the rudder like the wing tip, assemble and glue the outer parts keeping aligned to the outer edges as best as possible. Then fill in the rest of the structure.



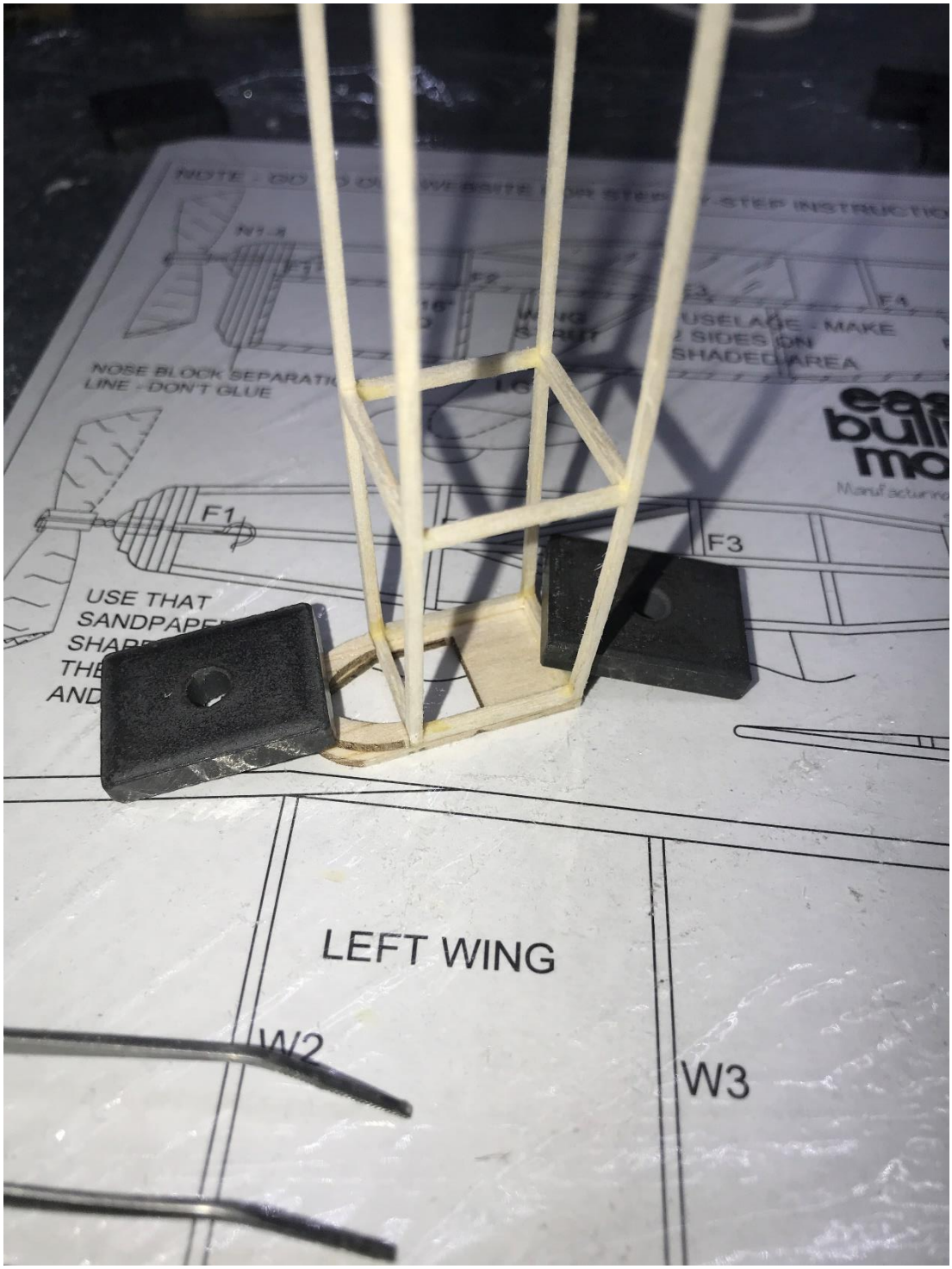
7. Before I start putting the fuselage halves together, I'm going to sand each side to be sure they are smooth. No glue lumps or maybe a part that didn't get pushed all the way down. I sand the inside end of each fuselage half so that when it is glued together, I've got some substantial material touching each other and the angles of the fuselage sides match closely the lines on the top view on the plan. I use the magnets to assure I'm keeping the sides square/perpendicular as I insert the top and bottom. I start at the rear of the fuselage insert the cross pieces top and bottom, using the magnets on the sides to apply inward pressure until the glue dries.



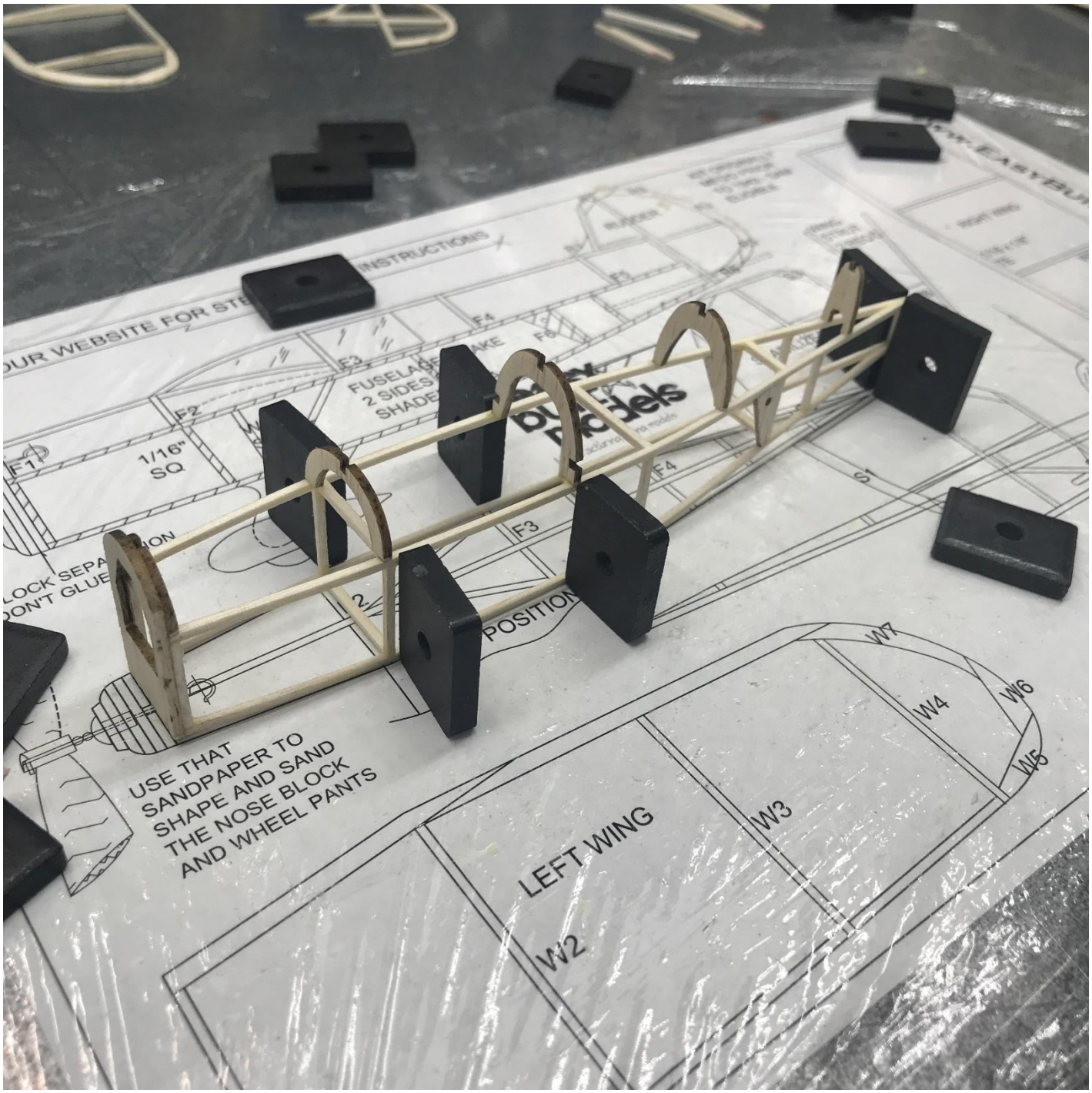
8. So, while the fuselage box is drying let's put the wheel spats together. You are going to glue up 2 separate, identical assemblies. The wheel is shown but is not installed at this time. Do your best to align the edges on all sides. This will make the holes for the axle line up and keep it easier for sanding to an aerodynamic shape. There is no left or right side on these for this particular model.



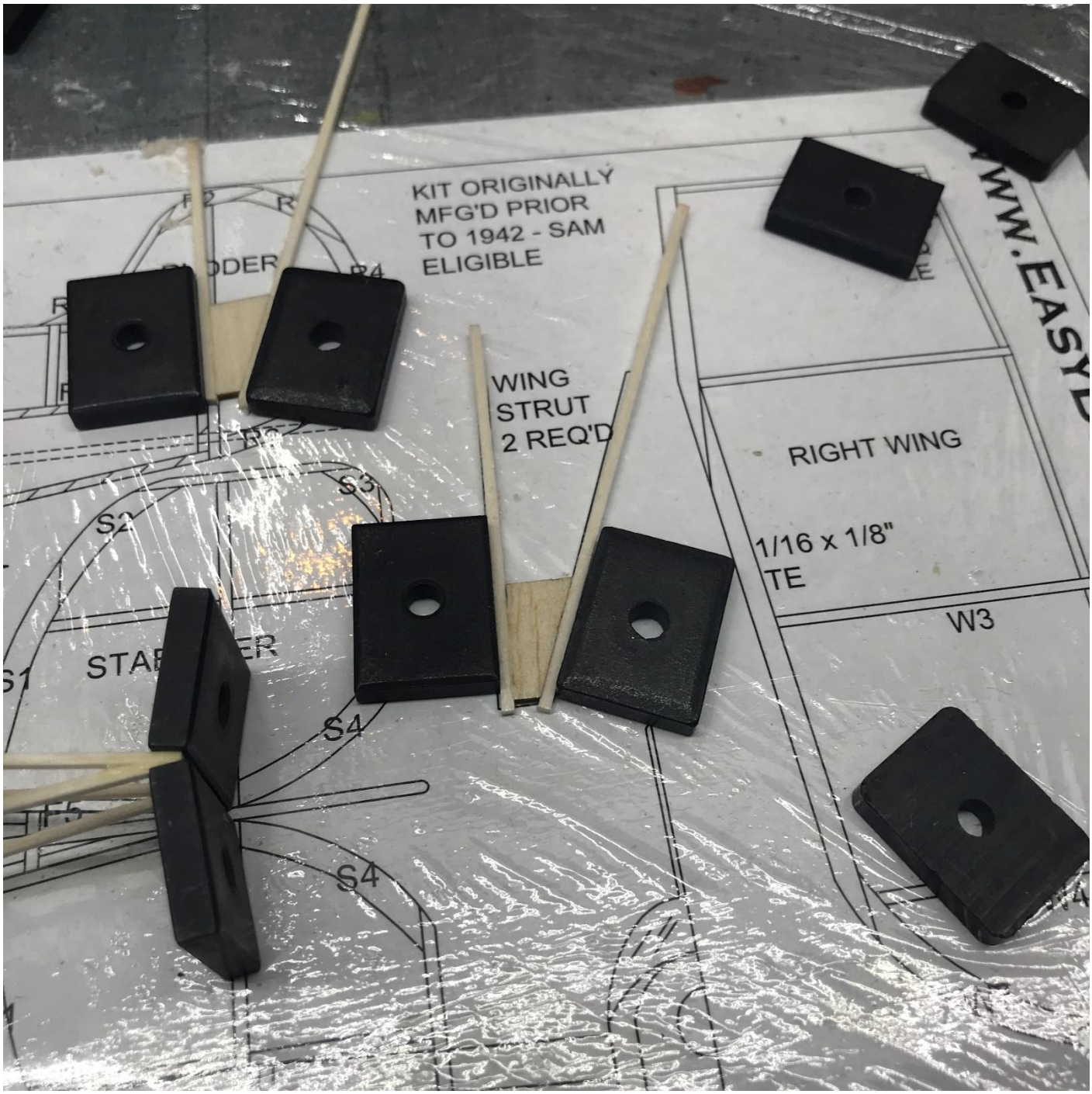
9. With the glue dry, remove the wings, sand the outer edge at the wing tips to shape. Then I like to sand the lower surface of the wing flat. Glue always wicks under the wood and the glue is typically shiny and hard, makes the surface bumpy and less likely for the tissue to stick well and present a smooth finished surface. So this is not a time for speed. This is also not a time for using old sandpaper. Most sandpaper wears out with use. Start with a 220 grit to get the worst off then do a finish with a 320 grit. If you have lots of instant glue which is harder than the balsa you might have to start with a finer grit so that you eat away at the glue with more control and not erode the surrounding balsa. This is a skill set that you need to work on if you haven't got it. Gently move the wing back and forth until you see the bulk of the glue is gone from the exposed surface. Then move on to the top of the wing. This is a bit more challenging with all the curves. Don't try to get the entire wing in one shot, you'll more likely start breaking things apart. To make this part of the sanding easier I like to rest the structure on top of another block faced with a 180 -220 grit sand paper. This block holds the structure like a bunch of little fingers and reduces the chance of breaking the delicate structure. I start at the top of the ribs and work my way towards the TE. I feel this is done when I get the outer edge of the TE down to about 1/32 high remaining. I don't want a knife edge. I then worked to the LE and I'll do something similar but with more rounded shape. Do both wings and set aside for covering.



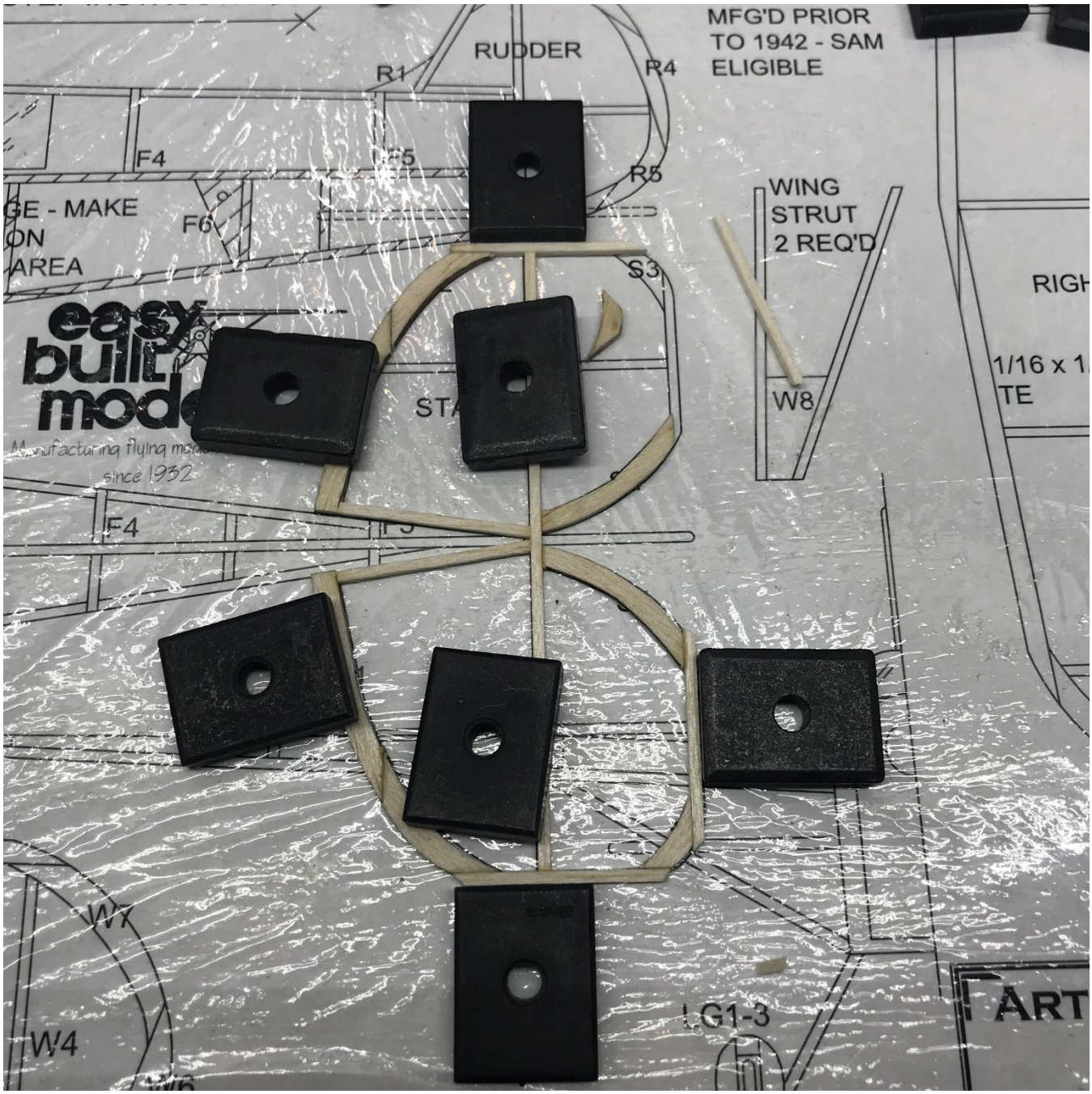
10. Missed a picture here. Once the fuselage box is glued up and dried, time to sand the top and bottom smooth. Stand the fuselage on end and glue the front former on. Once the former has dried, add the faceplate. I use the magnets to assure this front stays square and aligned.



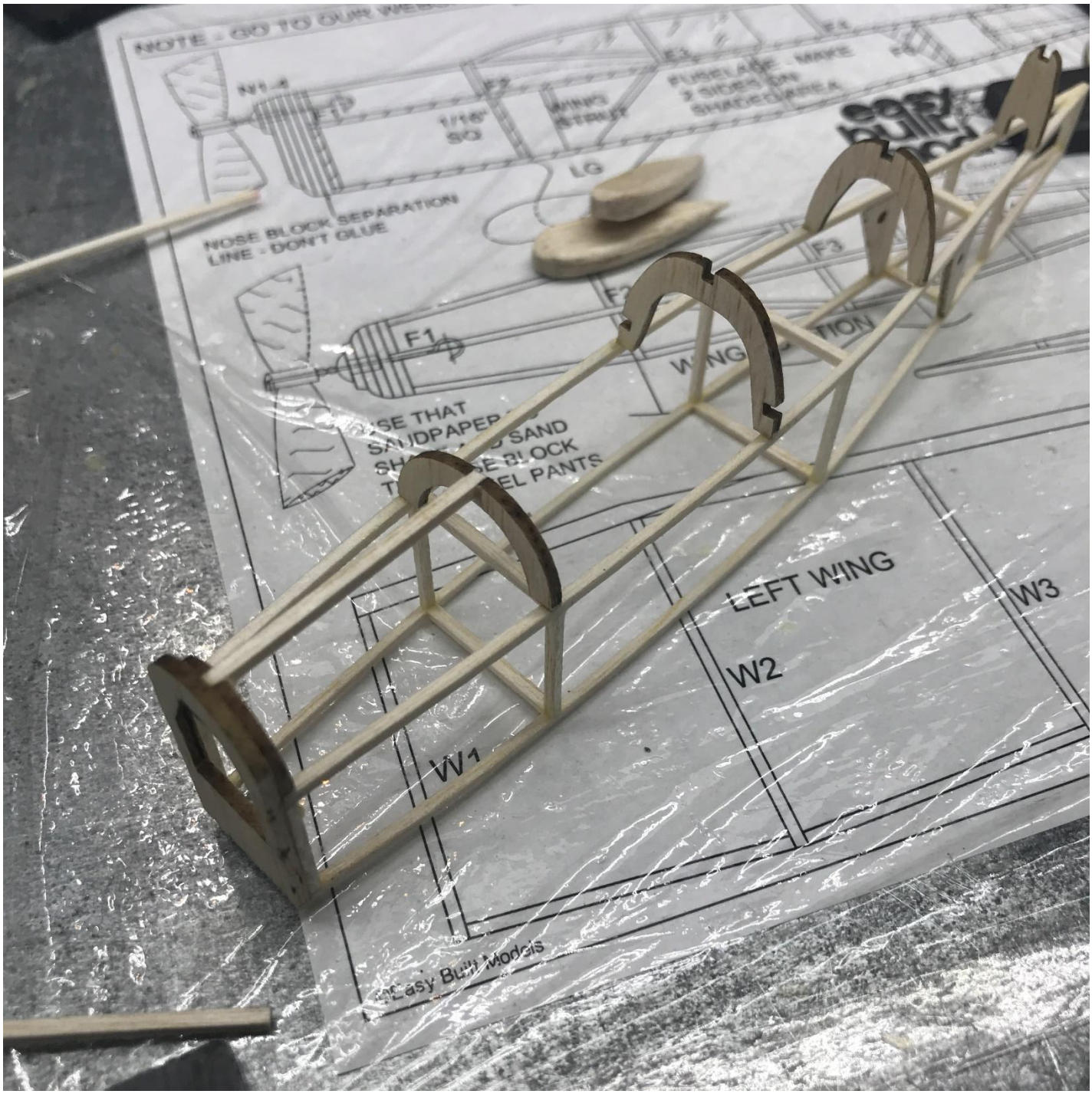
11. Time to install the formers on the top of the fuselage.



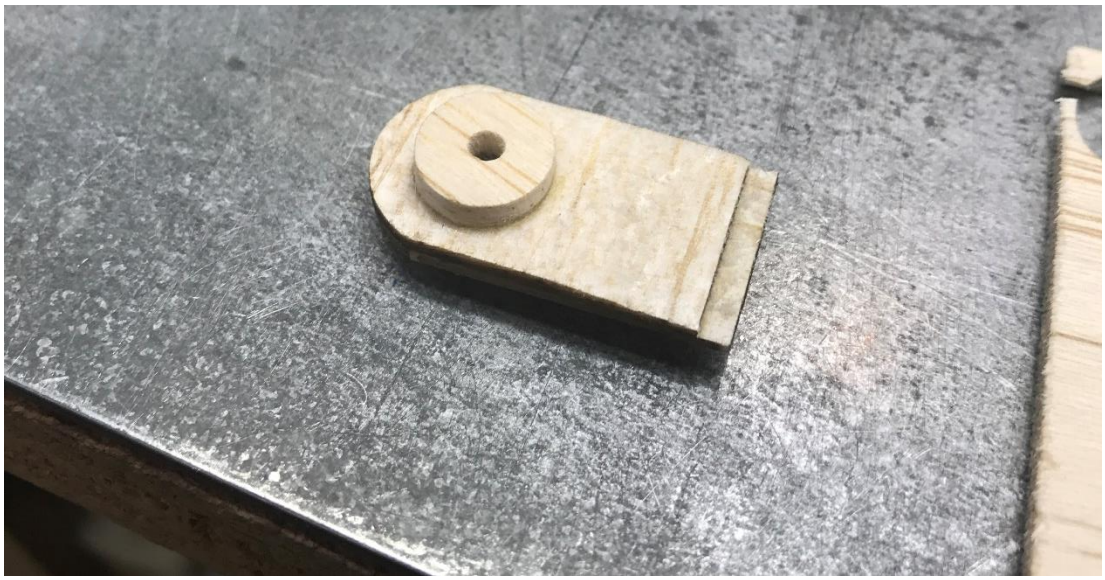
12. While the glue for the formers dries assemble the struts. You can make them a little long if you plan to go with more dihedral than 3/8". When the glue dries round off the square edges.



13. Assemble the LE with the laser cut parts then build the structure with 1/16” square balsa. As you get the strip wood in place you will finish off with the last of the laser parts. Now this is a nickel kit and I honored the butt joined stab and wings. Normally I prefer a 1-piece wing and stabilizer. I built the stab here as one piece and then cut in half at time of installation. No reason why you can’t modify your fuselage now to take advantage of a 1-piece stab.

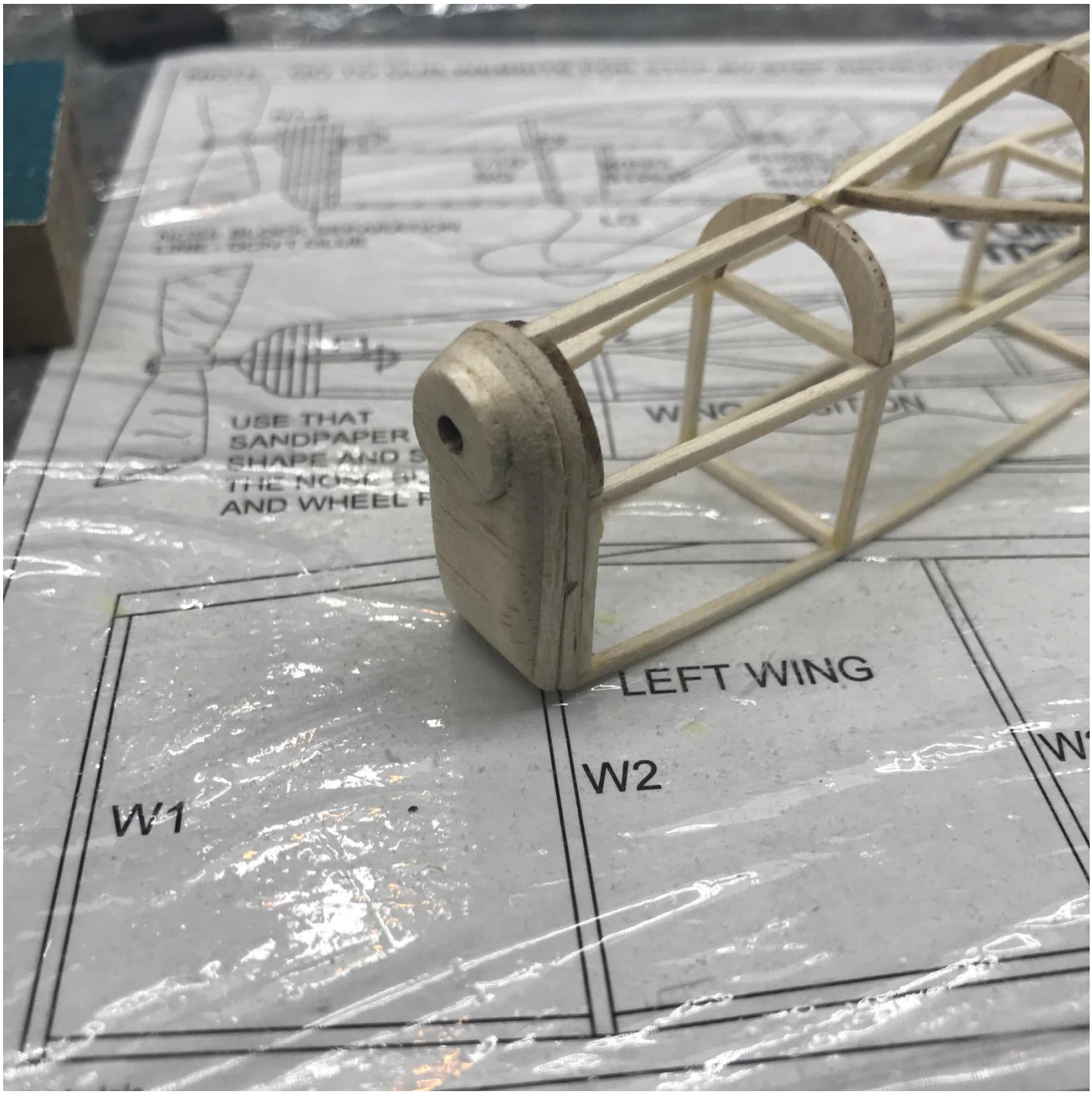


14. Install the top stringer from the front to the rear matching the side view.

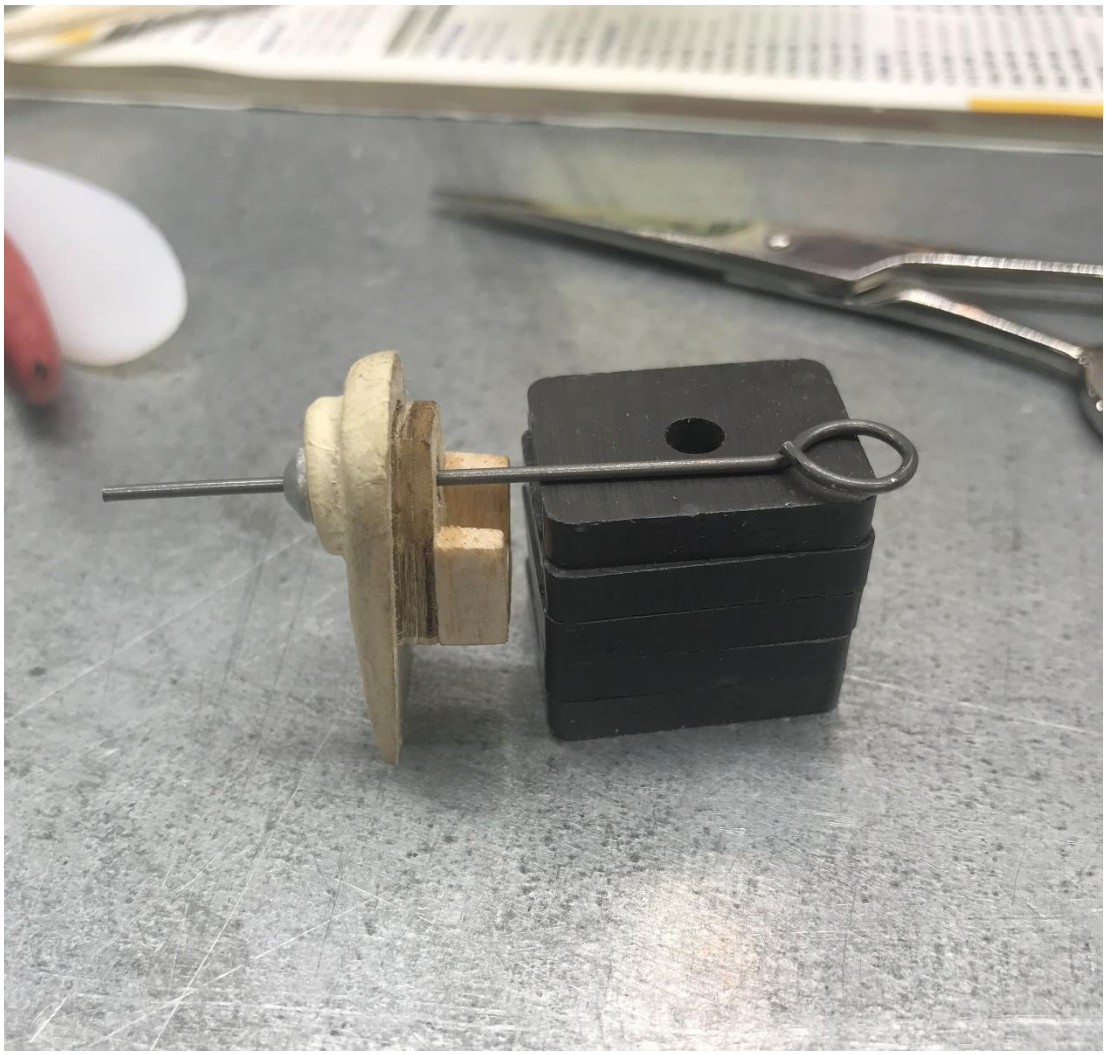


15. Stack up the parts for the removeable half of the nose block. Glue together being sure to keep the thrust button aligned. Do the same to the keys. I don't glue the keys to the back until the glue on the front pieces dries first. I take the assembled keys, insert into the fuselage and put a drop of glue on the front of the keys. I then align the nose block with the fuselage edges and very carefully remove the entire assembly from the fuselage. Allow the glue to dry. If you think you bumped out of alignment then put back in and correct.

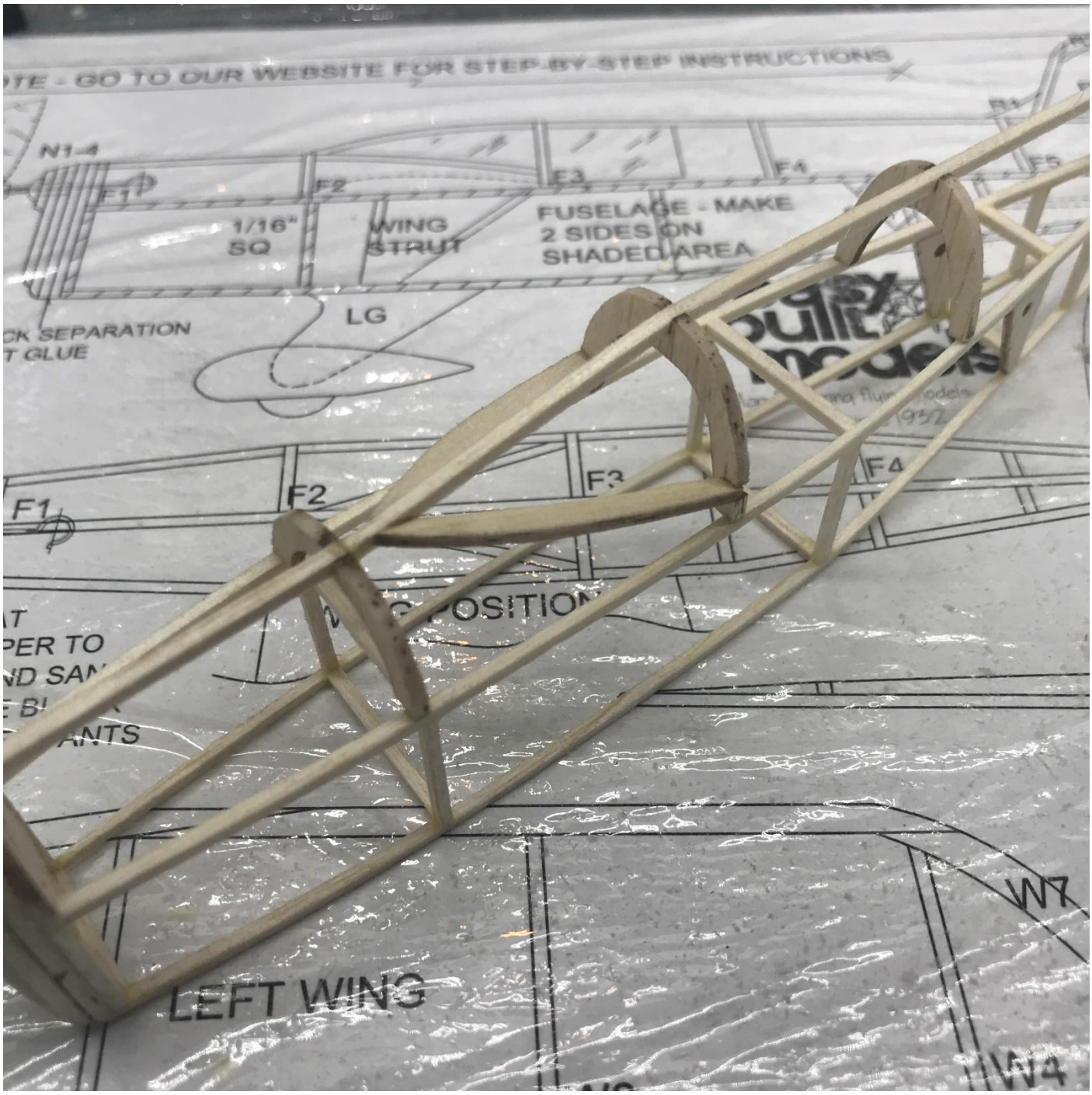
16. As these pictures are of the second nose block and I've already flown my model, I know that I will need additional down and left thrust. Notice how I've sanded in an angle in the front most part to give me these angles.



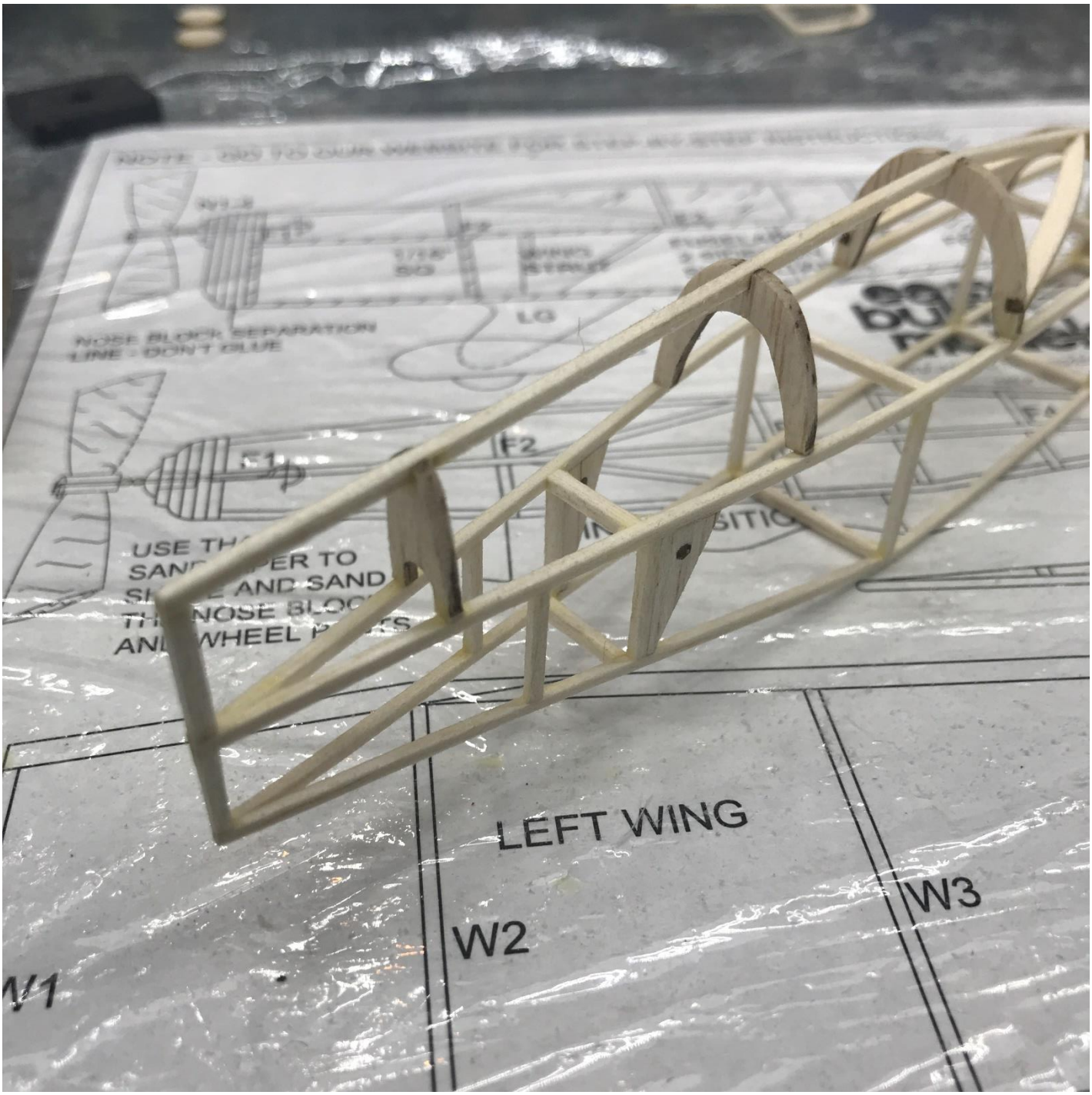
17. Sand to shape after the glue dries.



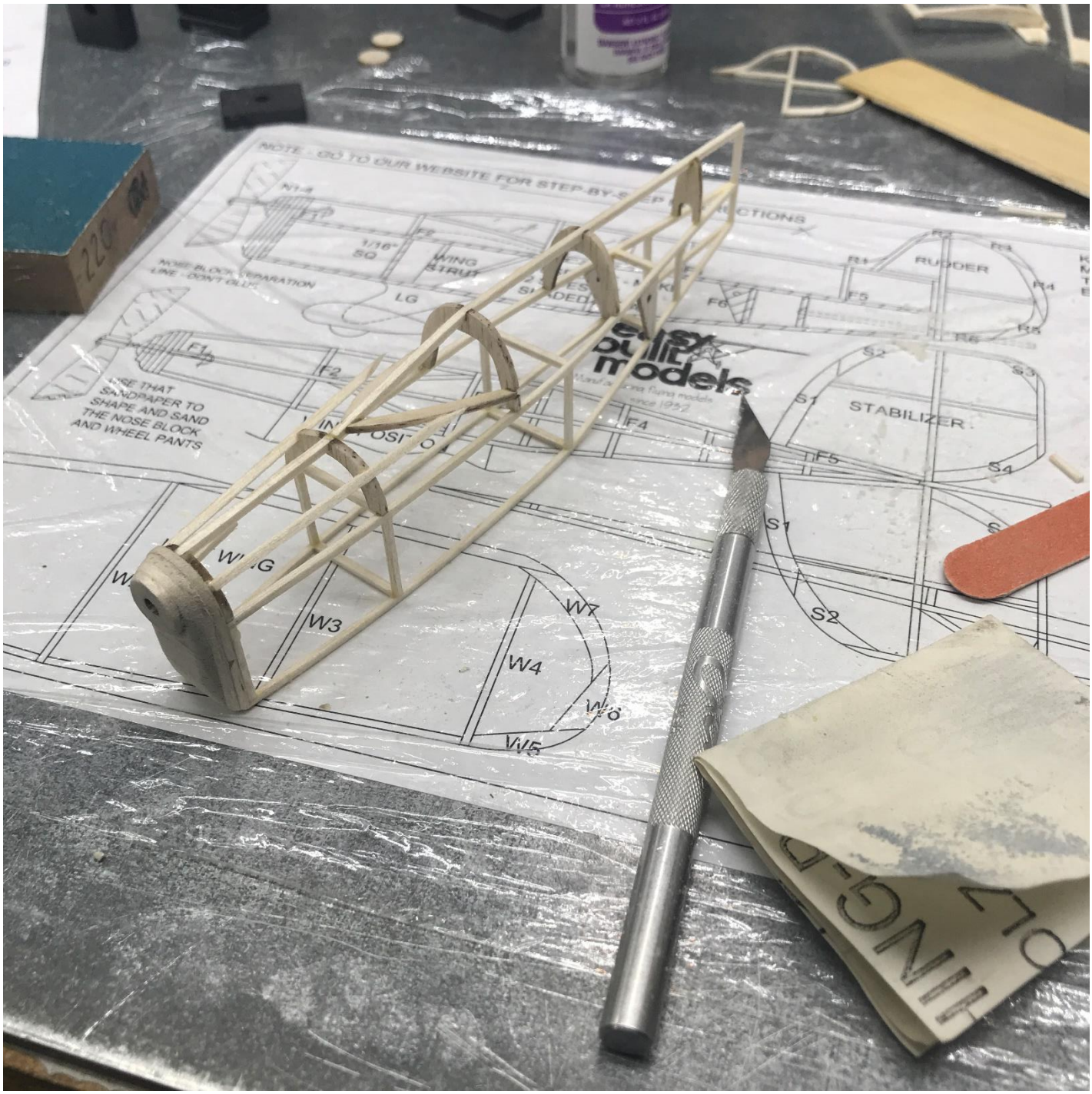
18. This step is not necessary but if you fly your model in competition then you should consider it. I like a bit more tightly fitted nose block so I added some 1/8” x 3/16” strip wood glued on edge to the back of the keys. I then go through a series of sanding these extensions to match the key frequently stopping to test the fit. Go to far and you have to glue some additional wood on and start the sanding all over again.



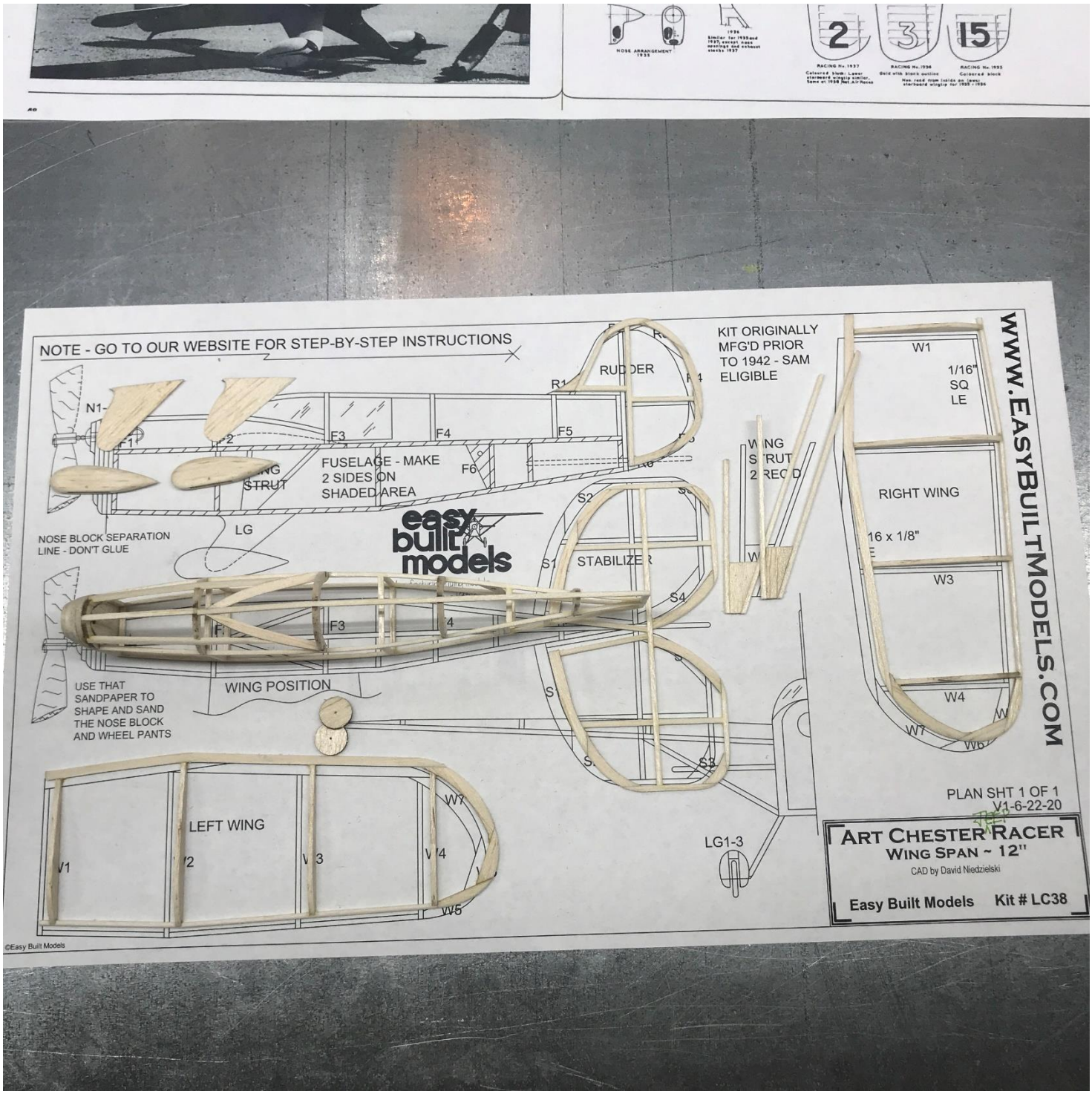
19. Continue adding the stringer on top and parts F7 for the bottom of the canopy.



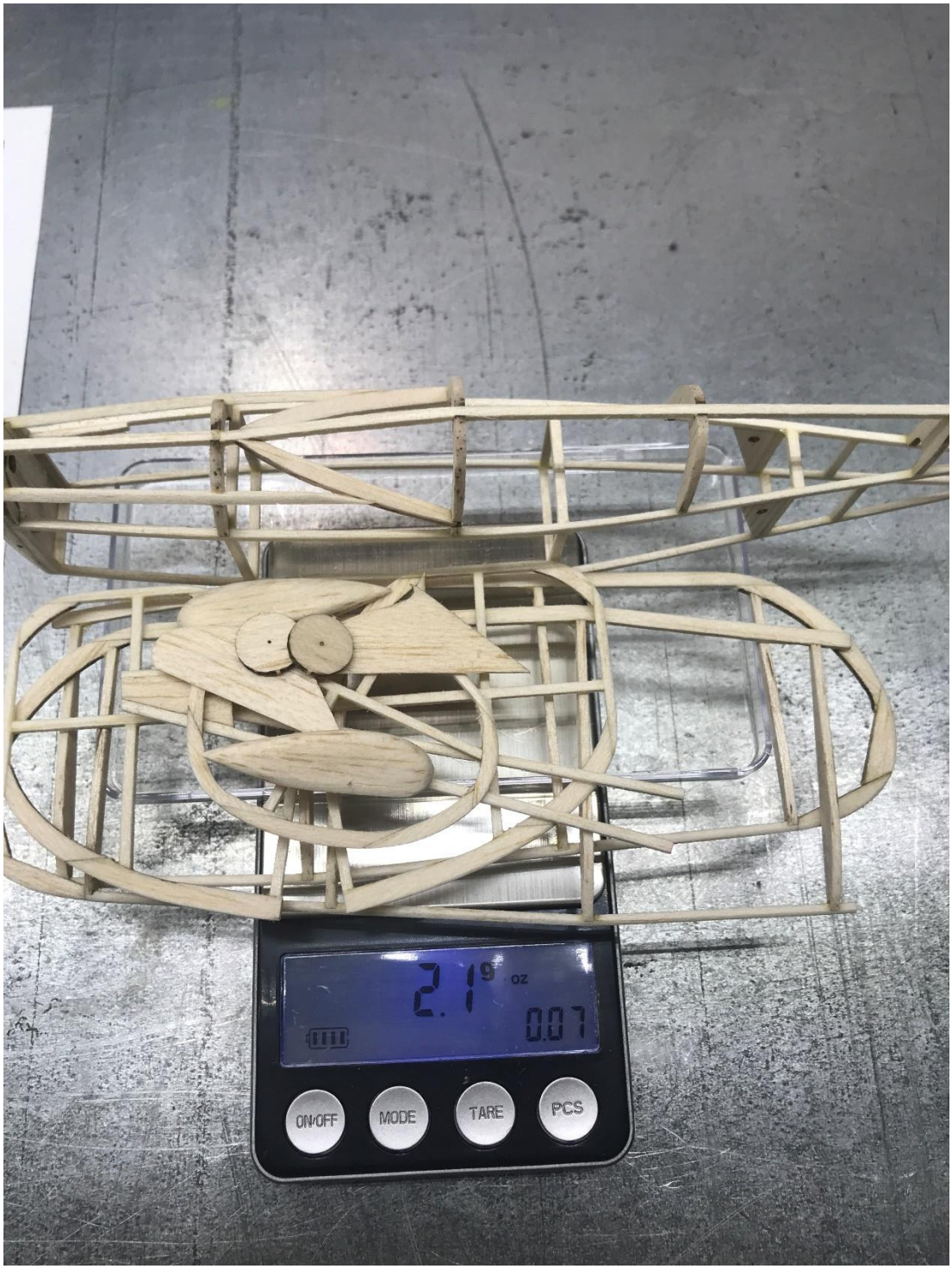
20. You'll need to make a piece of 1/16" square balsa to fill in between the box fuselage and the top stringer at the tail of the airplane. To save other problems, before gluing this piece in place confirm the height is right by test fitting the rudder. Adjust as necessary to get the correct height.



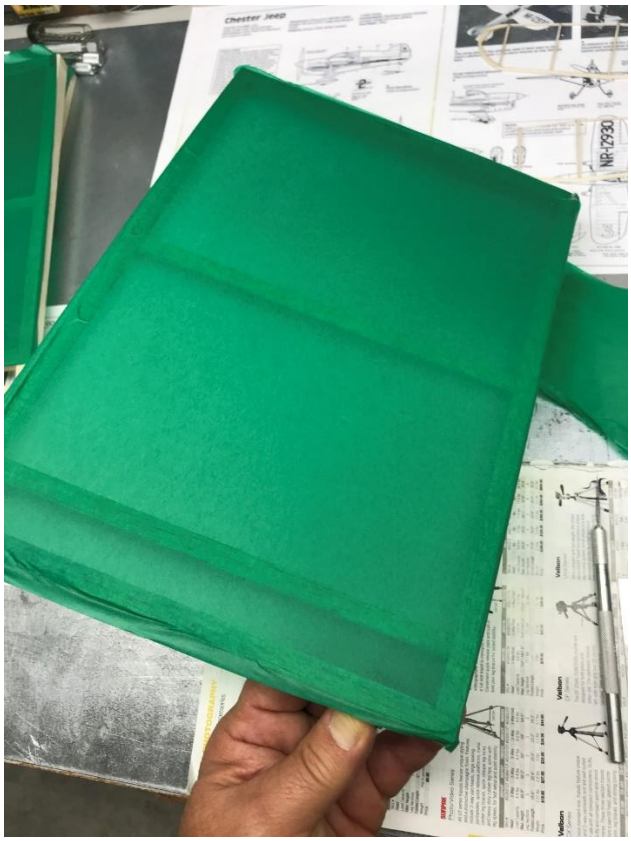
21. Install the short stringers from F1 to F7. After the glue dries time to go all around the fuselage with some sandpaper and smooth it out. So let's say you are sanding and get carried away or don't pay close attention and cut deeper into one of the fuselage strip wood pieces than you should have. You have two choices, but out the piece now while it is exposed or sister on a piece. Take a similar size piece of balsa and glue it on to the side of the harmed piece, let the glue dry and then sand into shape. No one will even notice it. I can only tell because I had to do it on this structure. Better than having a weak spot in your structure.



22. Here's a picture of all the structures ready for covering. Hey, why doesn't my plan look like this. Well this is a prototype plan that I add notes as I build. I fix little mistakes that went unnoticed while drawing in the computer. Etc.



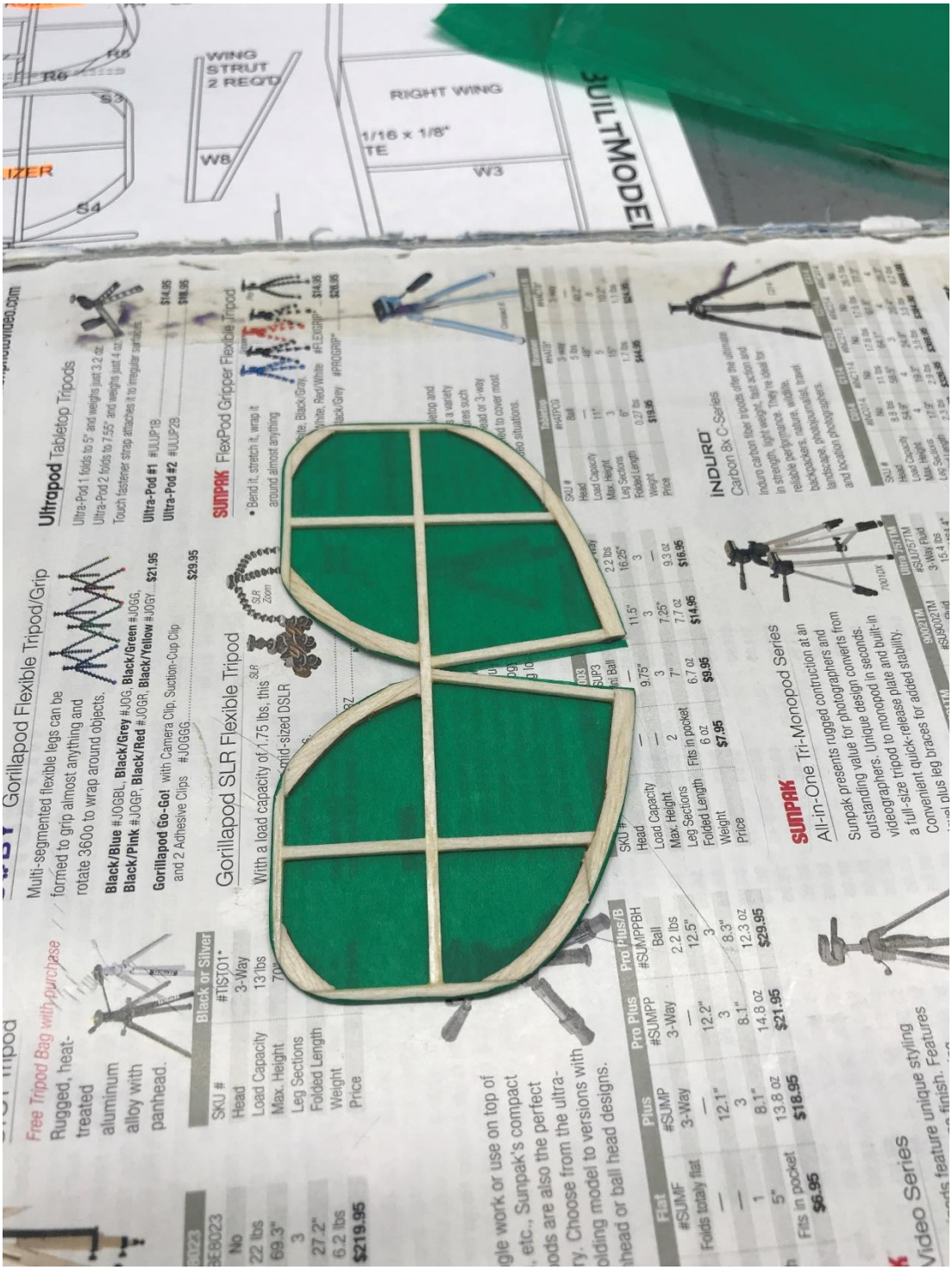
23. Not bad. All my bones weigh in at 2.1 grams. A good place to be at this stage of the build.



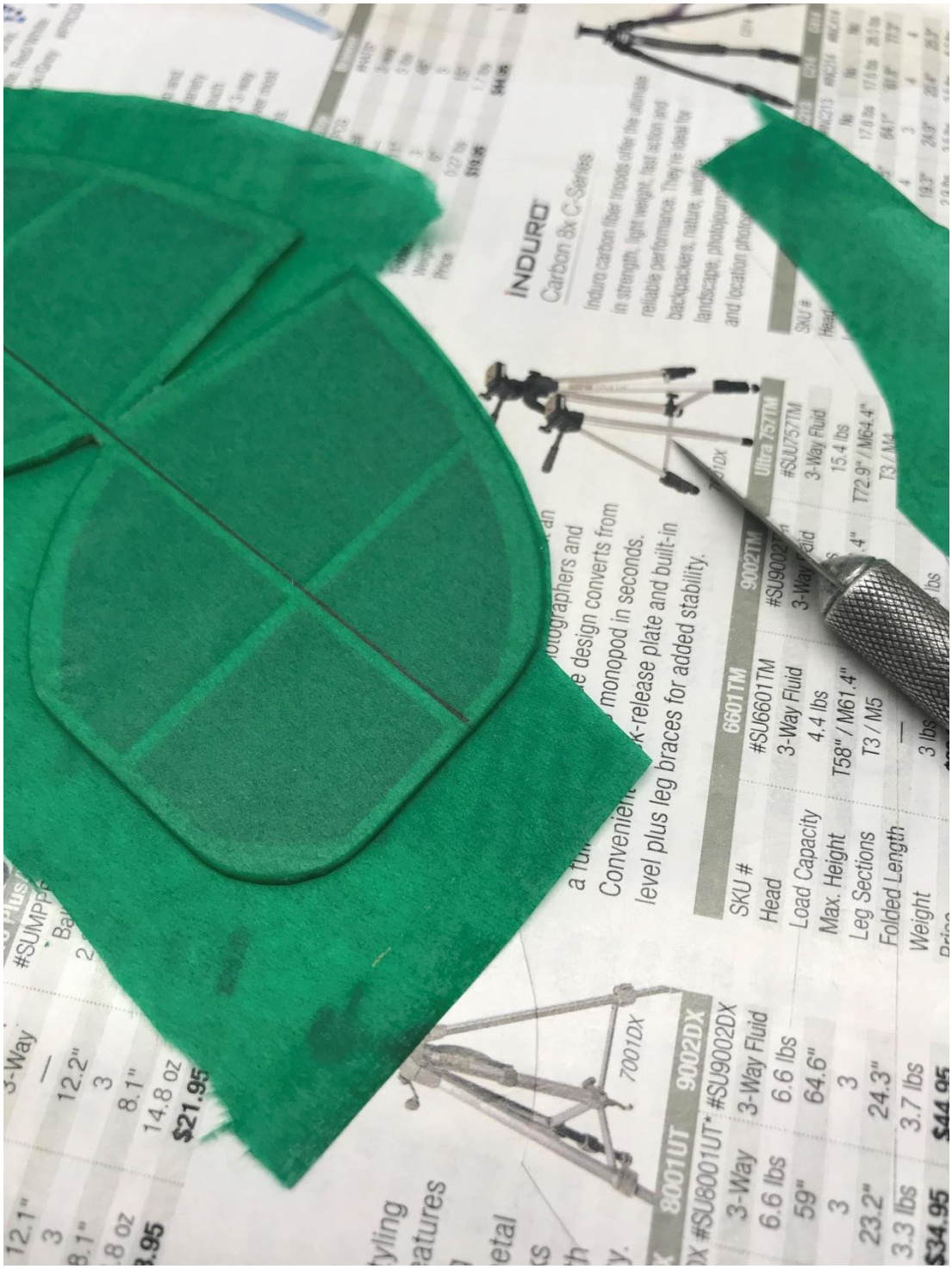
24. I got tired of severe warps a while back and bit the bullet. I made up some large full sheet frames and several small ¼ or less sheet size frames that allow me to pre-shrink the tissue. I use a glue stick to adhere around the outer perimeter only. I lay the sheet out on a flat surface. Put glue stick to the frame, two passes, then I flip the frame over and press it into the tissue. Flip it back over and make sure the tissue is adhered all the way around. Use some water on your finger to activate the glue stick if it dried out before it stuck. Now spray the tissue so it goes limp and set aside to dry. It will pull tight. Note, try to not pull the tissue out as you are going the opposite direction and increasing how much it can pull tight. I repeat at least 1 or 2 times. I then cut the tissue free of the frame and store for use.

25. Here are the basic few tools I like to use when covering. I have additional burnishers, knives, etc. The links should take you to the tool if you are curious for more information.
    1" wide ruler – this is my favorite 6" ruler ever. It is heftier than most and doesn't seem to slide around. The holes are a bonus whether for drawing or pushing a square balsa stick through to make a balsa dowel.
    Hobby knife or two – I like at least 2. One for cutting the tissue on the cutting mat and the other ONLY for trimming the tissue once the glue dries adhering it to the model's bones. The mat allows you to cut without making a mess, dulling your blade, or adversely changing the direction of the knife's travel due to grain. You always want the newest, sharpest blade in your knife for trimming tissue to avoid causing unwanted tears and making the most precise incisions.
    Jewelers Awl – indispensable, I use during the entire build to pin point glue application, pushing glue under a spot where the tissue lifts, burnishing, the list goes on.
    Tweezers – first I want the curved tip, next I like having a spatula tip. Last is the pointed straight tip.
    Burnishers – my favorite of the three is the spoon tip shown here. But there are times when the ball tip in the small and large tips work better. These allow you to apply pressure to tissue very strategically. I can't get my big stubby fingers into the tight corner between the rudder and the fuselage but I can get that nice smooth seam using the burnishers.
    Permanent glue stick – We've got a couple different types; I find my friends each have their own preference. These have always been reliable. I like to add a drop or two of rubbing alcohol to the tip before I put the cap back on after a building session. This keeps the glue soft for smooth application. I do like the colored ones so I can see where I've applied the glue.

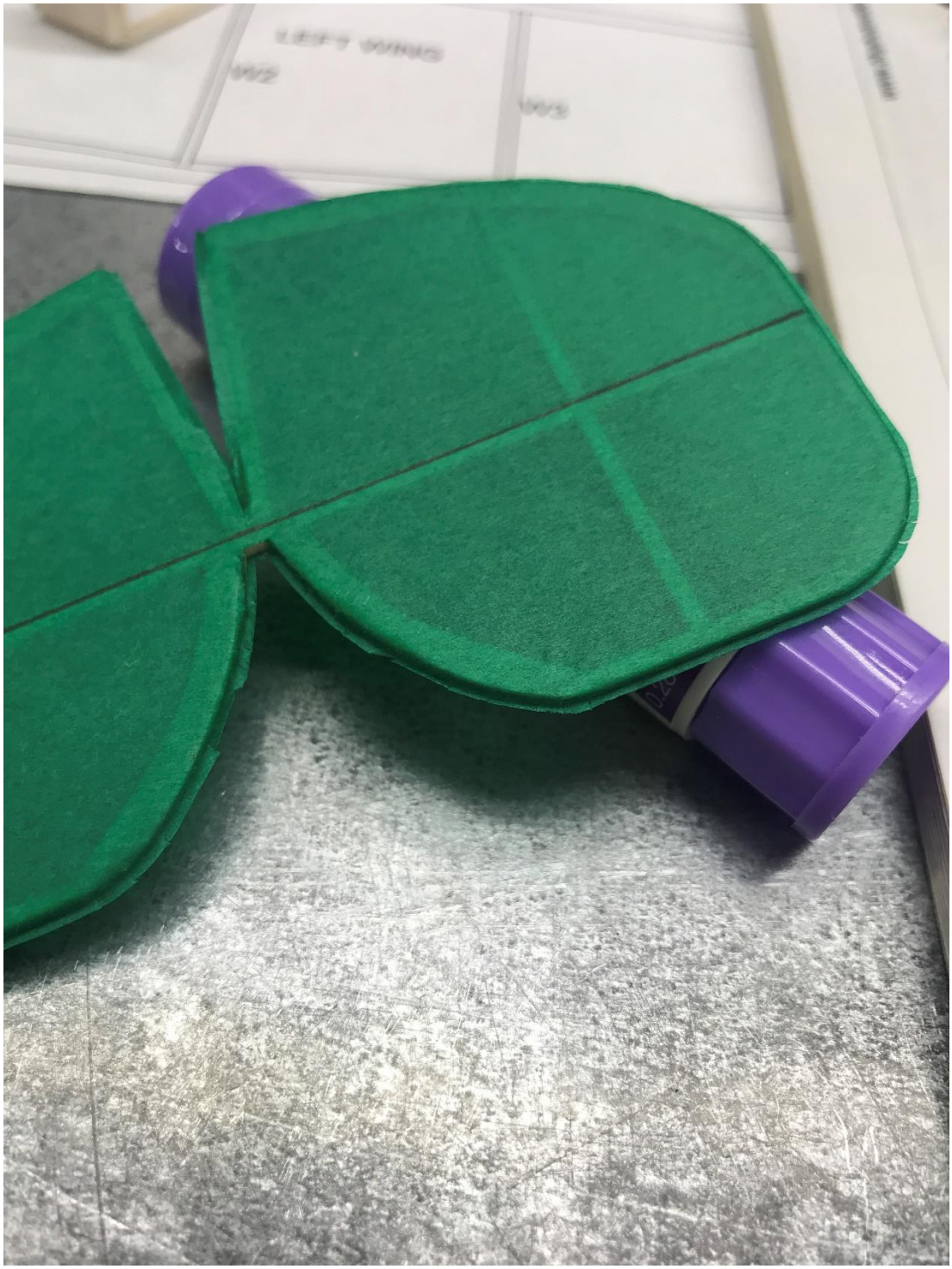
26. Until you learn how to read grain direction put a mark on the tissue that is the last indicator to be separated. The grain runs the longest dimension of the stab and the grain will be run the same on both sides so they counter each other. When attaching the tissue do not pull overly tight as this undoes the preshrinking. I don't pull at all unless I've a sheet of tissue that won't lay flat on the table. Start by applying the glue stick to one side of the stab. On this small plane I'm only applying to the perimeter as glue is weight. I then press the glued side of the stab against the tissue. I rough cut it free and then trim leaving only about 1/32-1/16" of the tissue overhanging all around.



27. So here we have the little overhang of tissue all around the edges. Now I put little slits starting against the balsa and pulling outward across the tissue wherever the balsa has curves. This will make it easier to get the tissue to conform when you apply more glue stick, lick your finger and roll the tissue over on to the edges of the stab.



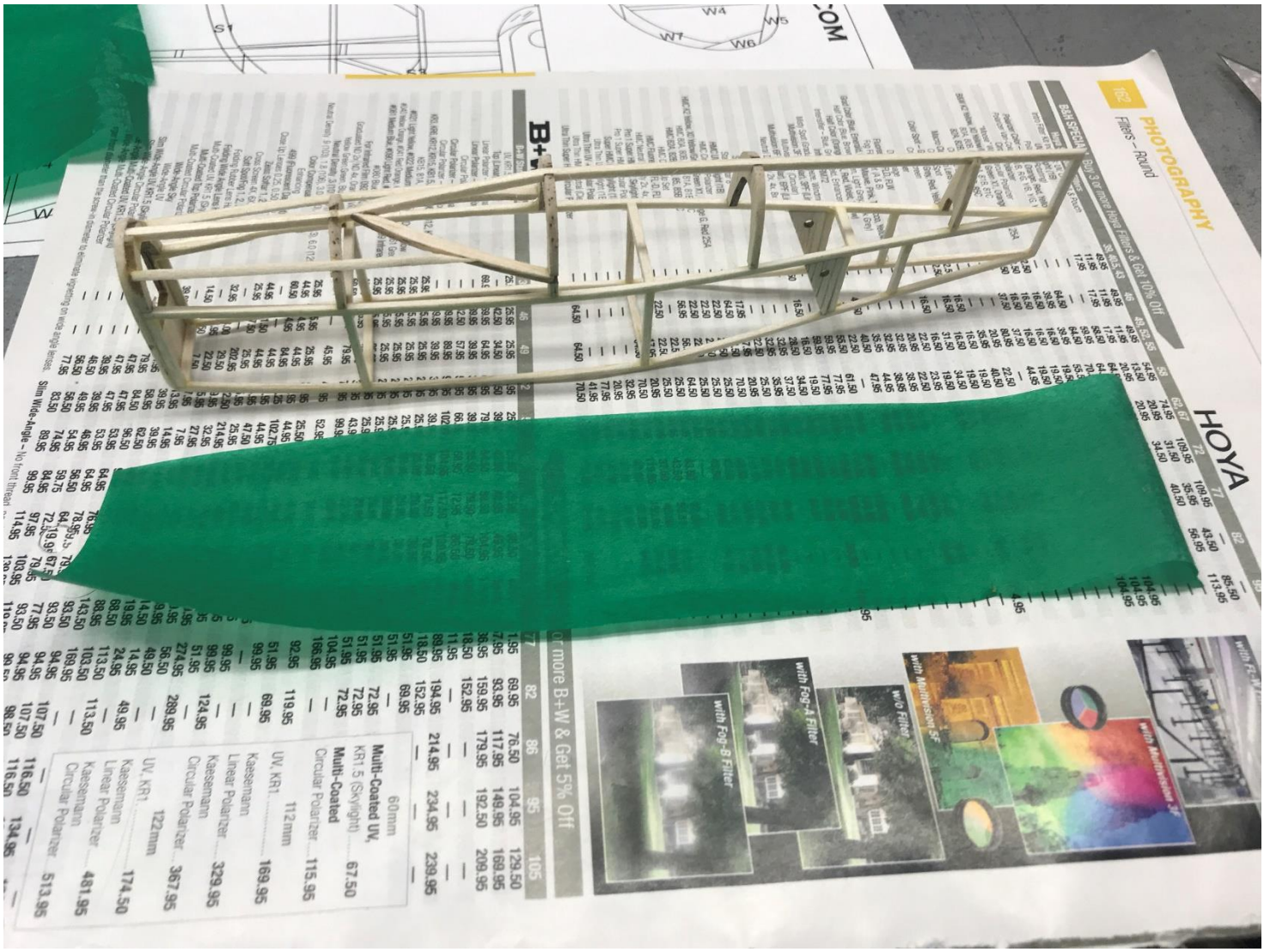
28. Now apply glue stick to the other side of the stab. Repeat the trimming process and glue the remaining flap over on the tissue from the first side you covered. I think this adds some additional strength to the tissue joint and less likely to separate.



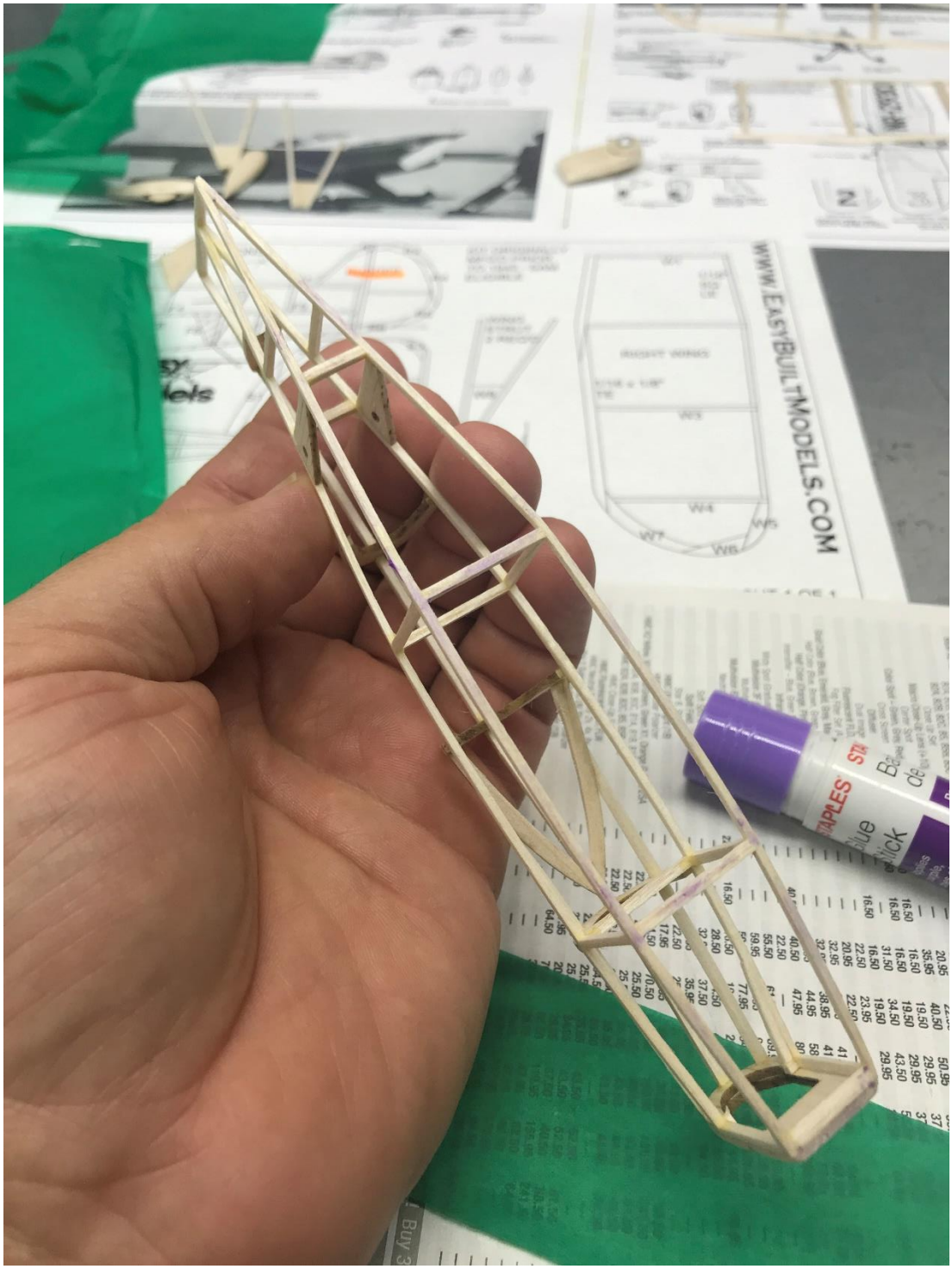
29. Here you can see the other side just before I roll it over and finish by drawing on the control surface lines.

30. Okay this is a good time to talk about that catalog under the rudder. I get these half inch thick catalogs in the mail every so often. They make ideal surface for applying glue to your tissue. You can get tissue on these pages and not have to make a mess or stop to clean things. I just remove a page and I've a fresh surface. I can make the catalog work better by applying some instant glue to the pages at the corners away from the binder. This way they don't slide or lift up until I want. So do the rudder now just like the stab.

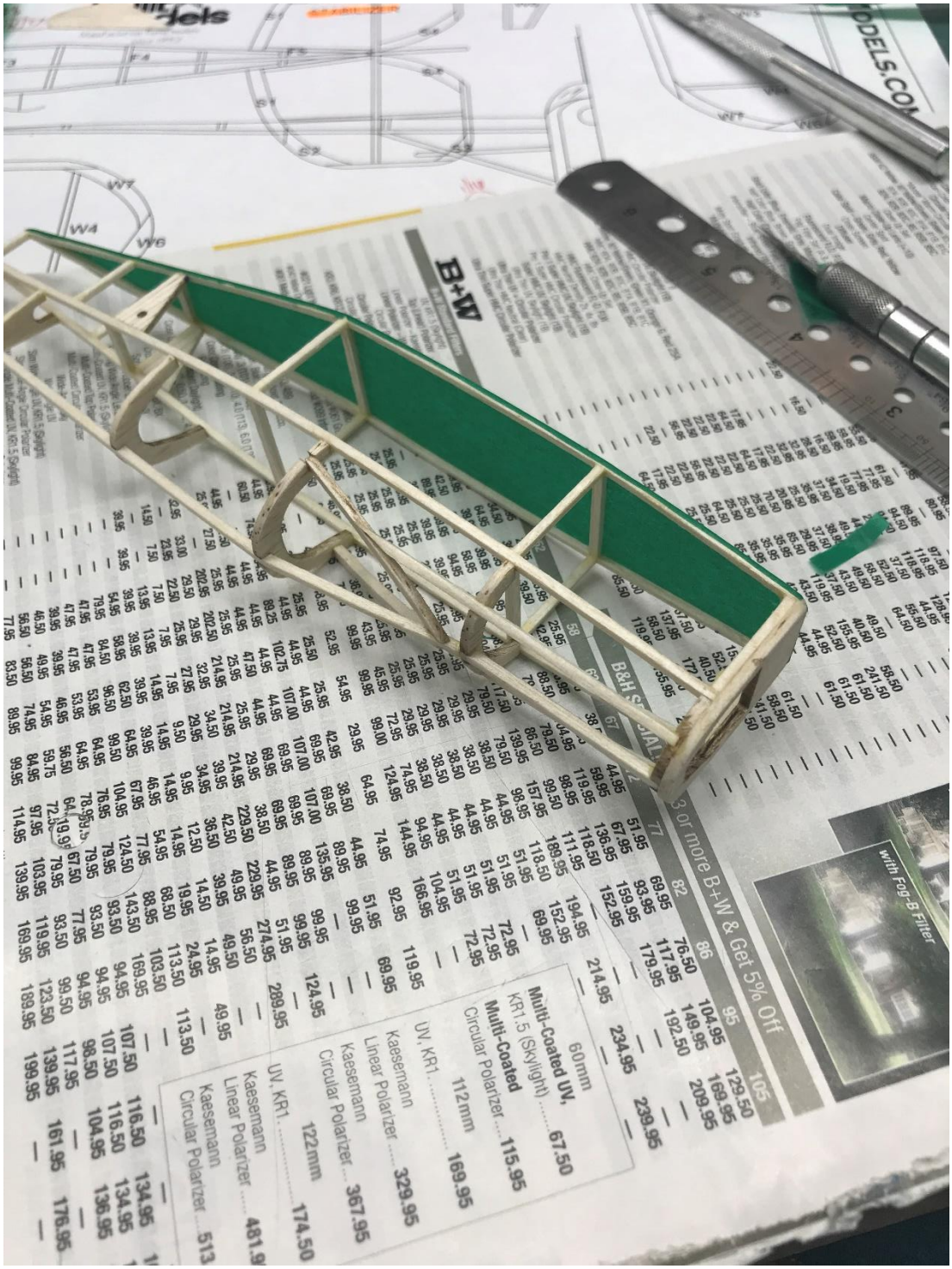
31. Apply the glue stick to one side and press on to the tissue. I run the grain from top to bottom. You can cut on the catalog but understand silica is commonly found in paper and this dulls a blade quickly. Also, before I had the cutting mat I used to cut on the catalog and ended up with a mess of paper slices that would get stuck to my glue stick. Finish off the rudder just like you did the stab. Oh, here's a great tip from Pete Kaiteris of NYC, place the rudder and stab in between the pages of a large hard cover book and let stabilize for a week to help reduce warping on these most delicate structures of most any model. I like to use an old sci-fi novel like Future Shock from a book club. They printed these on uncoated paper and it works the best for this type of moisture managing tasks. Don't put it between plastic that inhibits moisture movement. If you must use wax paper.



32. Cut a piece of tissue oversize with the grain running lengthwise to cover the bottom of the fuselage. Start with the bottom rear and work yourself forward. Then you work the sides and finish on the top. All about maintaining balance of the tissue shrinkage pull from one side to the other of the fuselage. Also, by doing this order of application, your tissue overlaps will be less noticeable and create less drag.

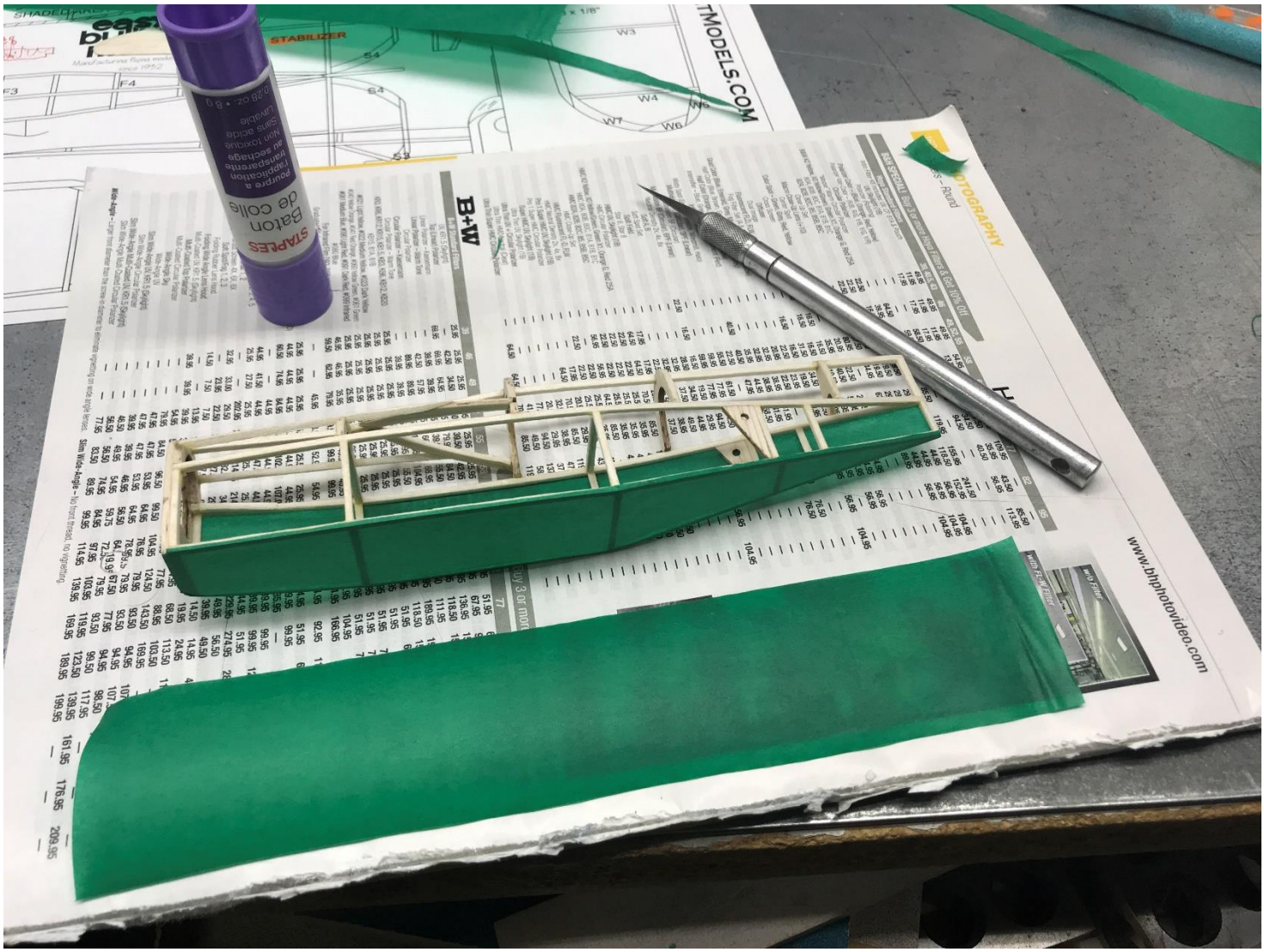


33. I run the glue stick all around the perimeter and the crosspieces. You can see the purple here showing the thin film. You don't want big globs stuck in the corners, use your jeweler's awl to remove any excess. It is unsightly and adds weight.



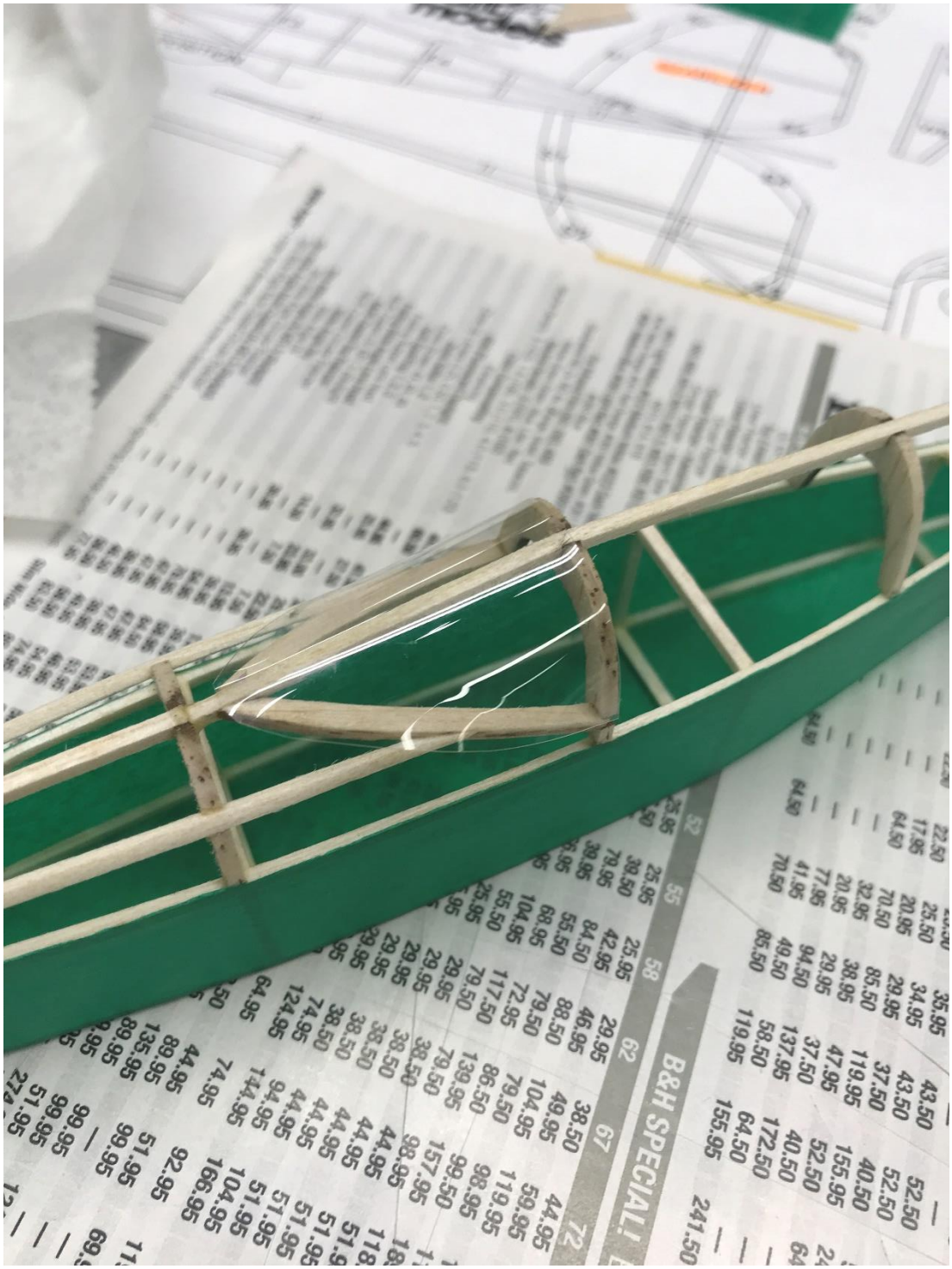
34. Like on all the other pieces I trim off the excess. Now I like that overlap from one piece to another as it gives the stronger seam but it also prevents wood from showing up where the tissue might pull away from shrinking.

35. Move on to covering the sides. Don't try and cover the entire side but a section that you can put on pretty flat. As this model has a flat lower side you can run from tail to nose. It helps that the model is also small. On a larger model it might become too cumbersome to do as one piece.

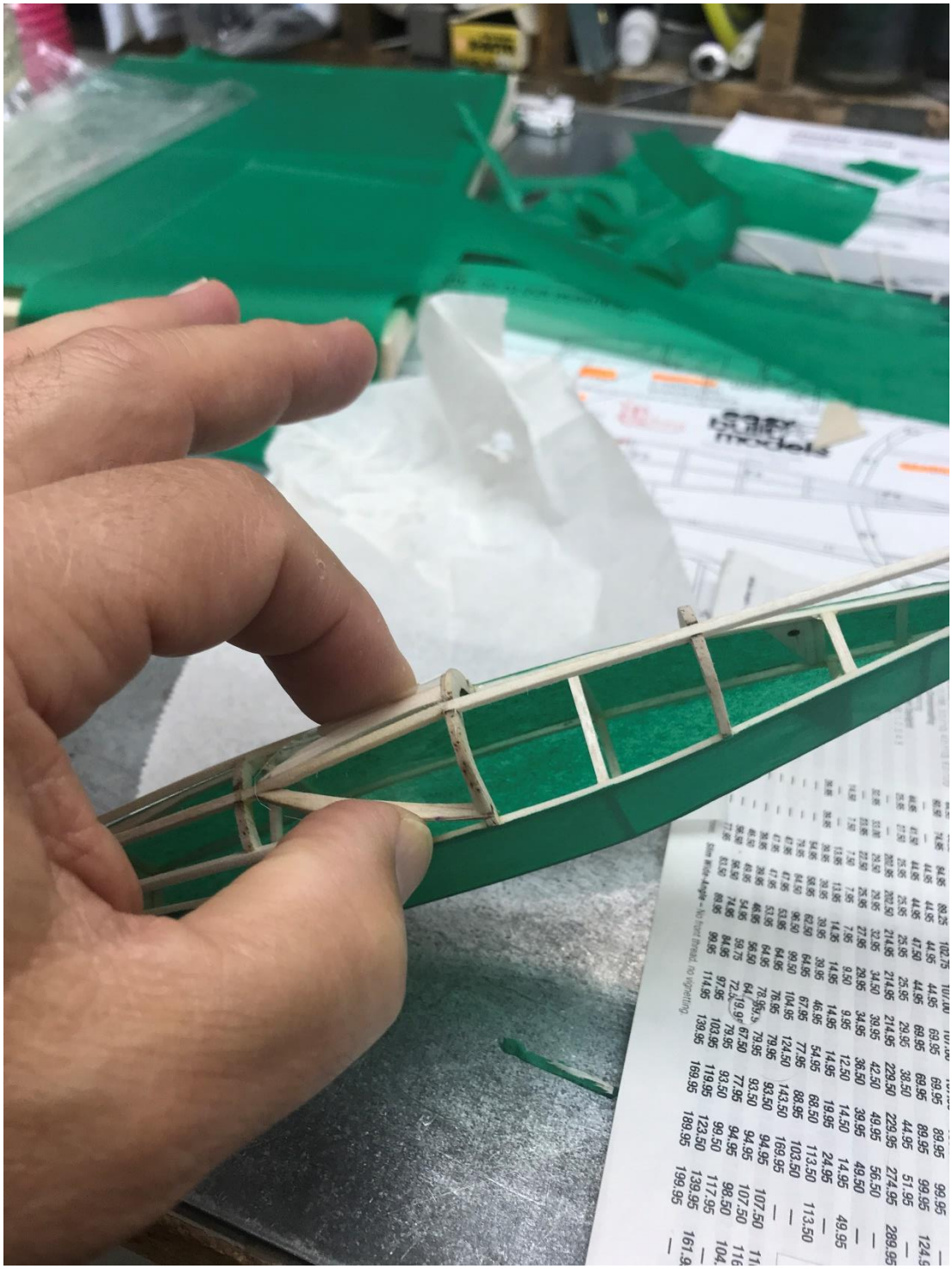


36. Flip over and get the other side in the same manner. Remember to keep the grain going in the same direction.

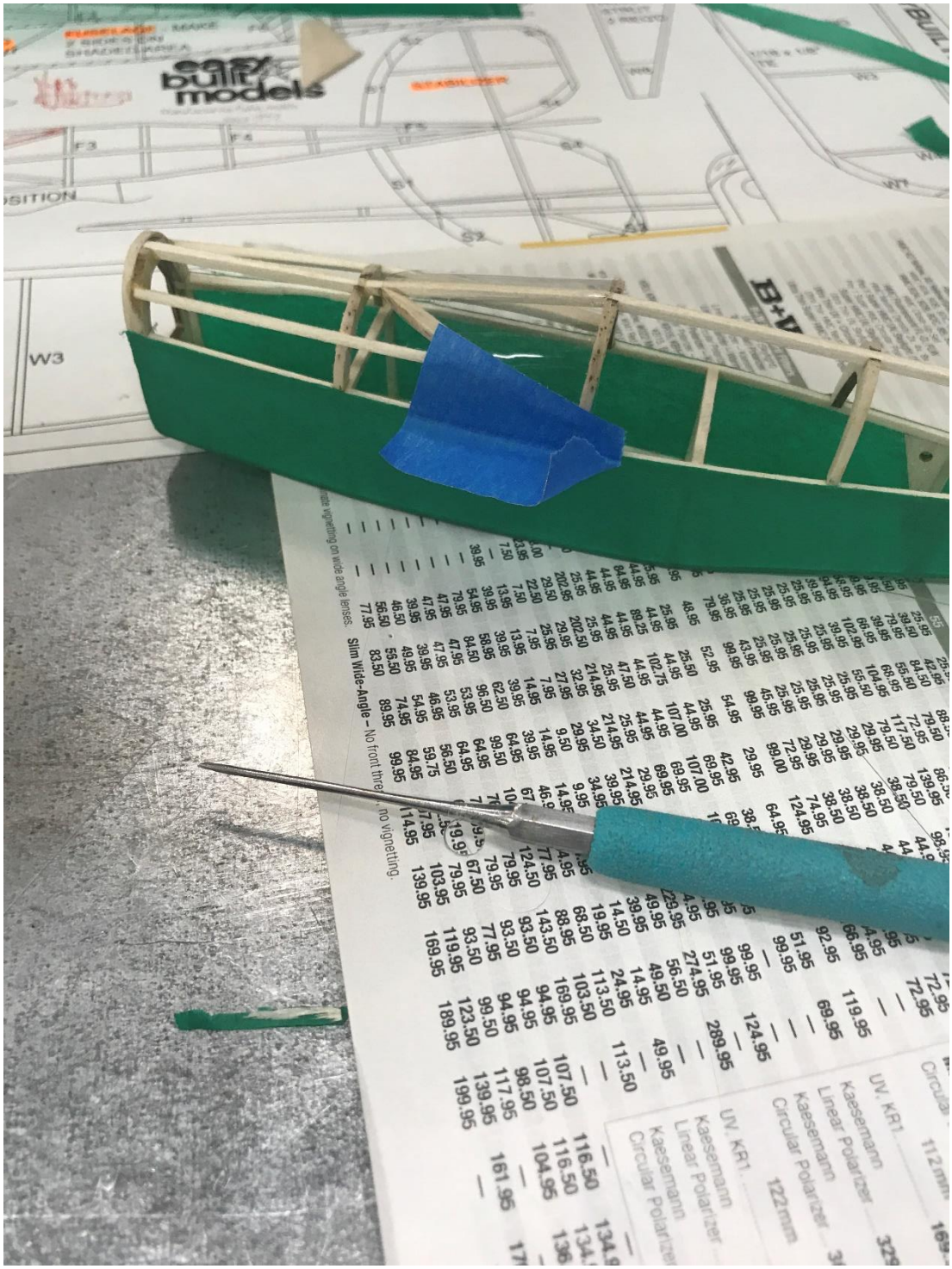
37. A point here about trimming the tissue. You work with oversize pieces to make the task of handling and getting the size correct easier. Using the sharp knife blade makes this task easier cutting the tissue along the edges. Now if you want your covering to look neat when you finish it needs to look neat at every step. Be consistent in how you make your cuts. If you have to use your tweezers to help hold the little piece of tissue that is fighting you. Every little inconsistent slice will show up later. Take your time and make a nice smooth slice. Now occasionally I'll get out my sanding stick and clean up an edge if I was having problem getting that smooth straight line cut.



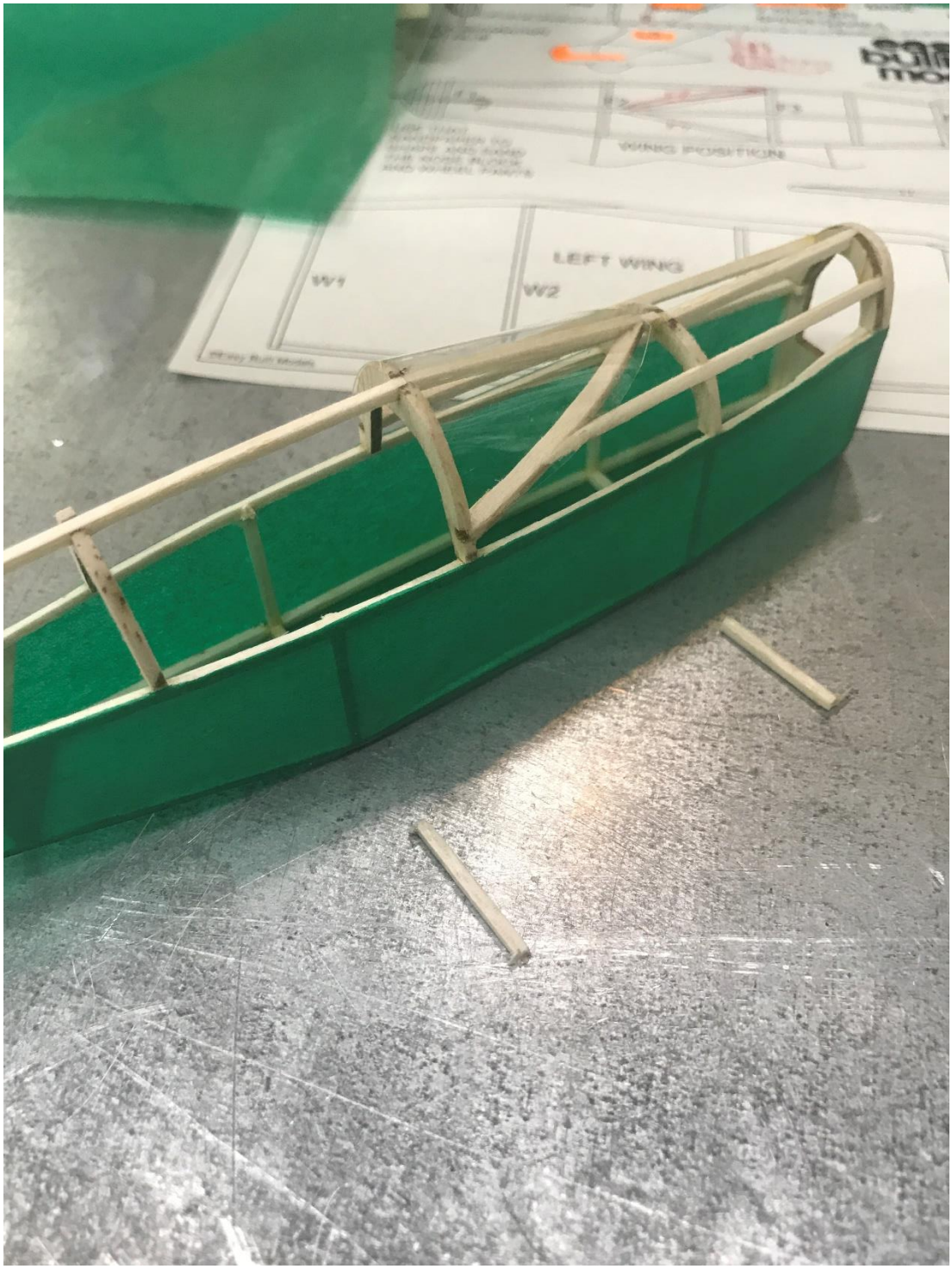
38. There is a pattern for the front windscreen on the plan. Cut this out a bit oversize and hold over the frame where it will go. Use a soft lead pencil to mark it up where the frame actually contacts the pattern then cut the pattern to the needed size. Do one more test, if you over cut then tape a new piece on and start over. Transfer the pattern over to the clear plastic and cut on the lines. Before I go further, I use a lens wipe to clean the plastic. Paper towels, tissues, and even cloth can scratch the plastic. Remember that silica I said is in paper, it will cut plastic fast. Unless you got a little pilot that likes to wash windows this is your last chance to get the inside clean. This is the best it will ever look. I always do one or more test and trim for fit before I get out any glue. Gluing this on is a series of steps and not done all at once. I usually get glue all over the piece showing my finger prints when I try to do all at one time. Put a line of canopy glue down the center stringer where the front windscreen will be in contact. Let this dry. Be careful not to bump it or you'll get a glue smear. The canopy glue is neat because it dries clear.



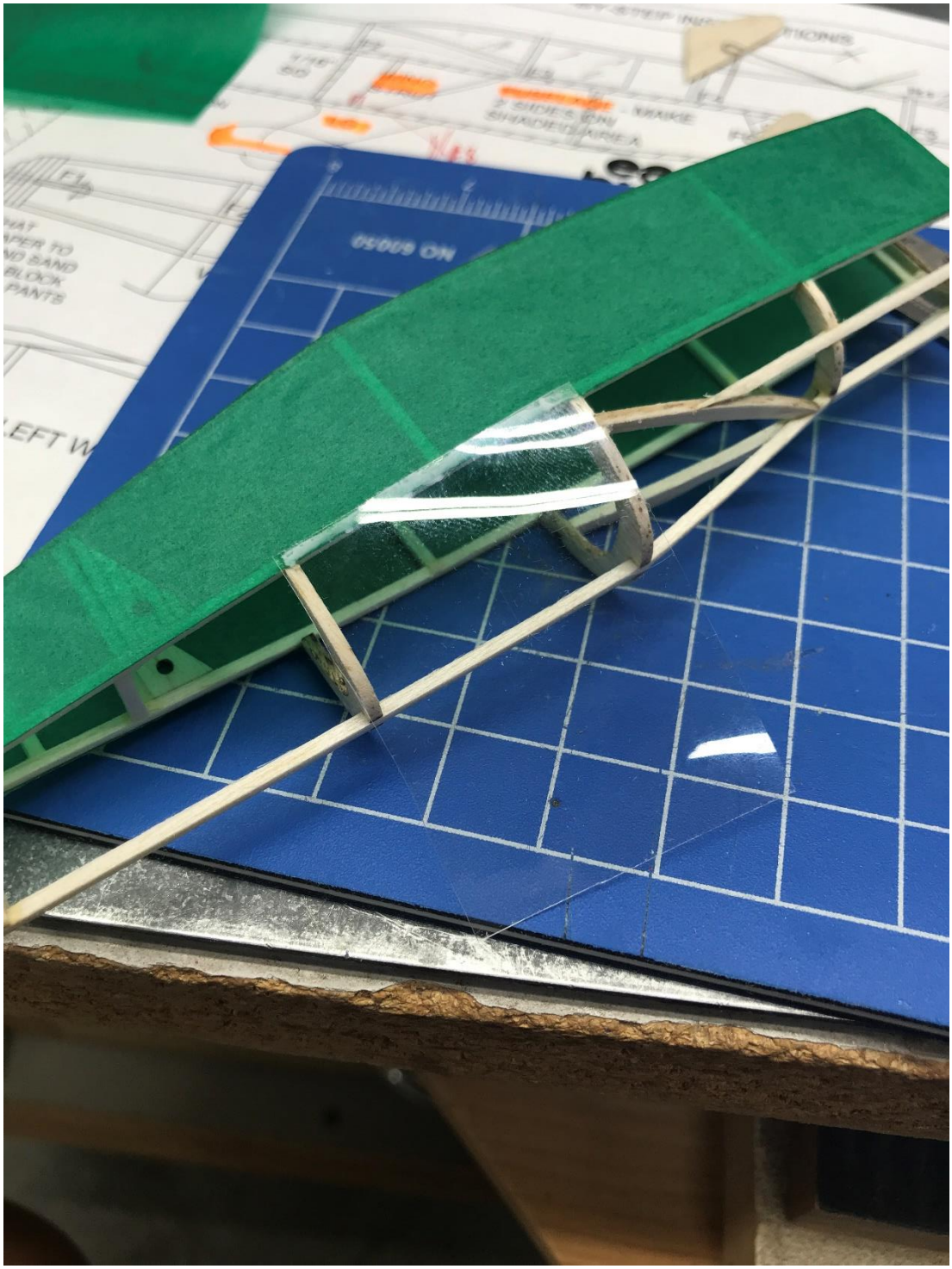
39. Once that first glue line dries it will anchor the plastic for the remainder of the task. I use my jeweler's awl to apply a thin bead of glue under the plastic over the former and along F7. Gently pull down and hold for 10-15 minutes while the glue sets up.



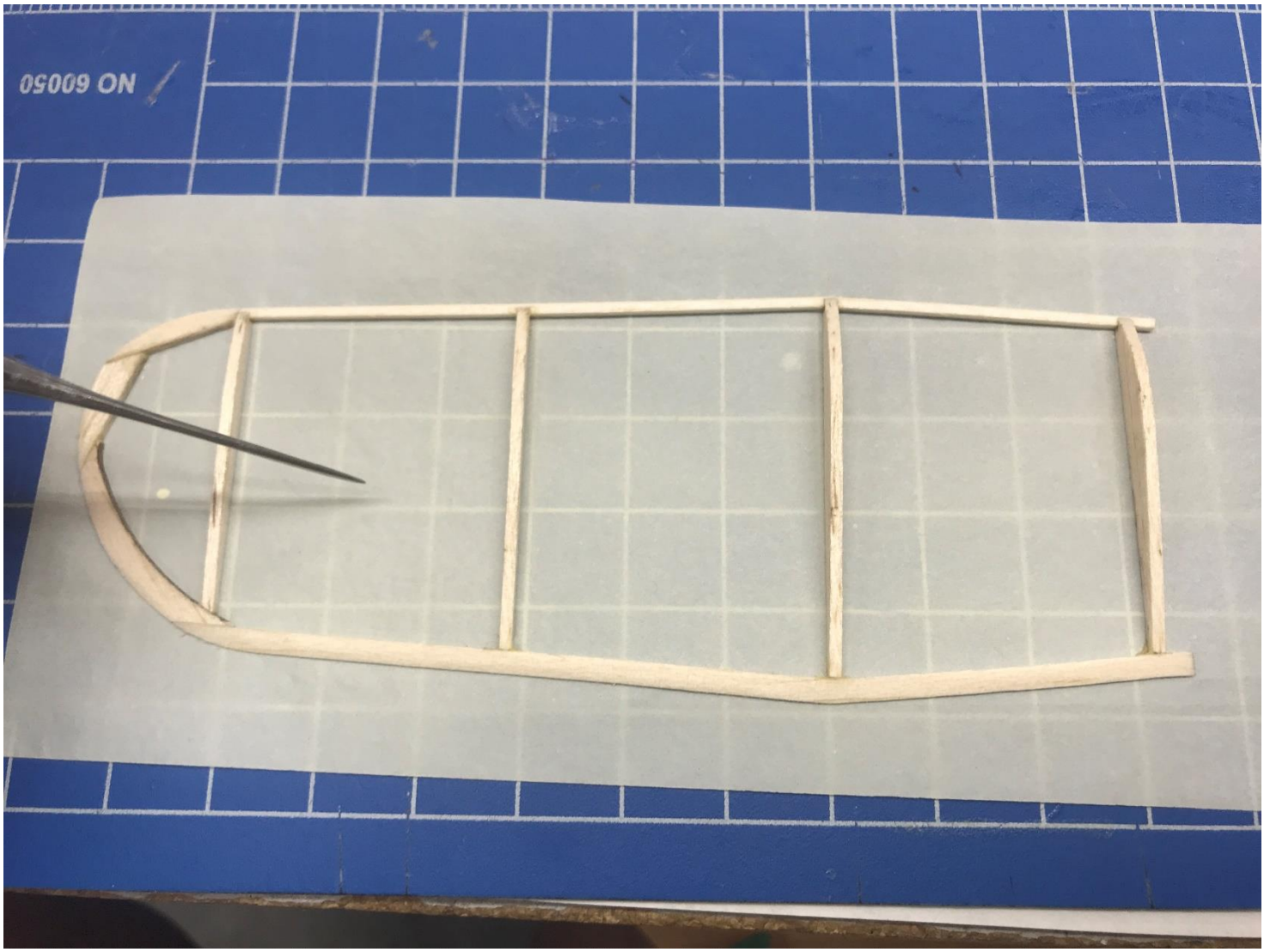
40. Now if you use instructions properly you read through these steps first before starting. I like to use painter's tape to hold the plastic down while it dries. Have a couple pieces cut and setting ready to put to use. Alternatively, if you are going to sit and hold have a comfy chair ready and something on the tv or radio. If you are afraid of the tape pulling your tissue off you can put the tape on something else first to remove some of the tackiness. Each time it is used it gets a little less bite. Another important consideration is to be sure not to leave it on any longer than necessary. Its bite seems to get more permanent the longer it sits there.



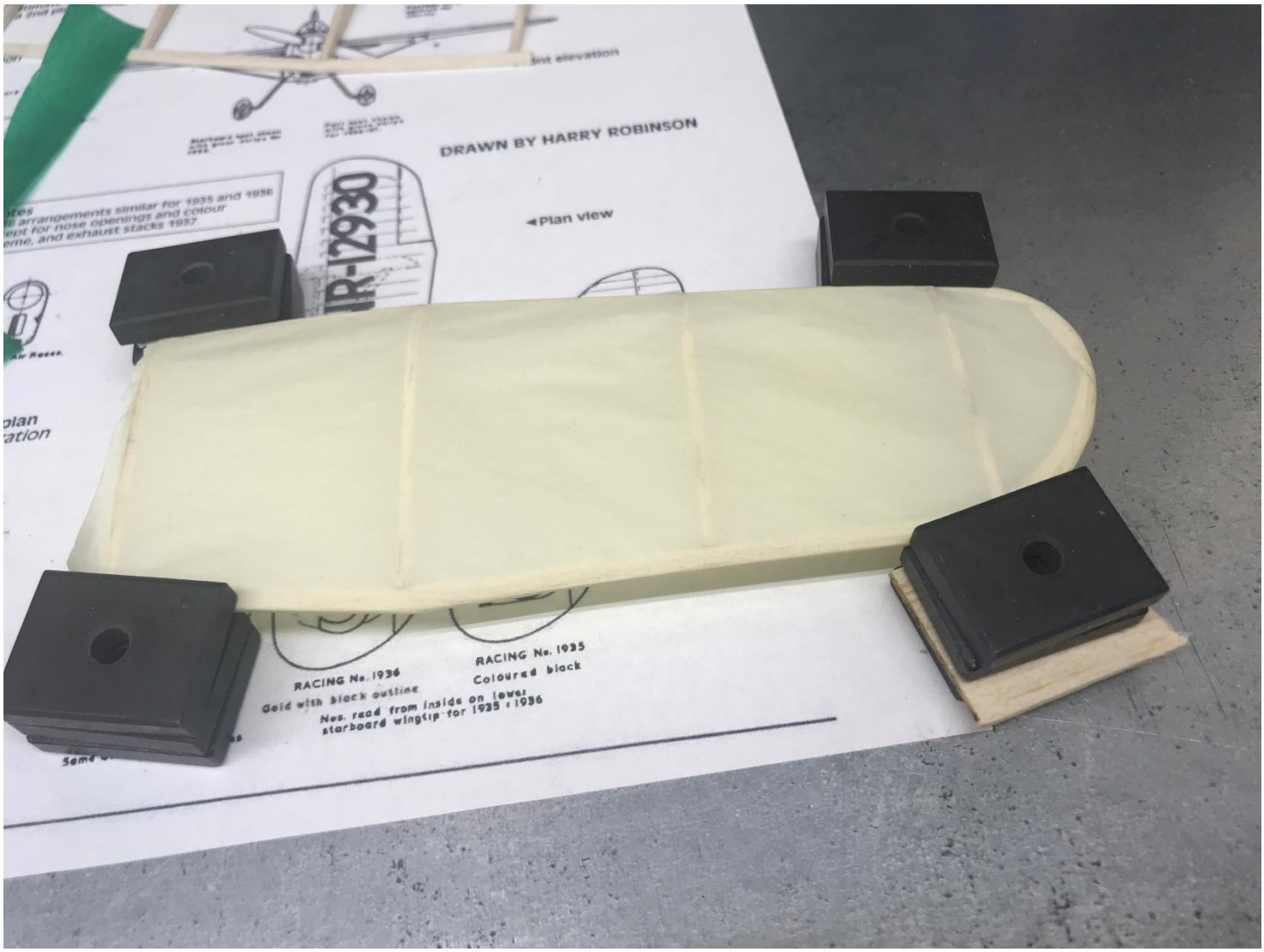
41. Before you go any further, we need to remove the cross pieces that are in the center of the fuselage as they will be in the way of your rubber motor. There main purpose to add rigidity and set the appropriate gap has been fulfilled. A sharp knife can cut these cleanly away. If there are any protrusions, get in there with your sanding stick and clean them up. You don't want any sharp glue remains nicking your motor.



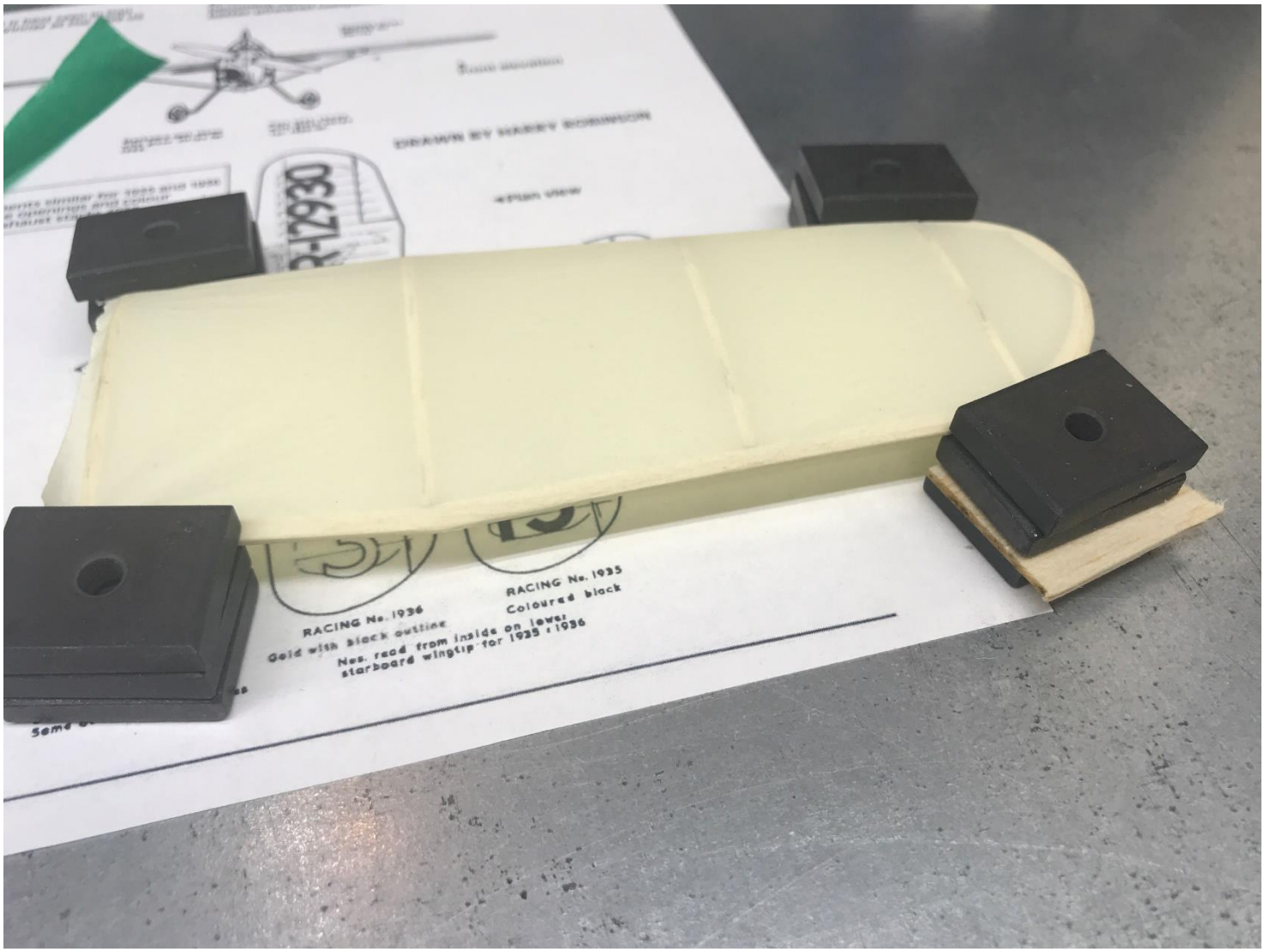
42. Now use the pattern for the rear cockpit window and repeat the prior steps much the same way. On this one I put my first bead of glue along the lower left stringer of the cockpit and then eventually in steps worked all the way over to the other side.
43.



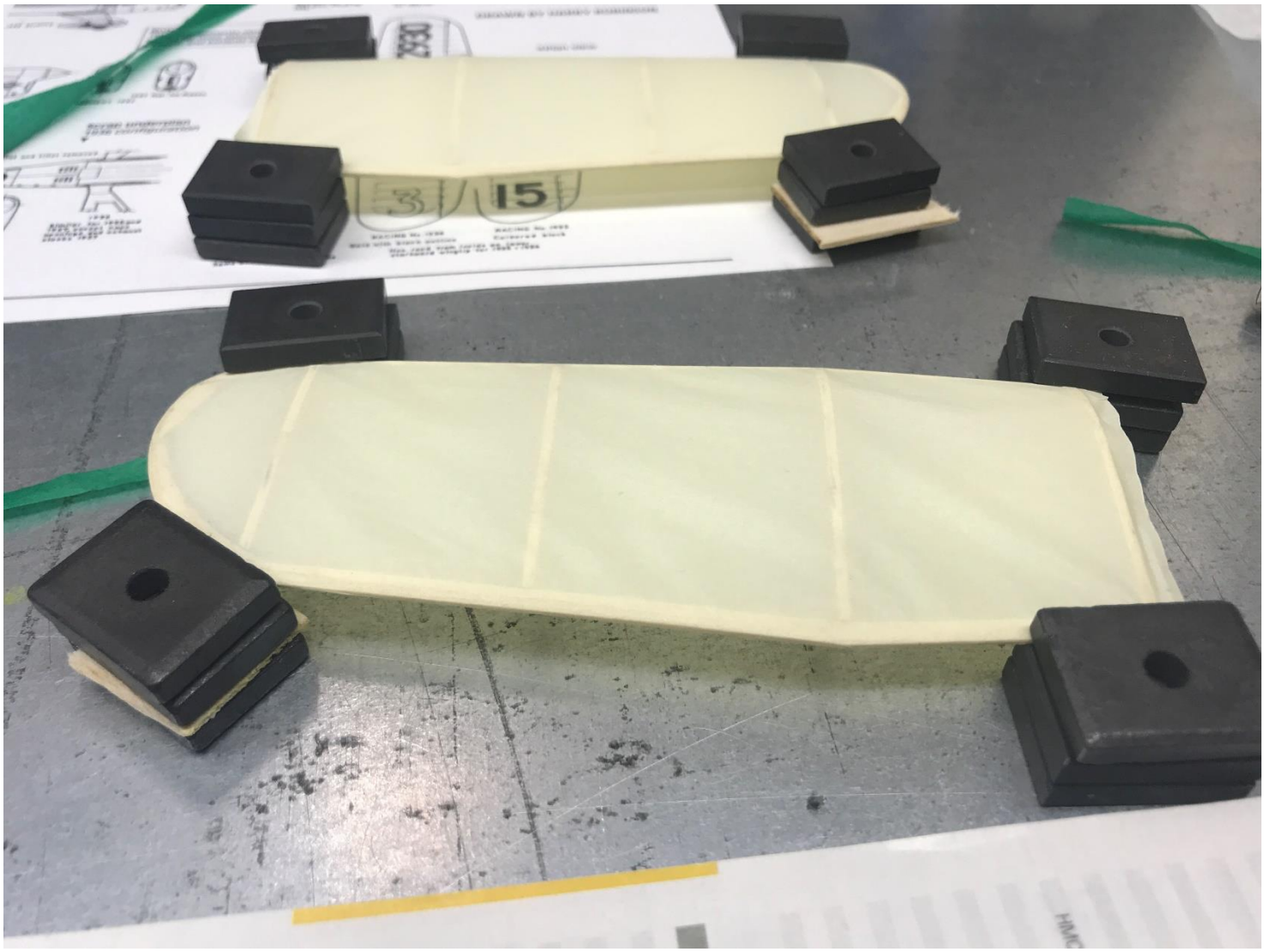
44. A point I want to make here regarding tissue grain. Assume the tissue here is cut from the sheet with the outer straight edge being at the bottom of this piece. The grain is running the length of this piece from side to side. If I don't take care to align the grain with the centerline of my wing assembly as shown here, just off a bit using the grid for reference. When I apply to each side and then shrink it, the fibers now out of alignment will apply forces that will twist the structure accordingly resulting in the wavy chip warp. So a little care now is a lot less headache later. I actually use these grid lines a lot when rough cutting my tissue to minimize waste. Another trick I like to use. I've an old waste can from my parents made from an old nail barrel. I've got a plastic bag in it. Only scraps from that model building session go in it and it never gets emptied until the model is done. I don't worry about accidently throwing something out, having a work bench cluttered with bits of wood and tissue, or having an odd strip of tissue to finish a part. It's all sitting in the bag and I can reach in and get some small piece any time.



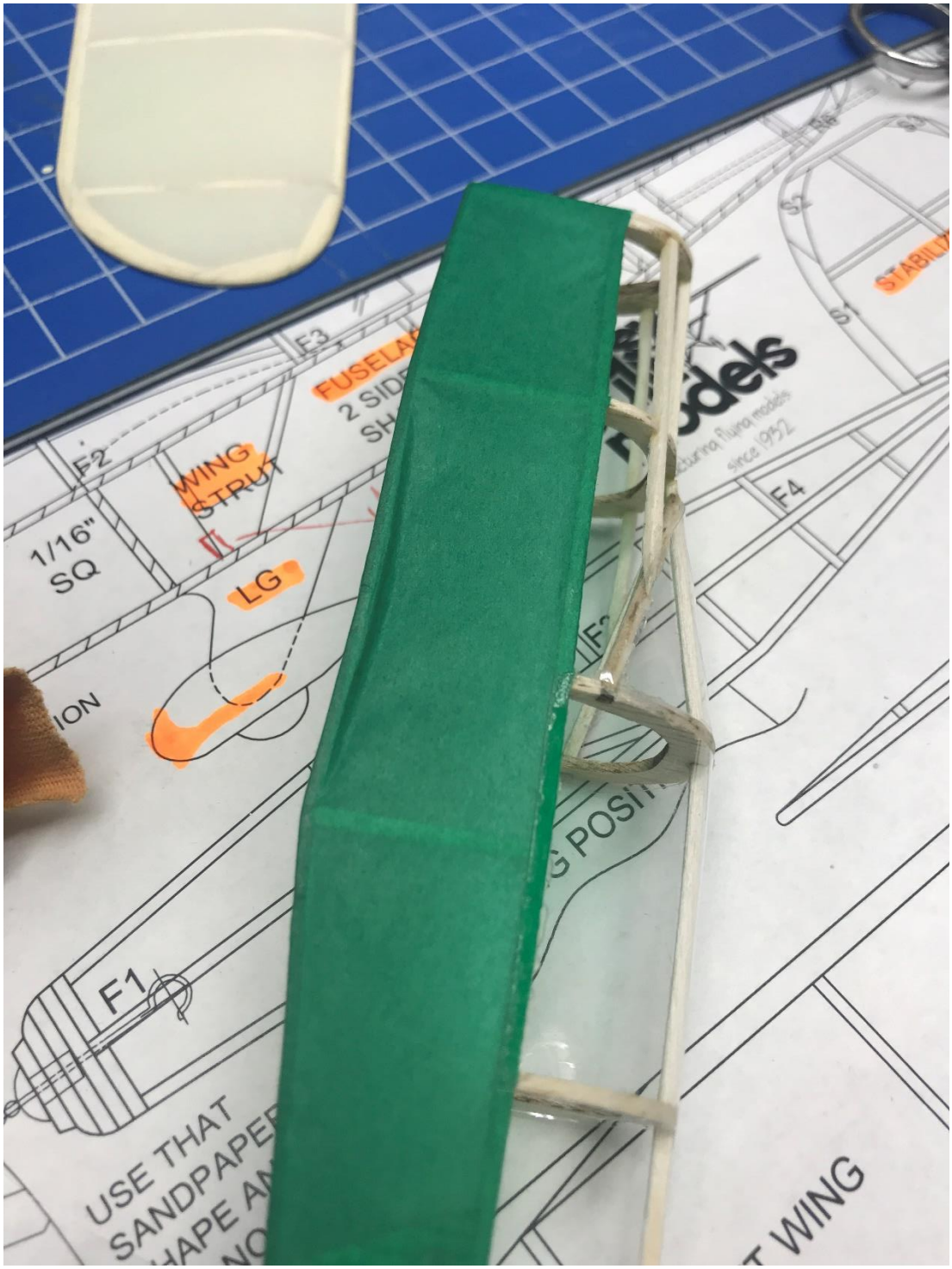
45. I covered the wings in similar fashion like the stab. Start on the underside and finish with the top. Once the glue dried, I used a fine water mister to dampen the tissue to the point it sags on both sides. I try to avoid getting large drops or even beads of water forming on the surface. If this happens, I have a paper towel or tissue ready to dab the excess off. It serves no purpose to have excess and can actually cause issues with getting a nice even shrink with the tissue. Before it starts shrinking, I have my magnets pre-positioned to hold the wing off the building table. 2 on the bottom and one on top that acts like a clamp. It's a small wing so these four points are enough. You see that piece of 1/16" balsa sheet in the stack of magnets holding the TE at the wing tip? That is how I'm going to add my washout which helps to stabilize the plane in flight. This is as simple as it gets. As the tissue dries all those equal and opposite forces are coming together and if you did everything right and had a little bit of luck, the wing comes out with smooth tissue covering, lays flat with no odd warps and the washout will be right where you set it.



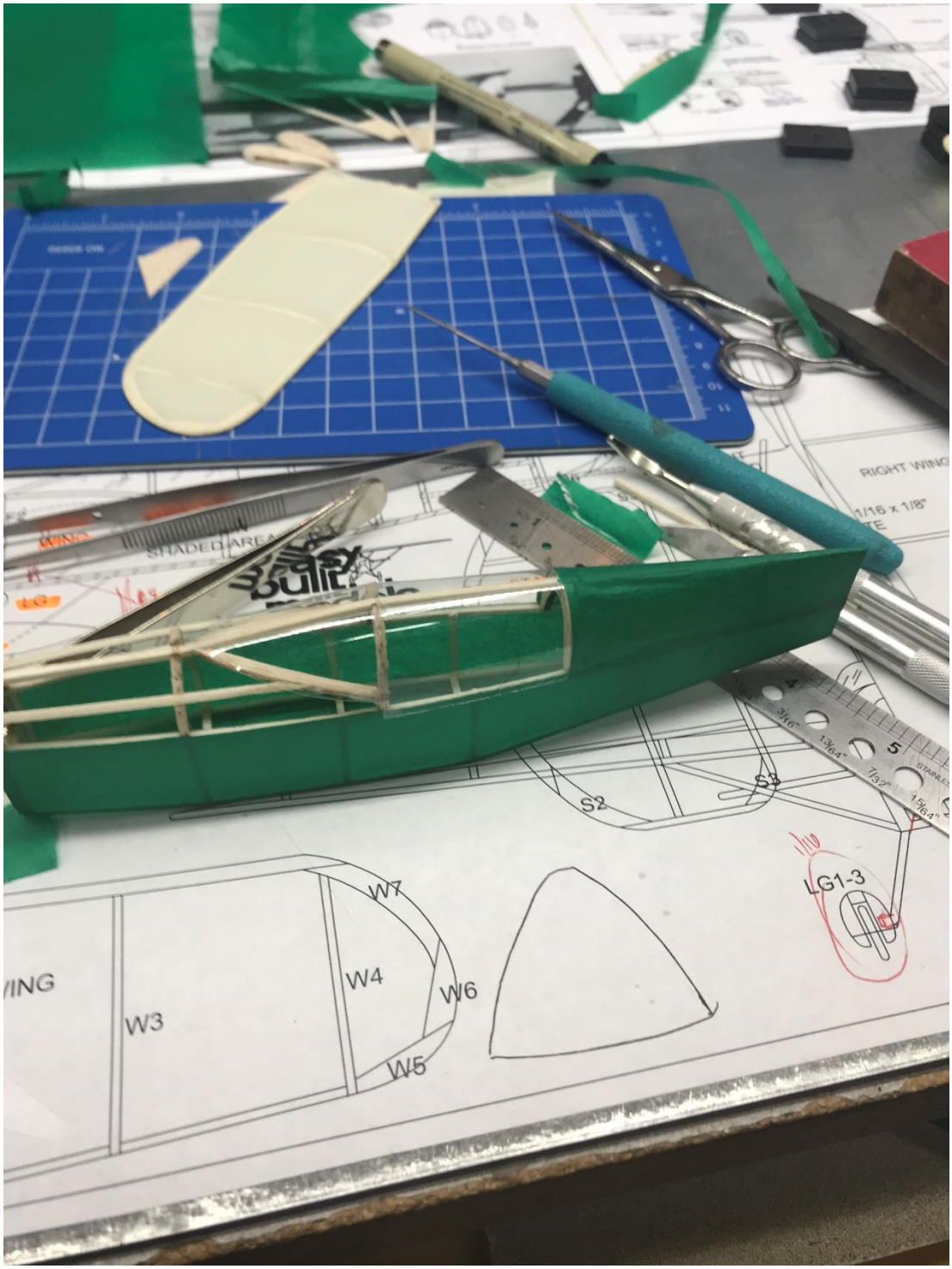
46. Here's the wing all dried and tightened up. Noticed I take care to just get enough of the wood frame to hold but not so much to interfere with the tissue movement. Also these are out minus magnets which are recommended for light structures. The standard magnet might crush the lighter balsa.



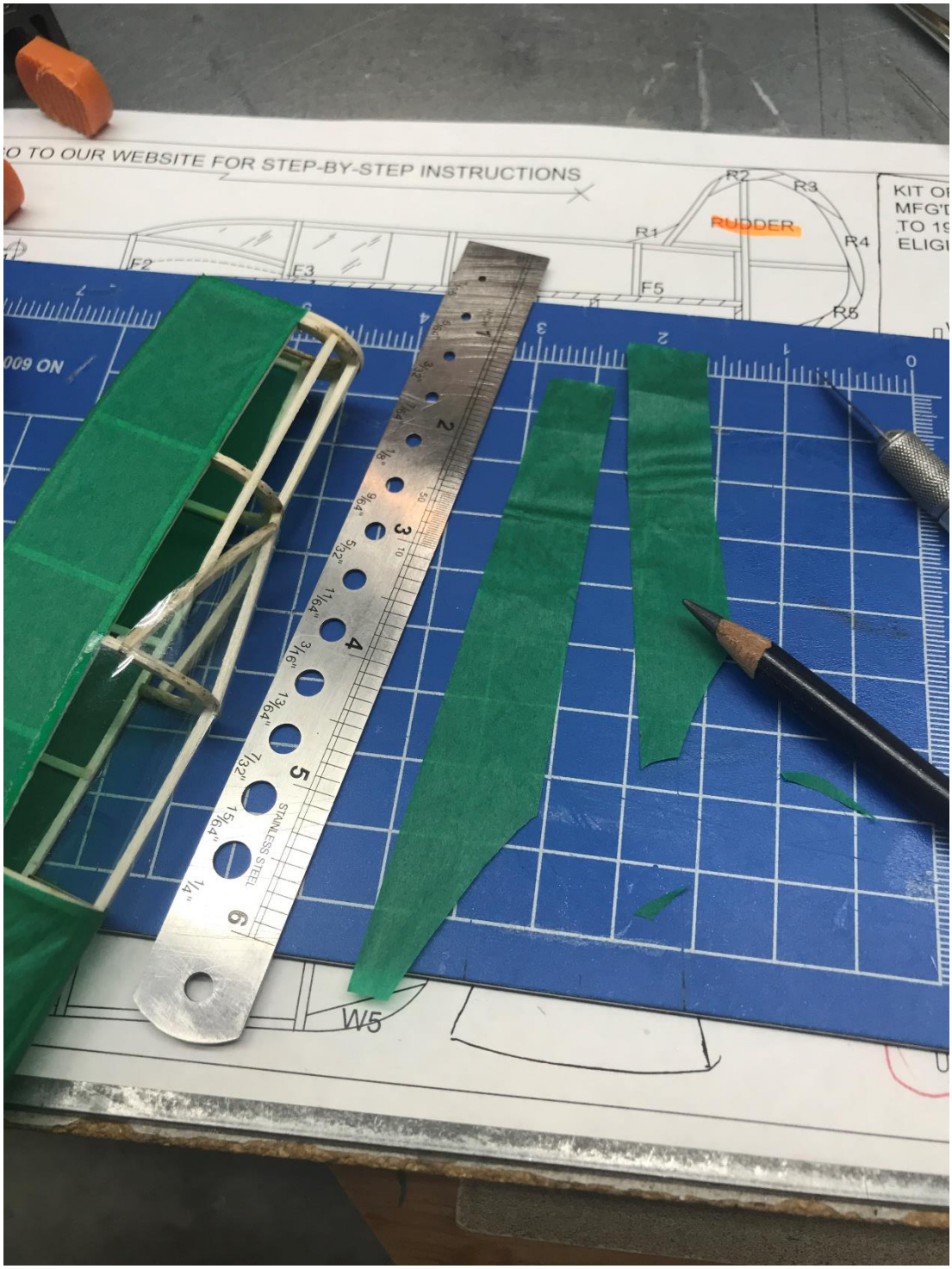
47. Get the other wing going and be sure to induce an equal amount of washout on the opposite tip.



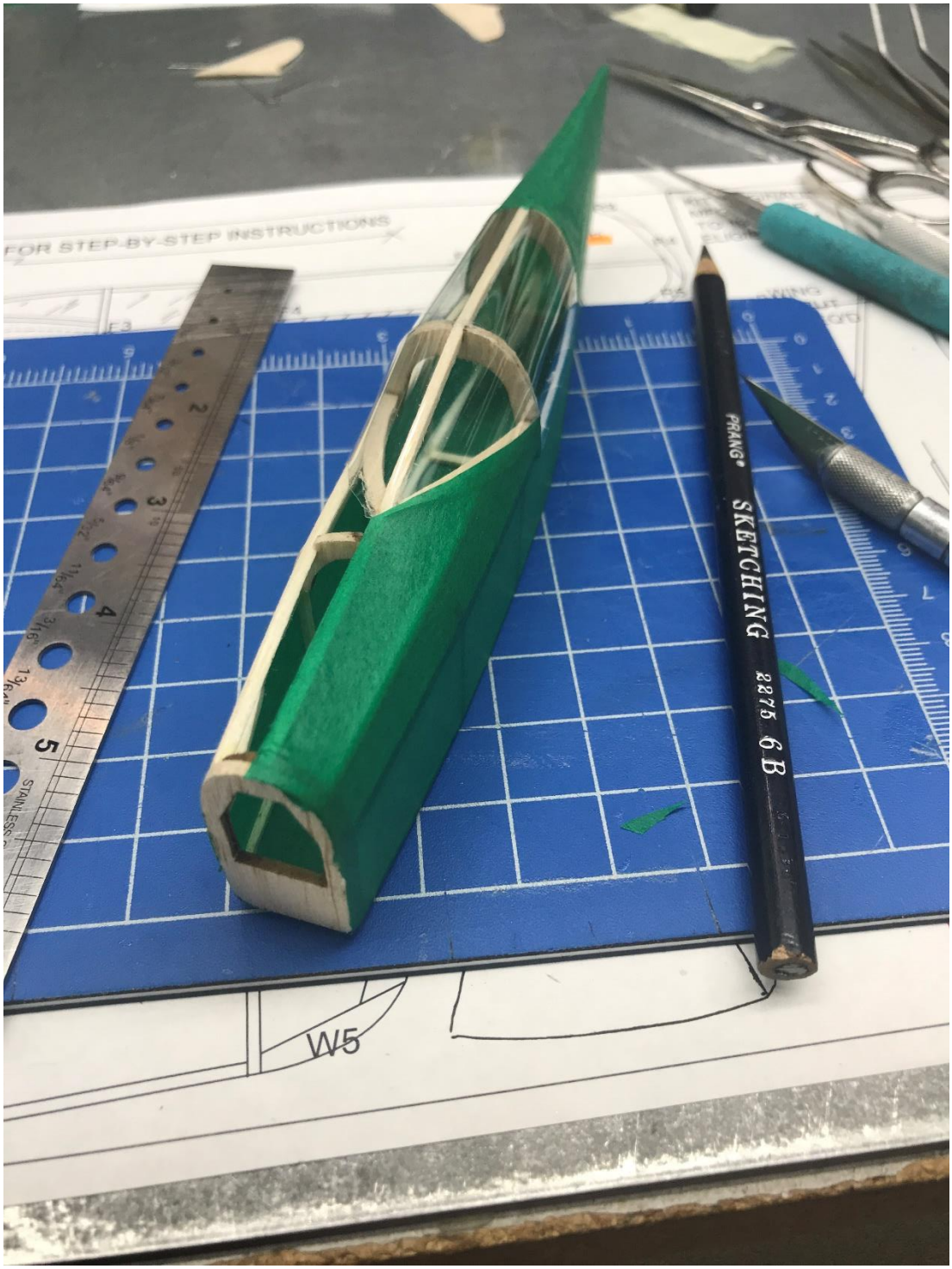
48. Ooops! We got a problem Houston. All that extra handling while we were making the many canopy patterns for this prototype build resulted in pushing this stringer in. Not very pretty, now is the time to deal with this. Cutting out and replacing the tissue won't do it. I cut 3 additional cross pieces and centered them in the offending zone. Used the tip of my jeweler's awl to pin point the application of the glue to make the fix permanent without the glue showing up all over the tissue.



49. Here’s how it came out with the fix.



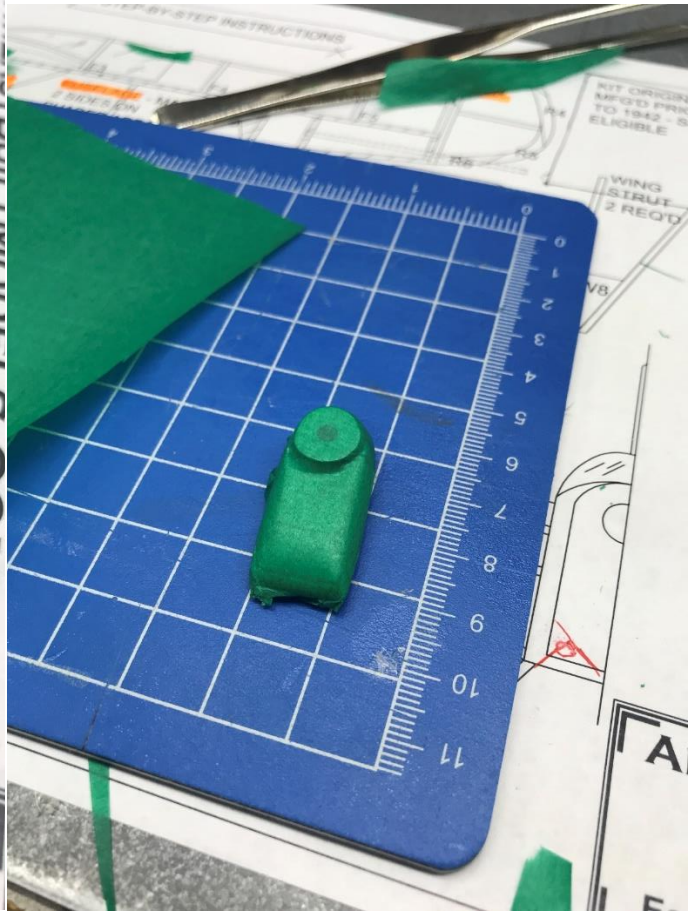
50. Time to cover the top of the nose. Take a strip long and wide enough to cover the next zone. I use the ruler to get a nice straight edge on the part that will overlap the tissue on the side. I want to keep my overlap as close to the width of the 1/16" stinger as possible. This makes for a neater appearance. While I align his straight edge with the stringer and hold in place, I use a soft #4 lead pencil to make little marks indicating what gets cut off. Here I've the curved line of the cockpit and the narrowing of the needed width as I approach the front of the plane. I'll have a series of little marks that I can then cut to. Be sure to put the marks on the waste side of your cut line so they don't show up on your model. Test before gluing.



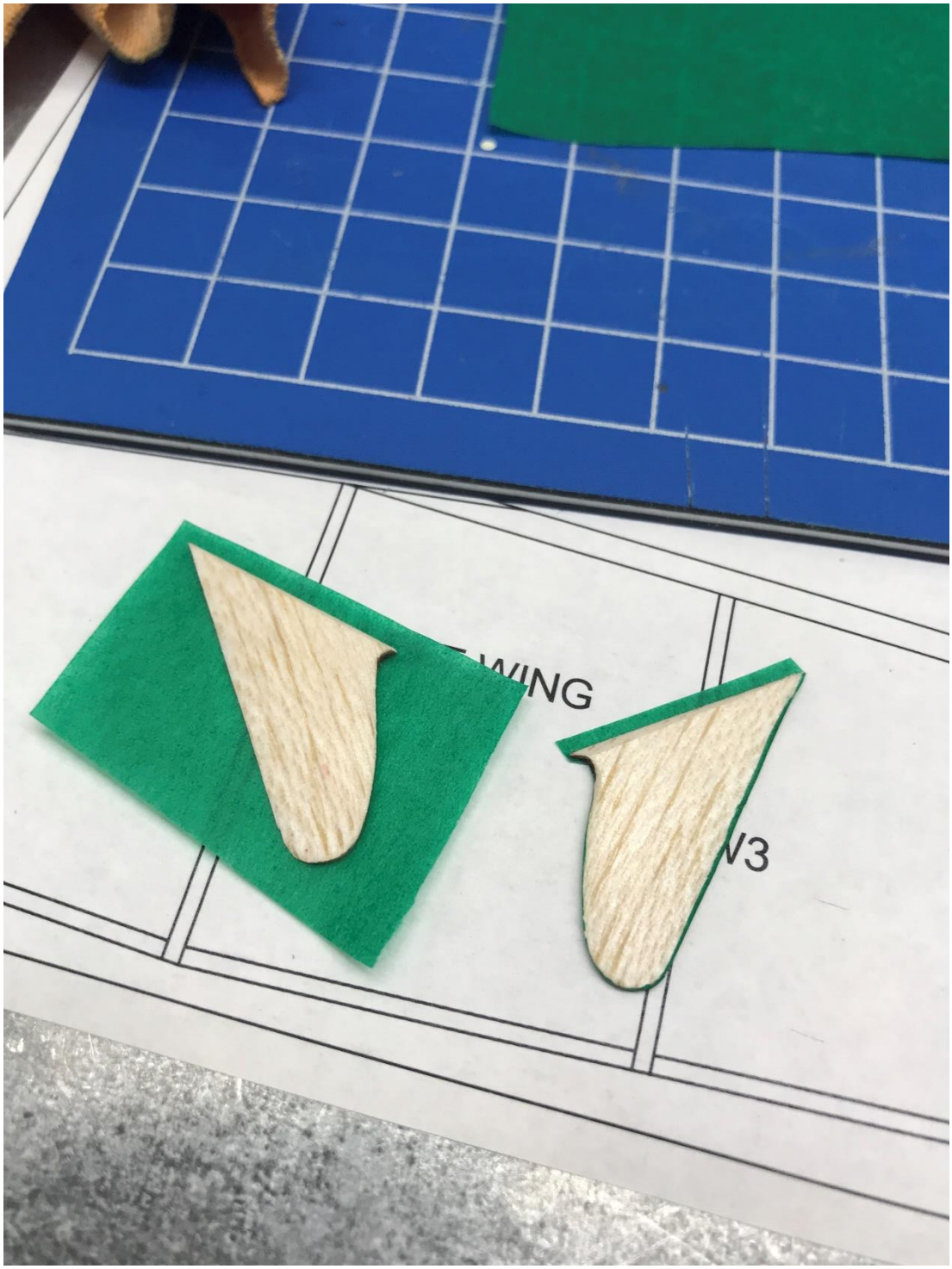
51. Trim the piece and you are now ready for the last strip to cover the main fuselage. If your blade is not making clean cuts when you go to trim clean or change your blade. I take extra time and try to make this piece a perfect match. I'll go around the outer edges of this piece of tissue with the glue stick. This is exactly where those clean catalog pages are useful. I'll also add some glue to the exposed wood of the nose before applying the tissue. Once the last piece is on you may not have a perfect seam on top. Put a crease in the tissue along the line of the and trim it. Smooth it out with a wet fingertip.

52. What is this oops #3? Glue on the finger made a mess on the tissue. Cut out the offending area. Create a piece that just overlaps by the 1/16” rule and then apply the glue stick to the bottom stinger. I trim the excess off and wrap it around to the underside.

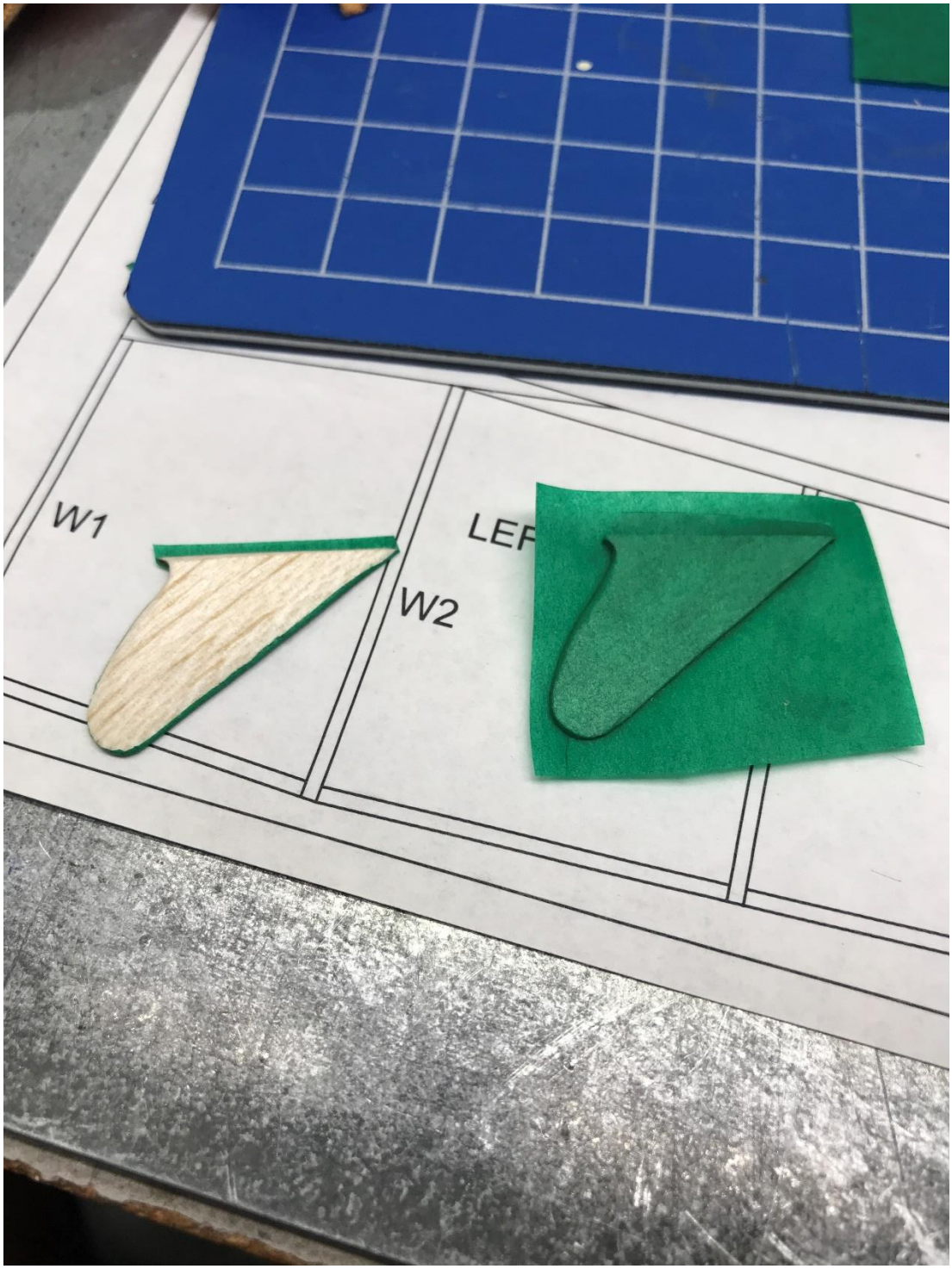
53. I sense ooop #4 here but I'll let you guess on that one. Here we are going to wrap the removeable nose block. I'm going to do this with one square of tissue and 3 slices. First apply glue stick to the entire back of the tissue. Second, center the assembly over the piece of tissue and make contact with the highest point, the area where the nose button will eventually go.



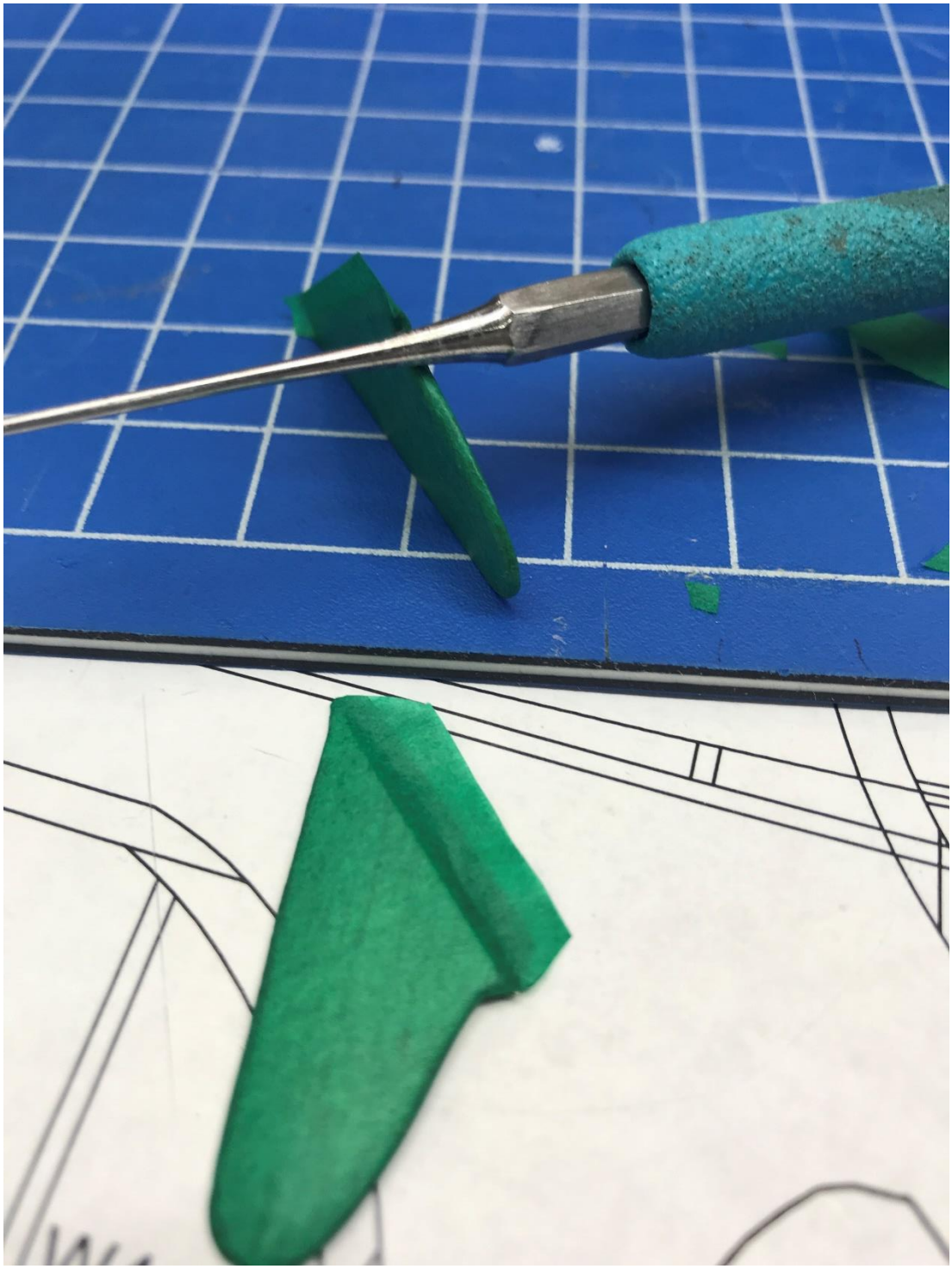
54. Flip the piece over and start working the tissue down to the balsa. I did the easiest part first working from the hole to the bottom, down the center line. Ultimately when I get to the edge anywhere on this piece, I want to be pulling the tissue straight down, not sideways. Now I'll use some water on my finger and gently keep working the tissue to conform, to stretch around the compound curves. The water will reactivate the glue stick allowing you to keep moving it. Work it too hard or pull it too far and you'll most likely get a tear. You can try to cover with a little piece of tissue or start over. Once the lower portion is smoothed out, I moved to the top half which is going to be a bit more challenging as the curves are sharper, tighter, bringing more tissue together in this zone. I made a slit at top dead center of the curve not quite to the high face of the nose. I made two others at about the 45-degree points to each side of the center. Working from the finished lower are towards the top. I kept smoothing the surface keeping as close to applying pull in that 90-degree line to the edge as possible. As you get towards the top you will see where there is excess tissue. You can either use those 45-degree slits as the overlap point and just slip it under or you can trim out the excess and minimize the overlap. I like to progress the same rate on each side before moving on, always about balance of the tissue pull. Eventually you get to the top and finish off. So don't be afraid to put more slits in where you want if that makes it easier for you. With all the tissue in place, I take my wet finger and go all over it one more time to smooth it out. After it dries if an edge lifts where there wasn't enough glue, dab some glue stick on the tip of your jeweler's awl and sneak it under the tissue, a little more wet finger work and then trim the tissue flush on the back.



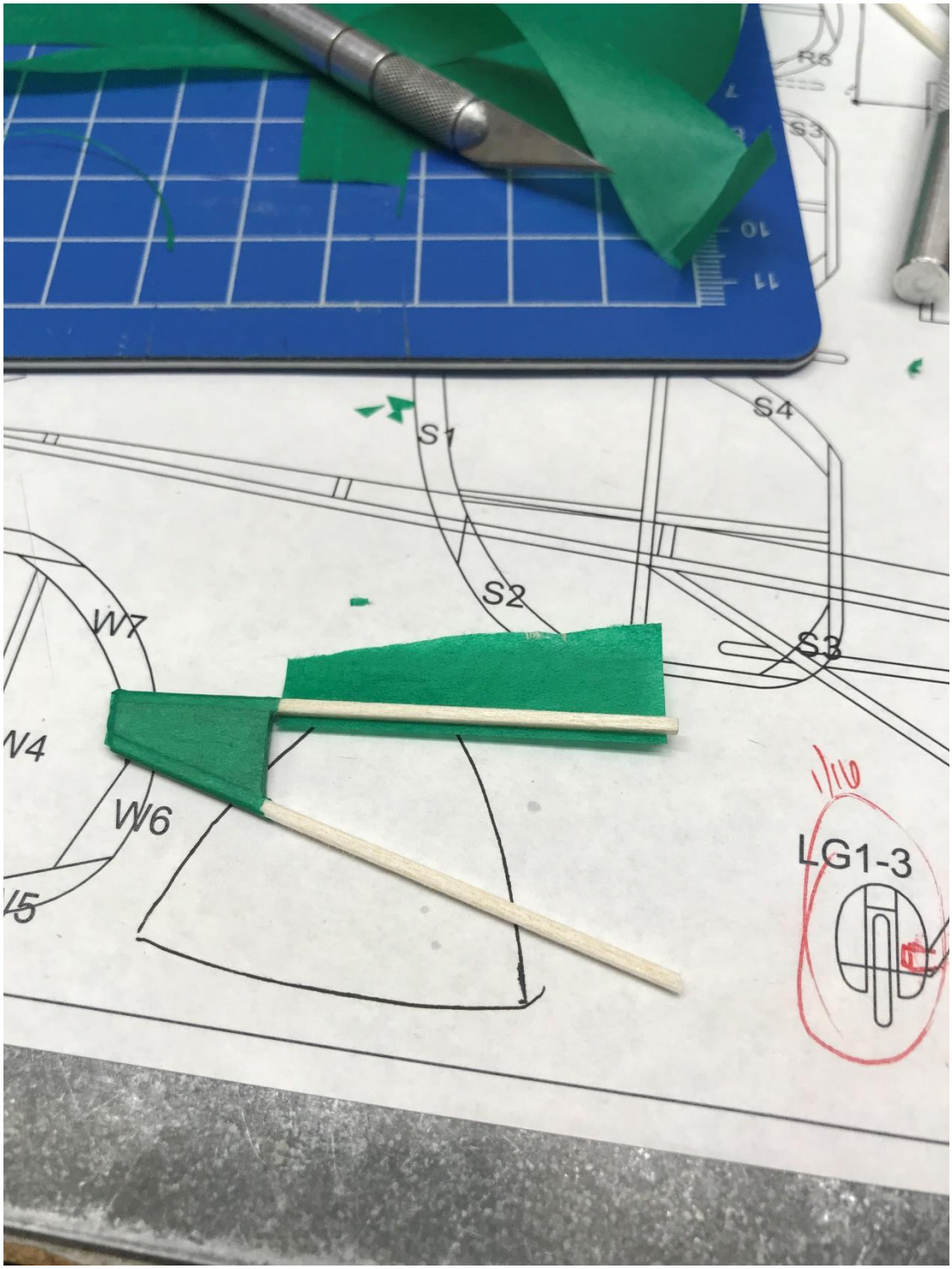
55. Just going to repeat all we've been doing so far on the landing gear legs. I leave a little overhang at the top so when we glue them to the fuselage, I have some material to seal over the glue joint. Look at the tissue here, see the grain, runs top to bottom on these parts.



56. I don’t coat all of the wood with glue stick, just the perimeter.



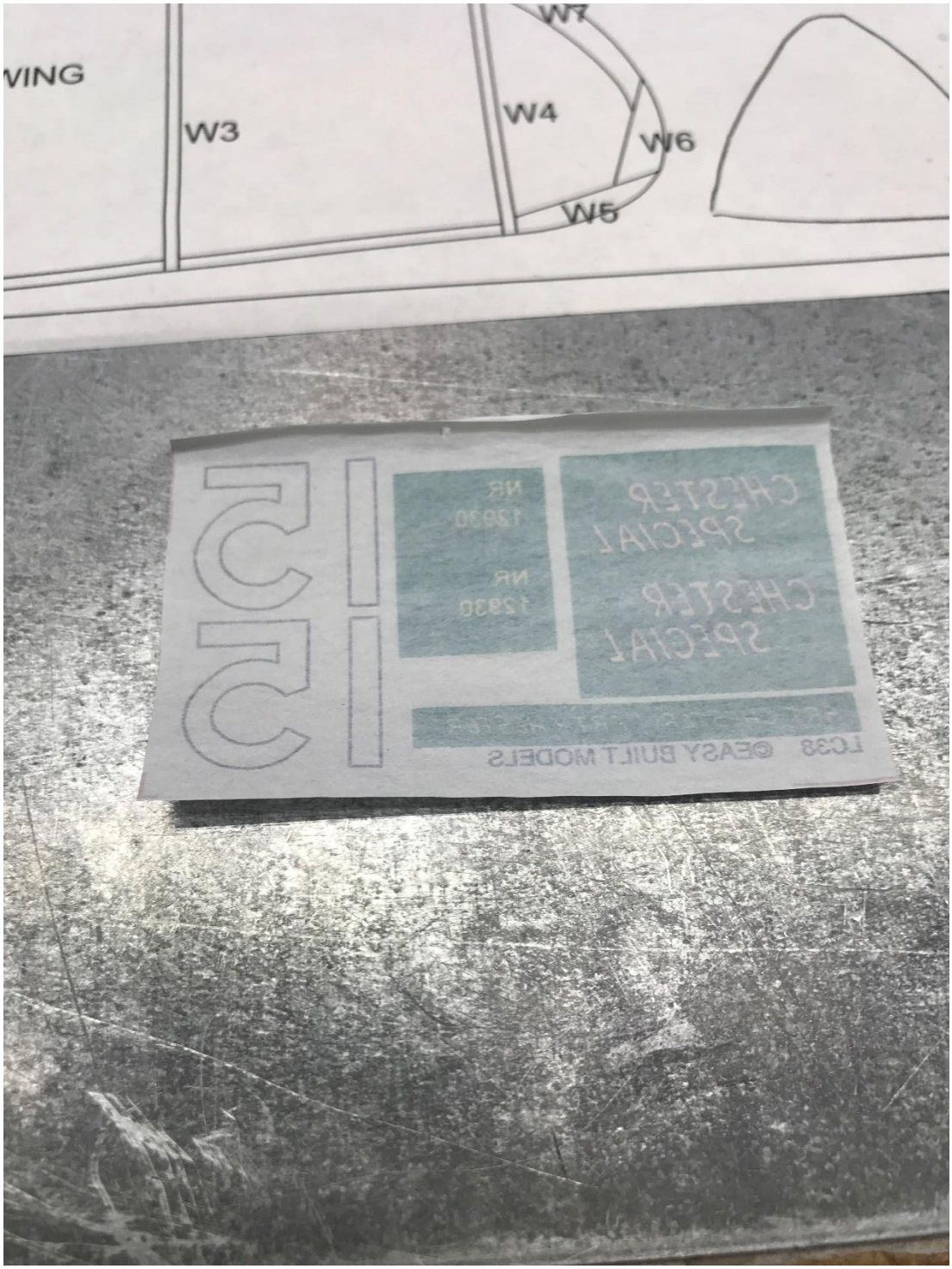
57. Use that round shaft on the jeweler’s awl for that smoothing in the tissue in that tight little curve.



58. Wrap the struts in tissue. I know I made mine oversize and not worried about covering all the way to the end. I'll trim them down as I go through the test fitting stage. Try to hide your seams so they are not obvious.

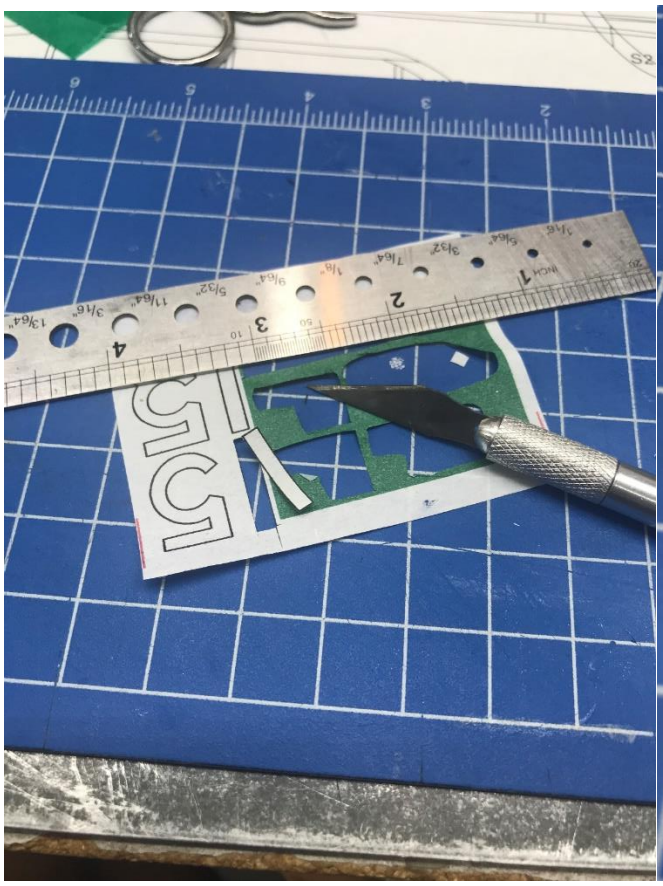

59. I did the wheel spats just like I did the nose block.


60. Smooth out the edge after the first side is tissued. Then carefully trim the tissue all the way around on the centerline. Proceed on to the other side and overlap the tissue and trim.

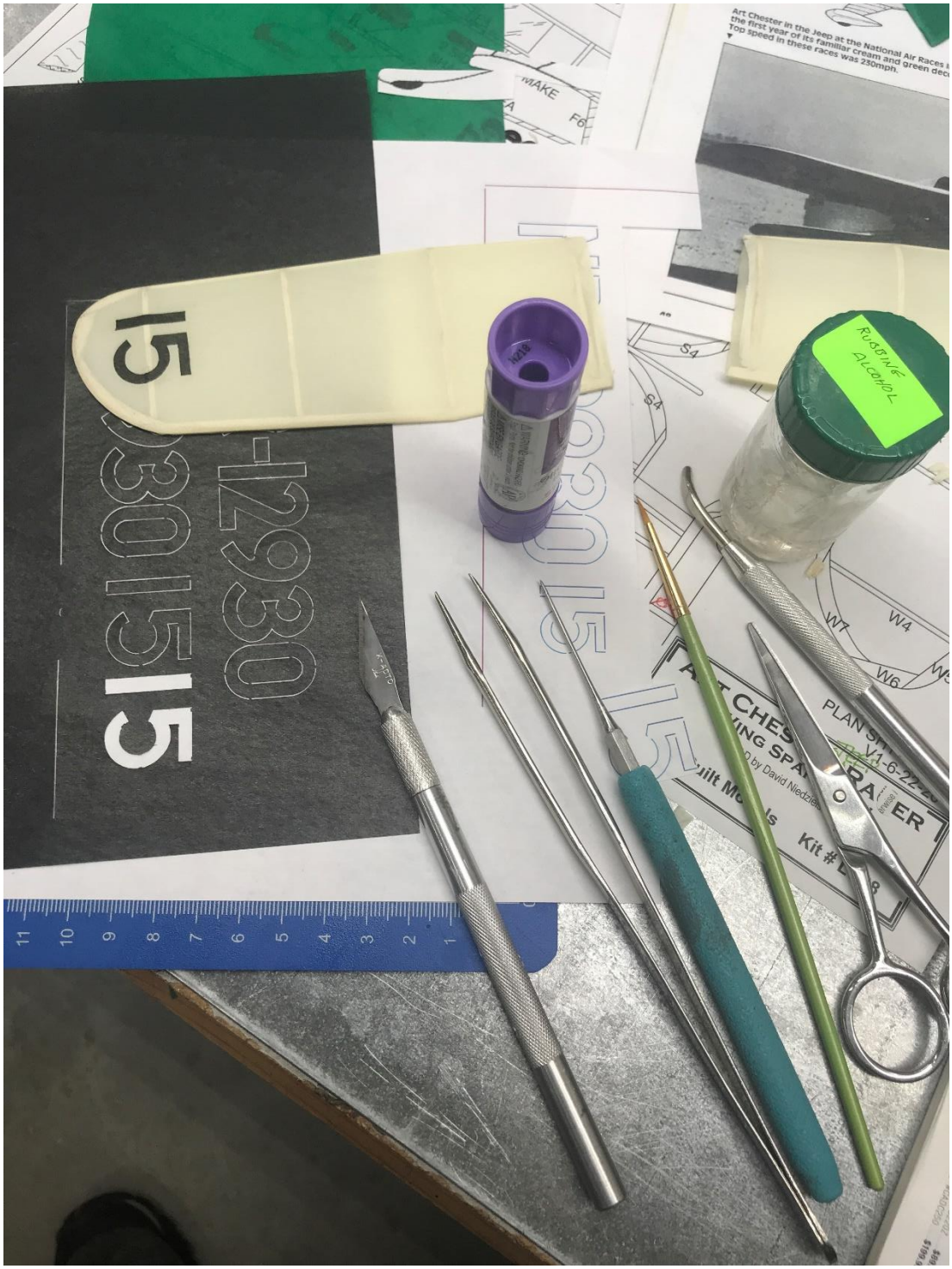


61. Prep the Tissuecal™. Any time you have white markings I like to spray paint the back a bright white. This keeps the color vibrant and reduces the likelihood of the marking becoming translucent with the background tissue color bleeding through. I sometimes use a spray enamel other times an acrylic via my airbrush.

62. I like to cut the marking out with only a slight surrounding area of color so it blends in when it is glued in place. It would not be practical to cut out the individual letters while keeping the black outline as in the real plane. Flip it over and apply glue stick to the entire back. I find that using a fresh glue stick at this time really helps to get that smooth finish. Have the spoon tip burnisher ready to apply some pressure since you want to spread the force out while working the marking onto tissue already on the frame. When possible, I like putting the markings on before I start assembling all the parts of the plane into one structure. It is easier when you don't have to work around obstacles.

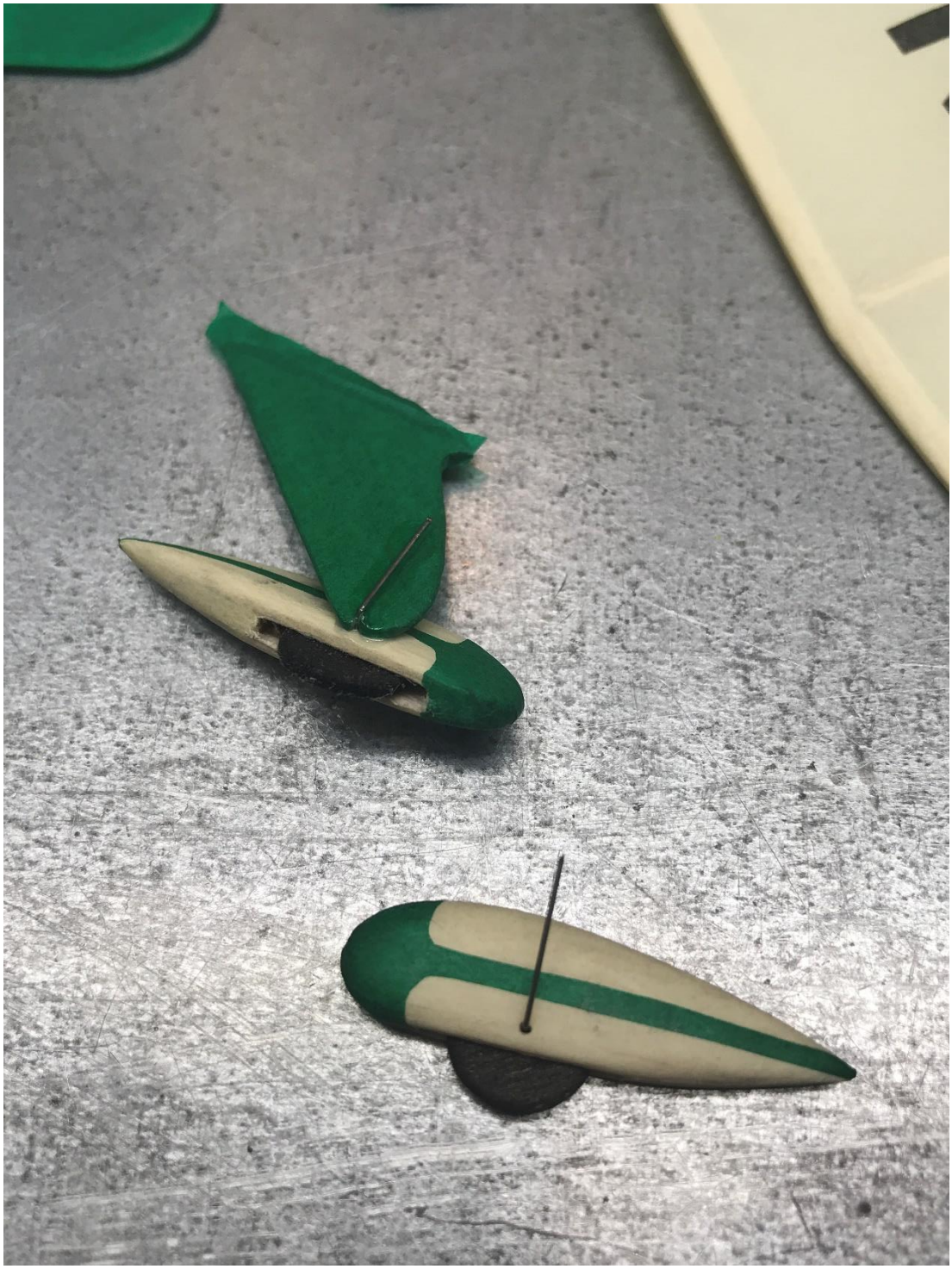


63. These fuselage race numbers on the real aircraft have a black outline. Use the sharp knife and a ruler where you can to make these cuts. Take your time. The finishing work will always take more time than the larger general construction.



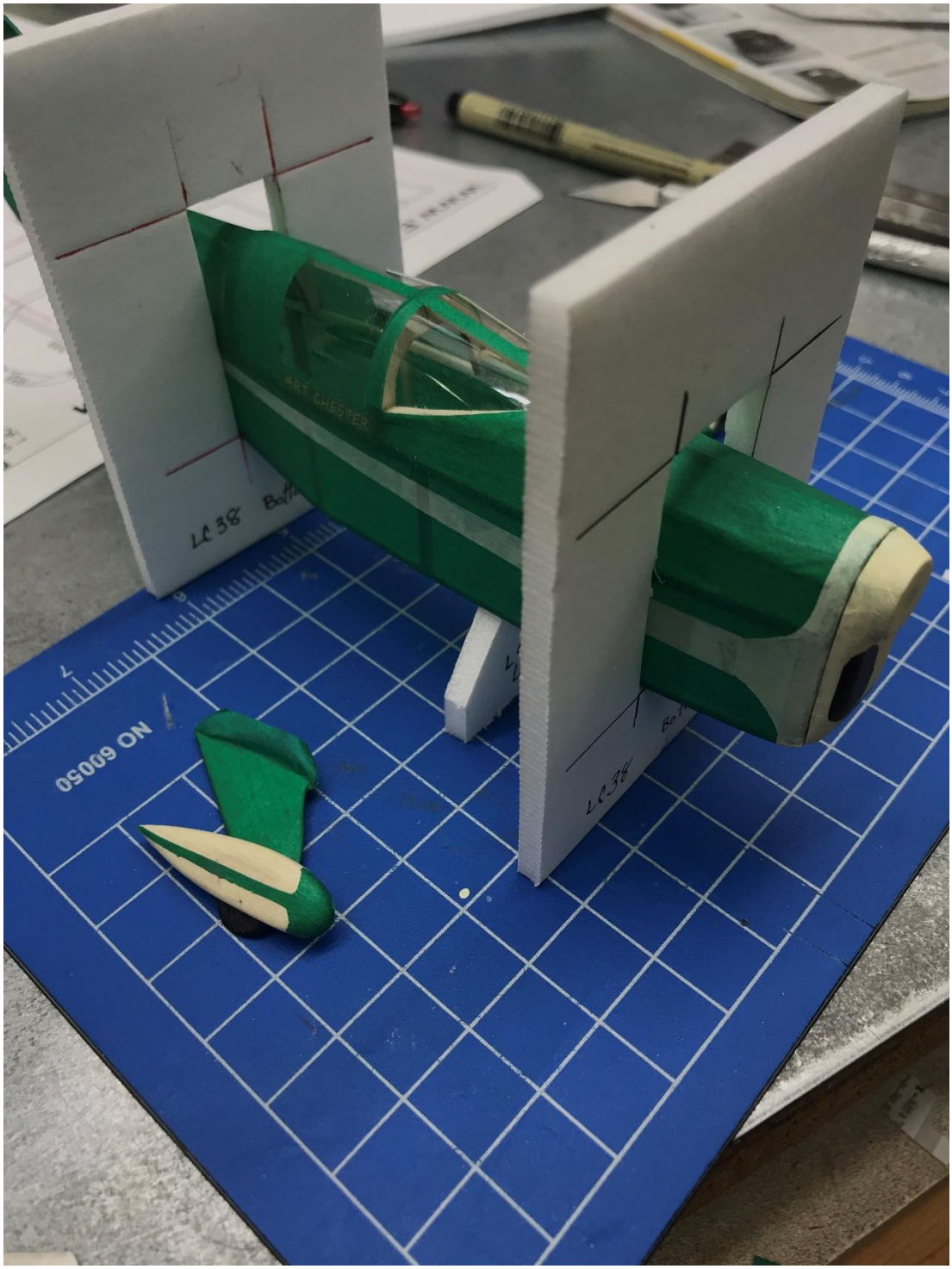
64. On to the LaserCals™. Got my tools ready for applying the numbers. Cut the numbers free from the sheet. Cut close to the number as opposed to the carrier sheet so the numbers will have clean edges. Now the good news is while I was applying my wing numbers, I had ooops 5, 6, & 7. The good news I decided to make this a trainer kit for applying the numbers and have included a full set of extra registration numbers for you. Go ahead and try to get it right the first time but don't get upset if you need to start over. I use the paint brush and rubbing alcohol to both loosen the glue and reposition or remove a number. It also works to reactivate the glue once you have the number just right and you can use that spoon tip burnisher to give the numbers one final rub down. Sometimes you will need your awl or tweezers to lift the number or fixe a rolled edge.

65. Wow, getting close. Everything is covered and I drew my control surface lines on while I can keep the part on a flat surface. Makes ruler work much easier. Okay there is that oops #4 I mentioned earlier. I covered the nose block with green tissue when it was supposed to be cream.

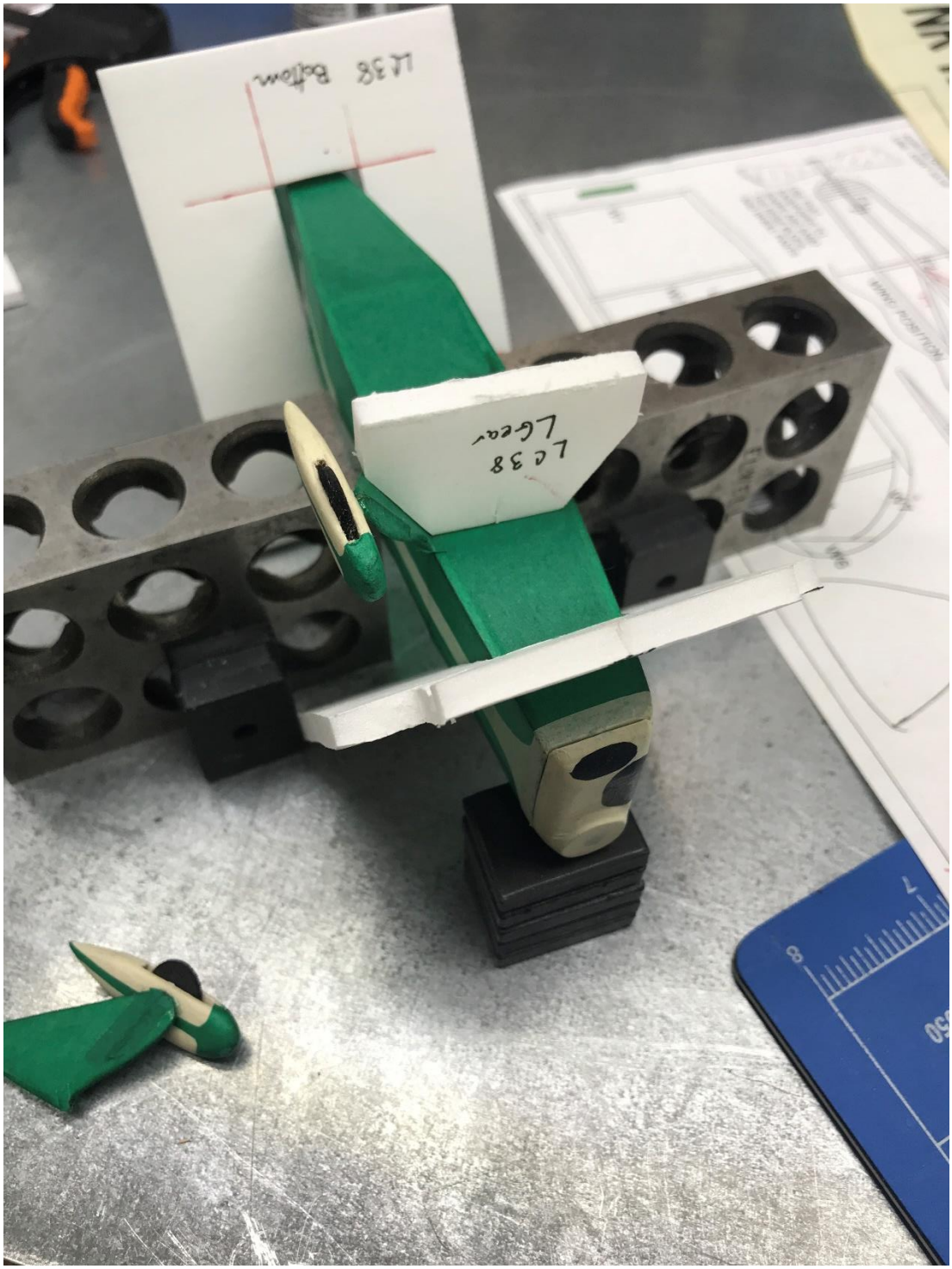


66. Let the games begin. Now this is where all your earlier efforts to keep things aligned, symmetrical, and smooth all pay off. I cut the emerald green tissue to create the lines for the spats and glued over the top of the crème tissue. Now you have to had sanded your wheels a little thinner than the host sheet so that they will freely spin on the axle. You are going to use a common straight pin for the axle, installed from the outside, through the wheel, and out the inside. Use some needle nose pliers to make the bend. Look at the plan to see if you have it correctly. You don't want the bend tight up against the spat because you need room to slide the LG leg in between the two. You will glue the wire on the inside back of the LG. Cover this glued area with tissue for a finished look. On bigger heavier planes we would normally want to use a free-floating full-length music wire for the LG to absorb the shock of landings. But, on this small plane that weighs so little we don't need to deal with shock absorption in most scenarios.

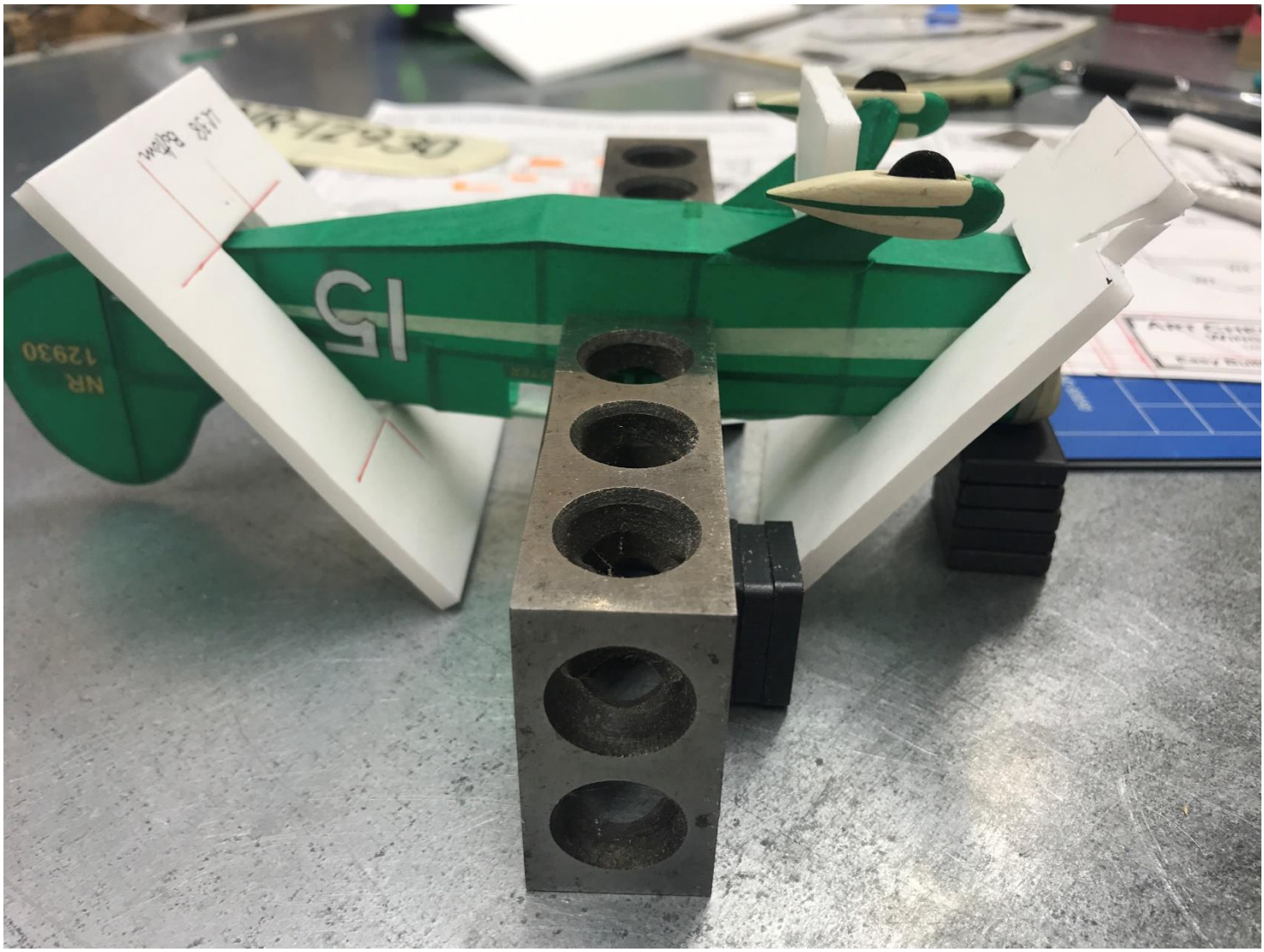
67. I used to assemble the final parts of the model by putting glue on each piece and eye balling it. So-so effort gives less that desirable flying results. So you can see all the red lines I added to use in aligning my Dollar Tree foam board to make the cut outs. Cut a large enough rectangle to start your holder. Make a center line registration point at the base of each piece you make so you can use reference lines to align parts and make symmetrical adjustments.



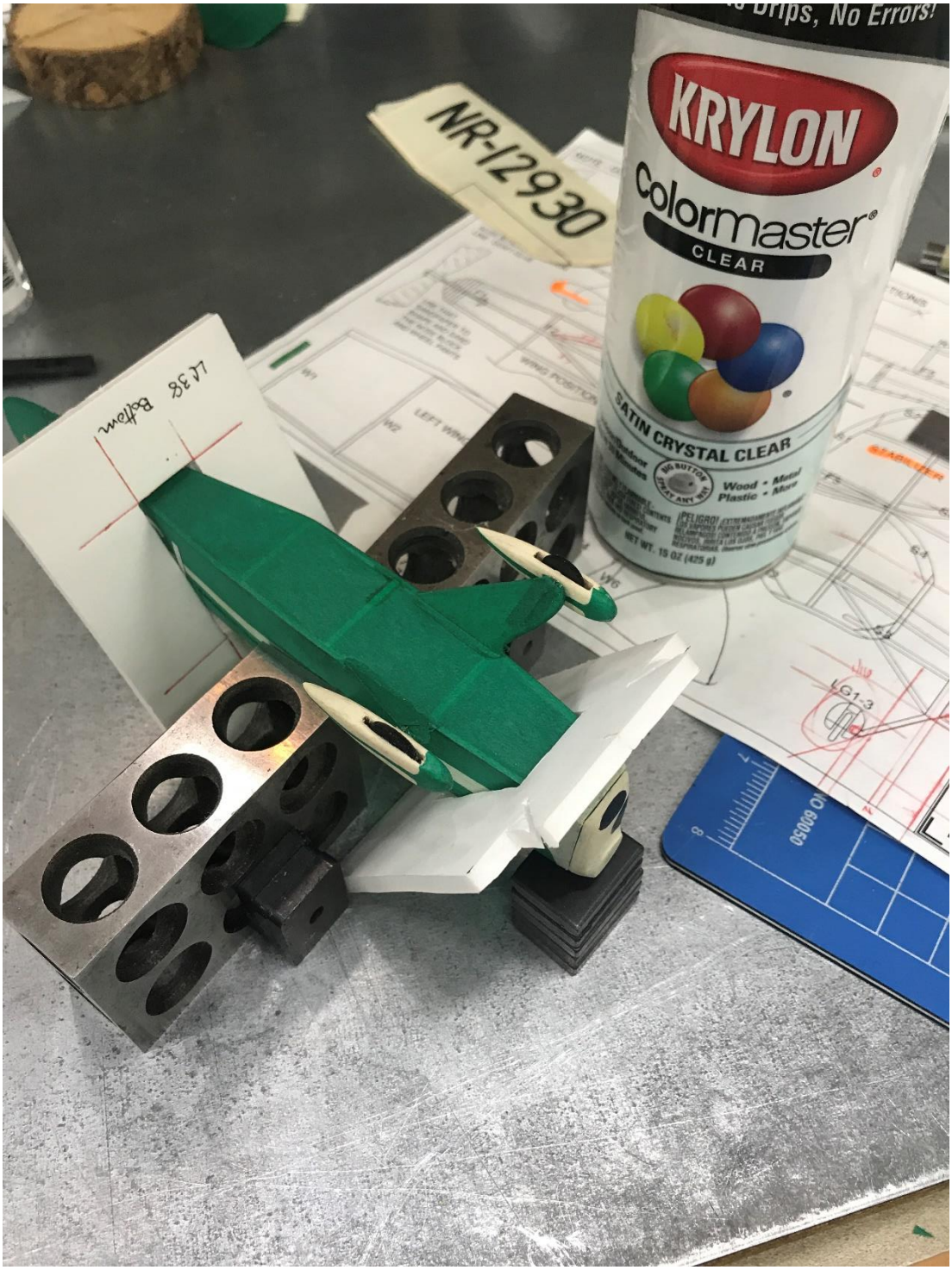
68. Well this was a first attempt at aligning the LG but the model is so small my big mitts can't fit in there to hold the piece.



69. Okay this worked. Working on the MagnaBoard XL, using the 2-3-6 machinist blocks and extra magnets I was able to lock the fuselage in upside down in a manner that kept it from sliding around, almost as good as an extra pair of hands. Now I can position each LG in place and glue.



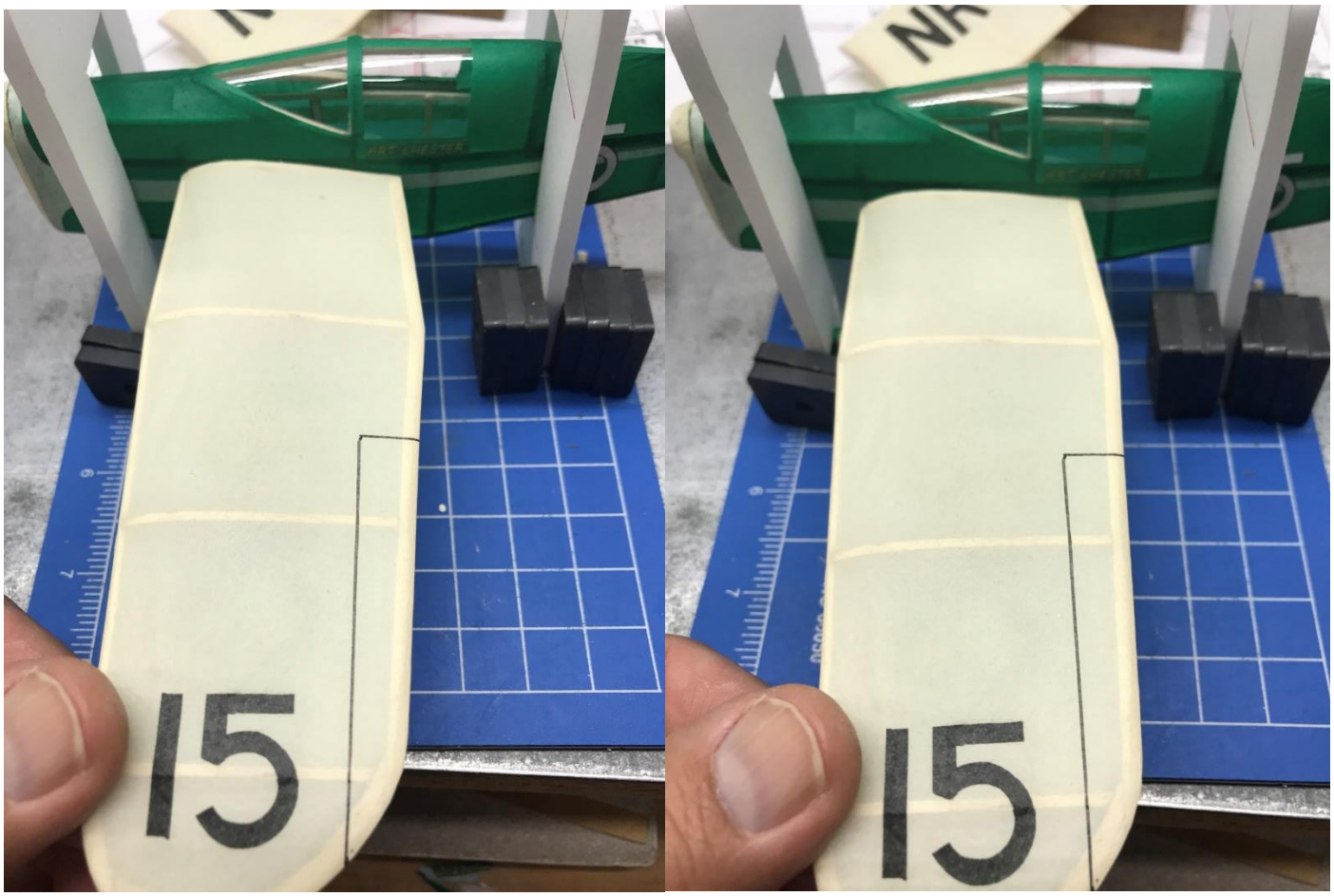
70. Side view of the LG.



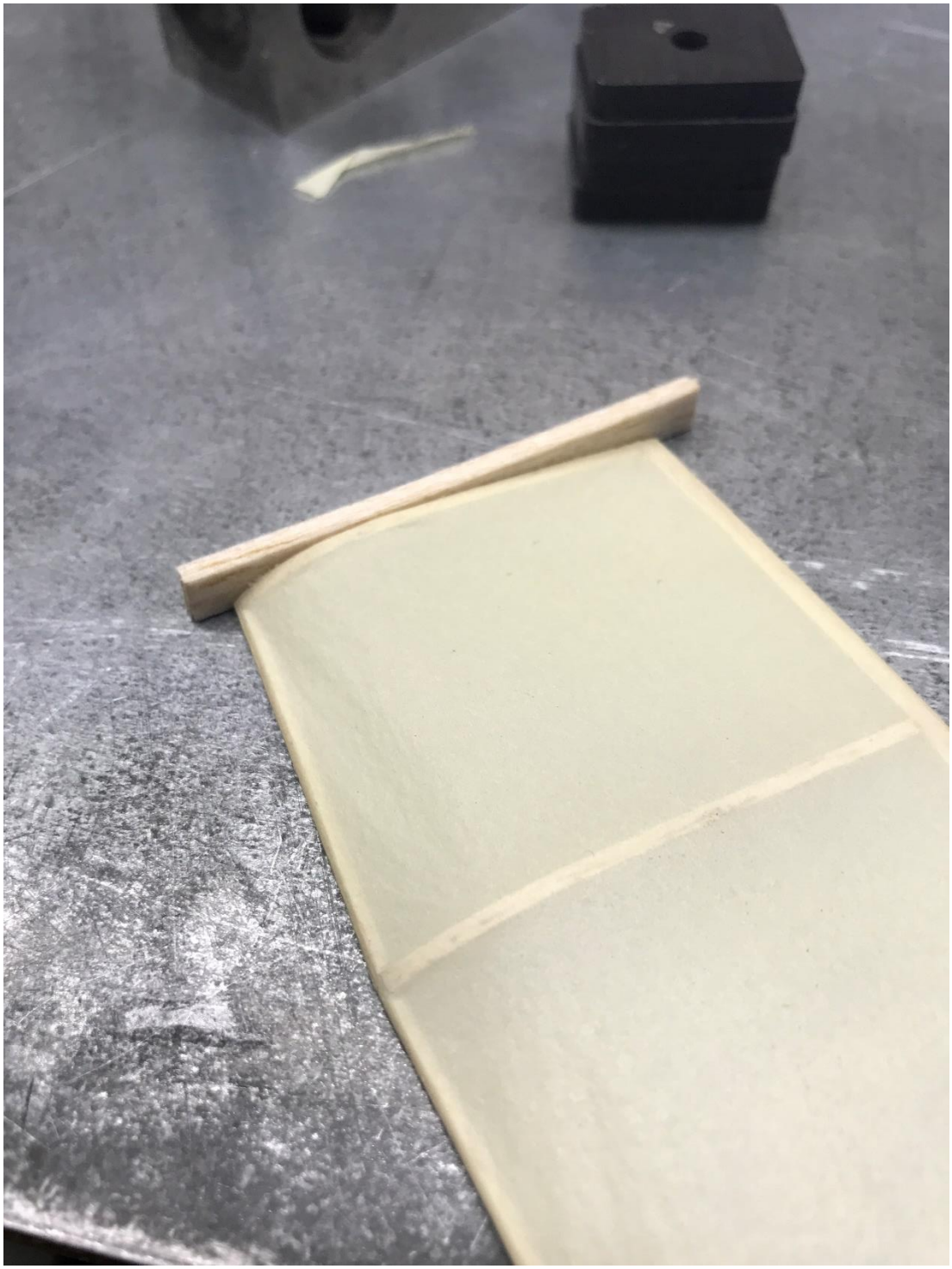
71. View looking down on the underside.

72. Nothing exotic here. You need to take a piece of 1/16 sq. balsa cover on 3 sides and glue to the end of the fuselage to start the rear tail dragger. Once the glue dries, I sliced it off even with the tail. Then I took another straight pin, put a slight bend in it, last inserted and glued in place.

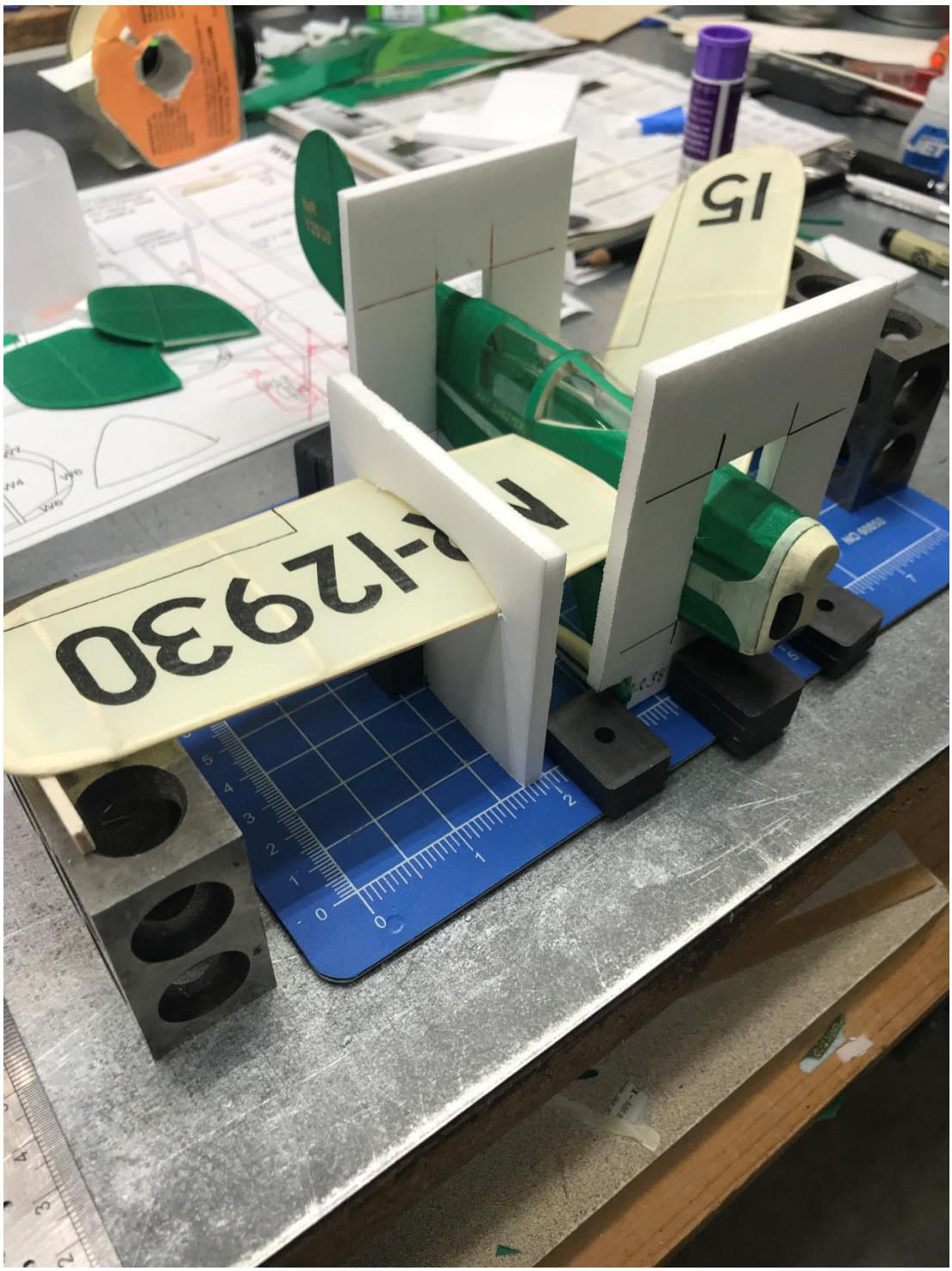
73. Since this is a butt joined wing, I trimmed the LE and TE flush with the outside of the root rib. Sanded to be sure flush.



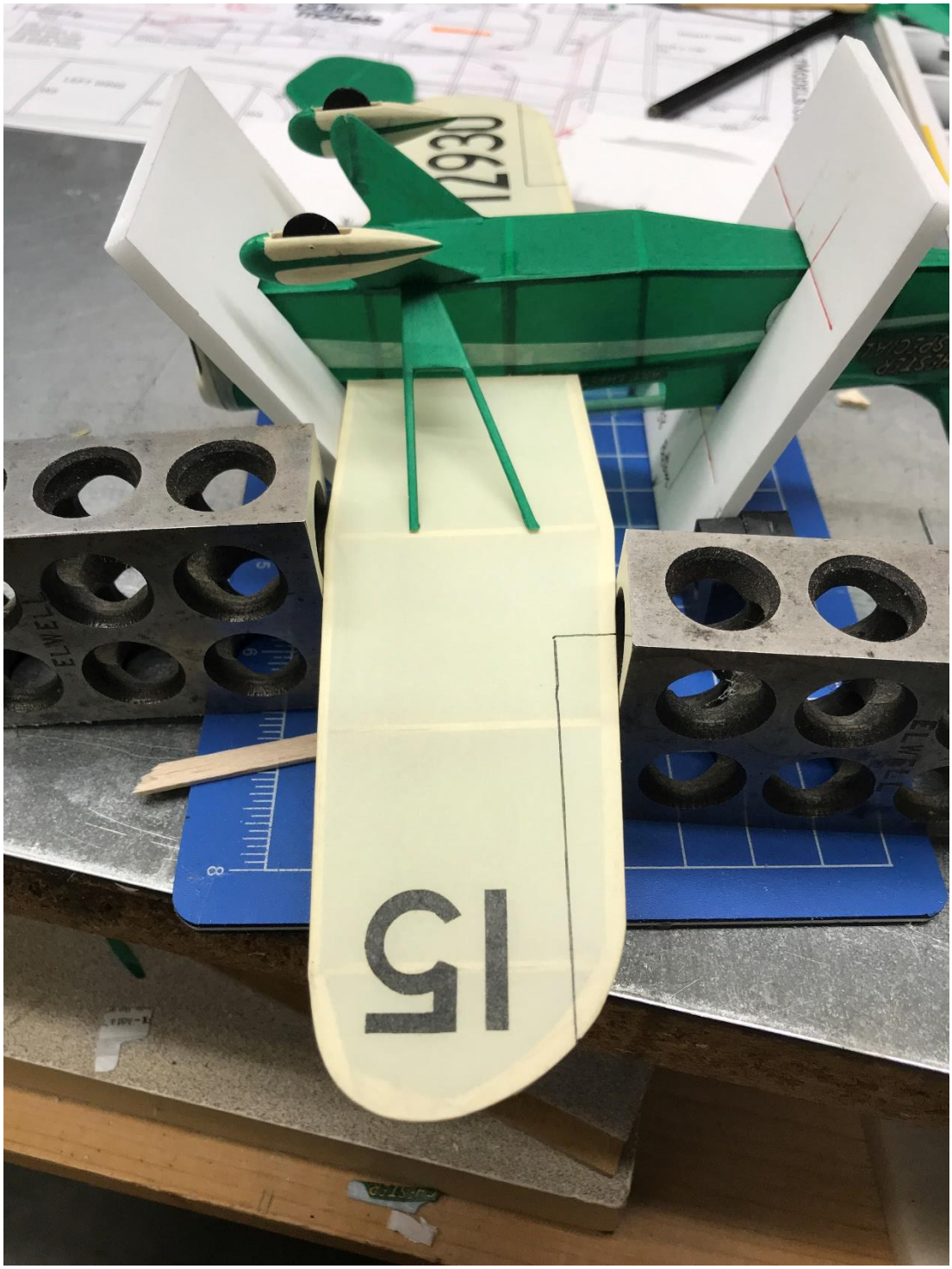
74. Aww, not another oops. Lost count. Just sharing that anyone can stumble and have trouble building a model. That's part of the fun, finding and figuring out these puzzles. Not much of a challenge if you don't have to think about what you are doing. Remember that problem I had back around step 45 with the balsa sagging inward? Well the fix is biting me in the butt. Those sides were supposed to be flat along that line. The real aircraft bows out a bit along the entire length so I was thinking all ok. I'm using the lines on the cutting matt as my reference point. The fuselage is parallel with the lines going across. The picture on the left shows how far the wing is angled forward when I hold the root rib against the curved fuselage. The picture on the right shows how it is supposed to look. Back to the workbench for a new fix.



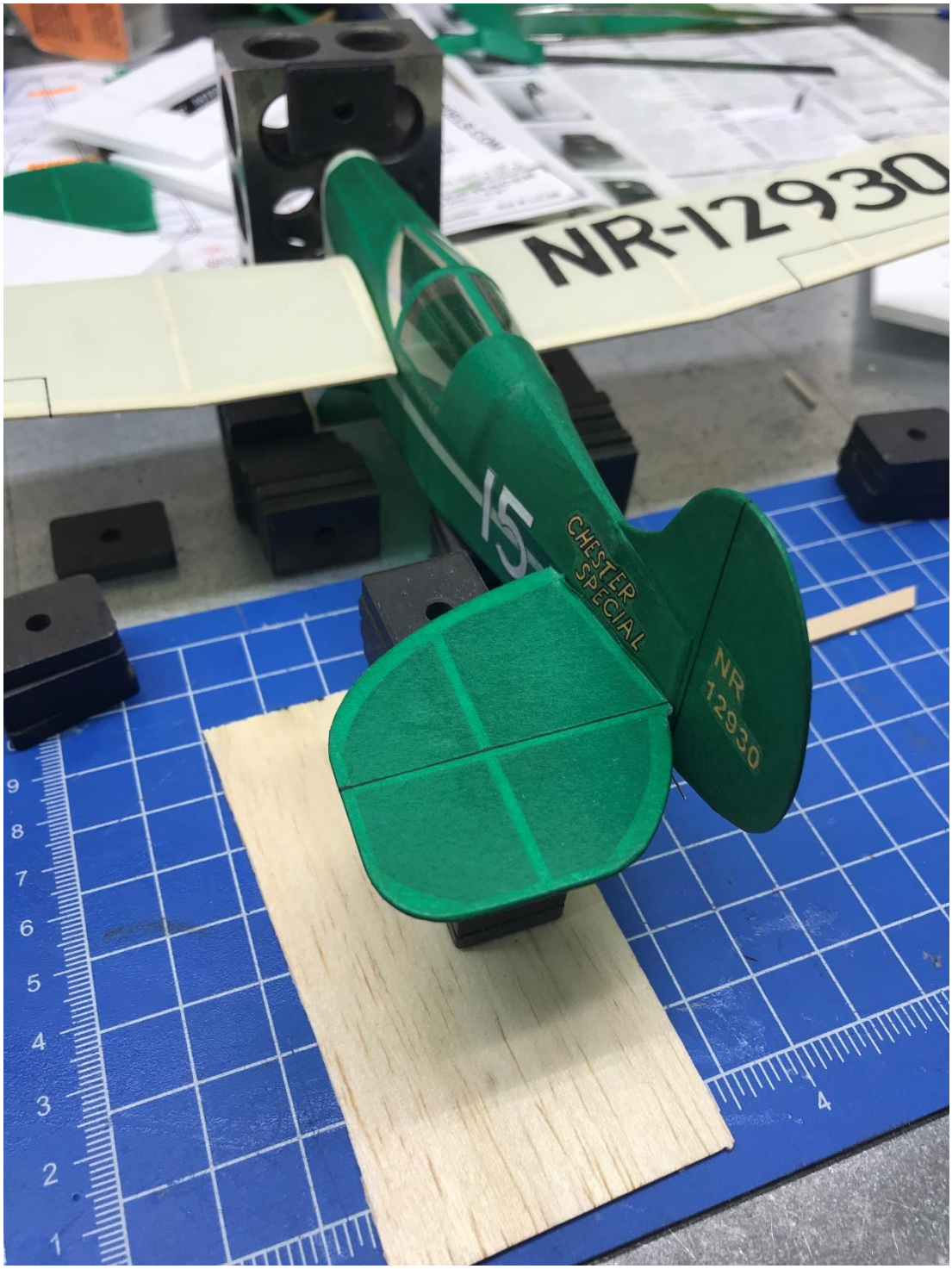
75. Okay, here's the fix. Sistered an oversize piece that was wider than the gap I saw when I straightened the wing out. Also, a little longer and wider. I used my sanding block to bring in to match the root rib. Wrap a fresh strip of crème tissue around it and the root rib and you don't even notice. Then sand to match the side of the fuselage so you end up with the correct angle.



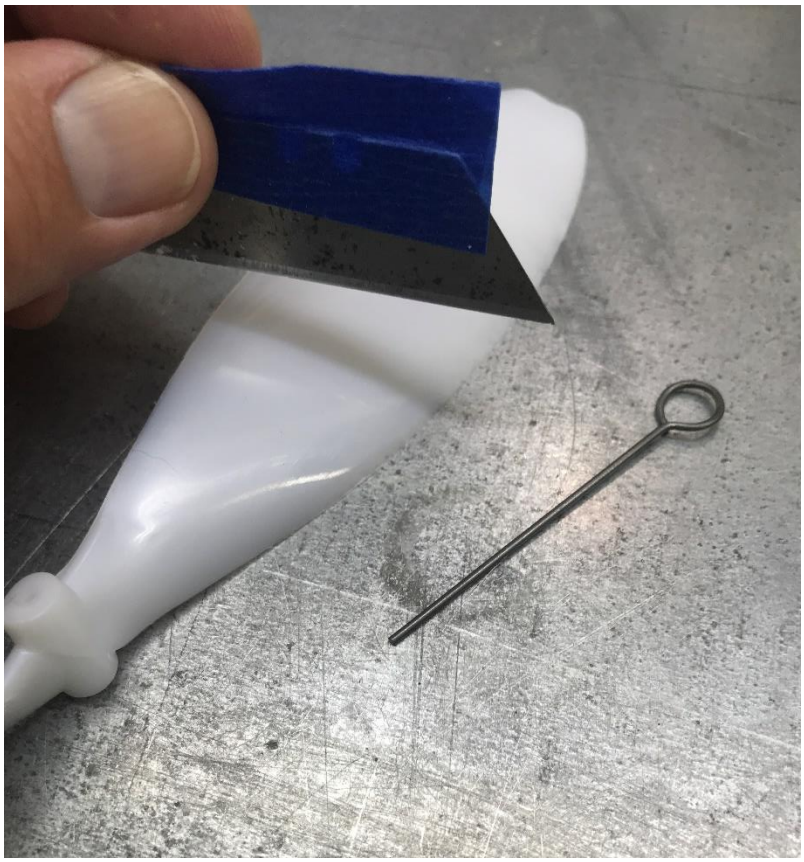
76. I created another foam board jig to align the wing at the desired height on the side of the fuselage and the steel block with a piece of balsa that sets the wing with the desired dihedral. Repeat on the other side.



77. Flip the plane over and now let’s put the struts in place under the wing.



78. Coming down the home stretch. I got the fuselage set at the right height at the tail. Then a stack of magnets with a shim of balsa under them to get the stab at just the right height. You can't see it here but I have that rudder perfectly vertical so that is my guide I want to use to assure the stab is perpendicular to it. Repeat on the other side.



79. An important step for a flying model is to have a balanced prop. One that spins on the shaft without always stopping in the same spot. I use a Stanley utility knife blade held at a perpendicular angle to the blades surface to scrape off a thin layer at a time. Sometimes quite a bit of shavings will be removed in the process. I don't just take the plastic off on one specific spot. I try to spread it out across the entire area. Removing from the tip will have the greatest impact.

80. Because of the small nose and high prop shaft line, I made a modified prop shaft with the nose as originally designed. Before the laser kit was released we modified the nose to lower the prop shaft location so the standard prop shaft will work. Finished with the prop balanced, the thrust button inserted from the front, the shaft inserted from behind, and the glass bearing slipped on followed by the prop. Now bend a sharp 90 degree bend in the prop shaft to catch the latch of the prop. Trim off any excess.

81. Oh, what a sweet pea. Ooops, Art Chester hadn't created that race plane yet. This is the 1935 version for the National Air Races. Go another year and add the spinner. I used a 5" prop to start with. If this proves too much, I'll start cutting the diameter down a ¼" at a time. I'll use an old Stanley utility knife blade to scrape the blade thinner while I'm balancing it. Finish off by slipping the prop shaft in through the nose button and bend the end so it catches the dog on the prop. Hope you had fun with your build. Here's a couple other shots for your reference and enjoyment. I'm off to finish my next build, Pres Bruning's Flying Fish Embryo. Dave.

82. 

83. 

84. 

85. I was off on my alignment of the incidence angle for the stabilizer. In test glides the plane kept diving in. To counter this I added Gurney strips, little pieces of 1/16" sq balsa to the top of the stab effectively creating enough drag to address my problem. I also was needing more right turn so I started playing with a similar strip on the side of the rudder. These have more influence on the powered portion of the flight with the prop spinning than during the glide so add or increase the size of these slowly. They are held on simply with a glue stick and can be easily removed. For additional help on trimming your plane for flight, go to our building tips section on the website and use the Air-Model Manual diagrams.