



## **Beechcraft Starship Build Description**

I was contacted by a flying club friend who has asked me if I would be interested in building him a new kit he was looking to purchase. Even though this is not a scratch build, I was very interested in this kit because I feel I can use the AMTN wing and fuselage design to aid me in coming up with plans for a JetZero Blended Wing Body RC model.

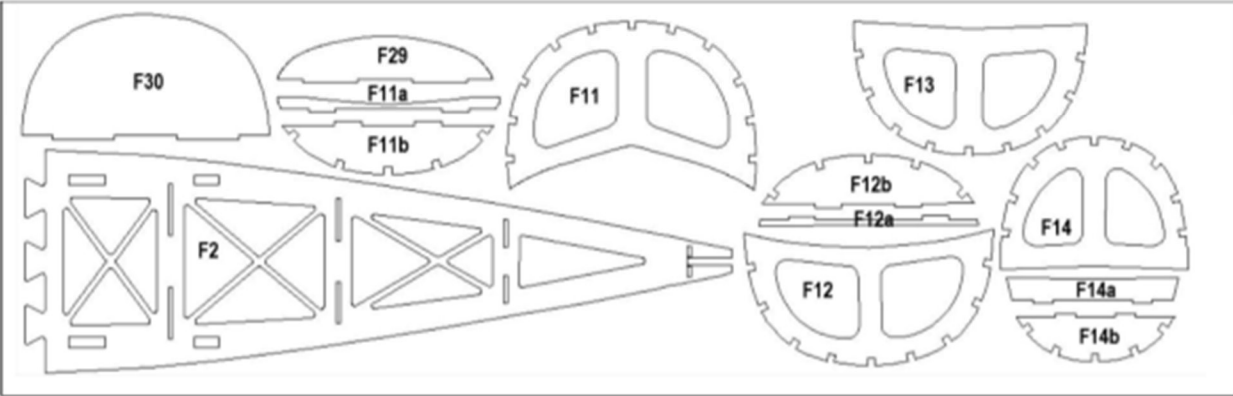
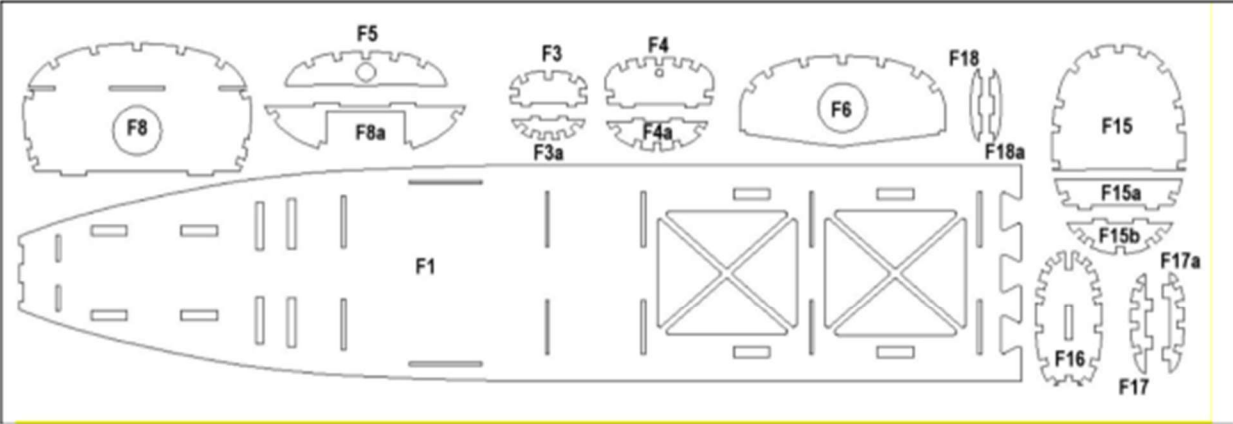
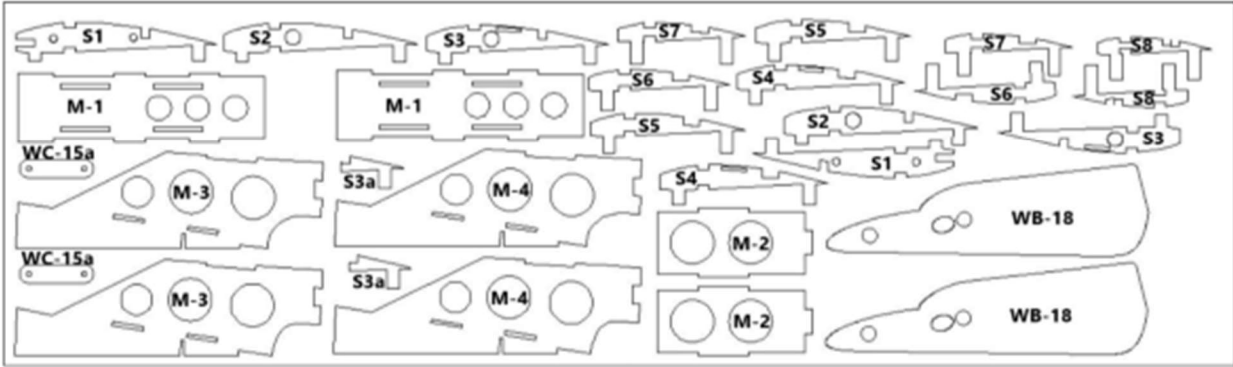
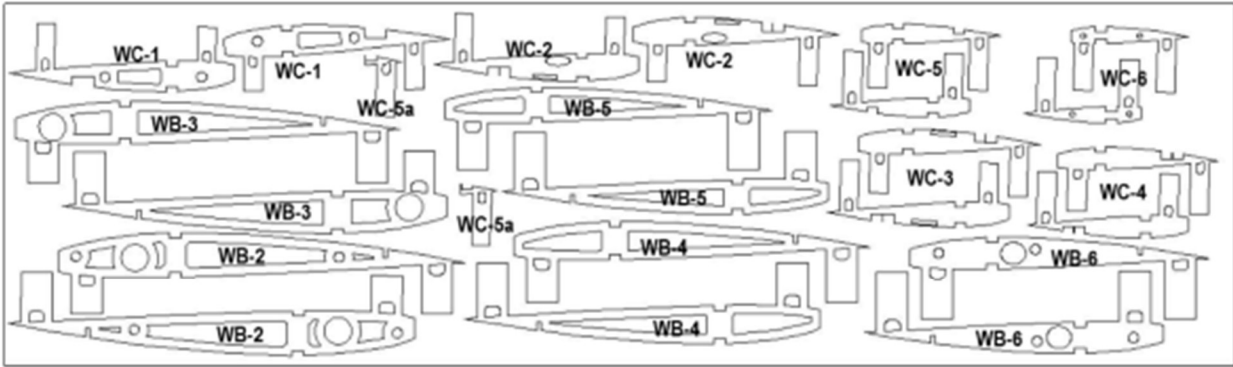
Well, the kit and retracts have arrived, and were brought to me on 5 April 2024. So, this model is now my build project. A Callie-Graphics package has been ordered and will arrive well before we will need it. I'm working with Innov8tive Designs, Inc. (<https://innov8tivedesigns.com/>) to establish what all will be needed for the electric power system. Many thanks to Lucien Miller. Below is an image of the balsa and plywood RC model in discussion. A unique aircraft indeed. You can see more images and information @: <https://www.amtn.nl/starship-s/>. There also is a multi-part video Build Log that you can view @: <https://www.rcgroups.com/forums/showthread.php?4148453-AMTN-Burt-Rutan-Beechcraft-Starship/>.



The first thing we did was unpack everything and checked out all the various light plywood and balsa sheets, and there are a LOT of them as you can see in the image below. I then took the AWESOME instruction manual AMTN provided and labeled all the individual pieces to ensure I would know which were which once they are removed from the large sheets. A couple of the instruction manual sheets can be seen below, or you can download the entire instruction manual @: [https://balsaandglass.com/Balsa\\_Builds.html](https://balsaandglass.com/Balsa_Builds.html).

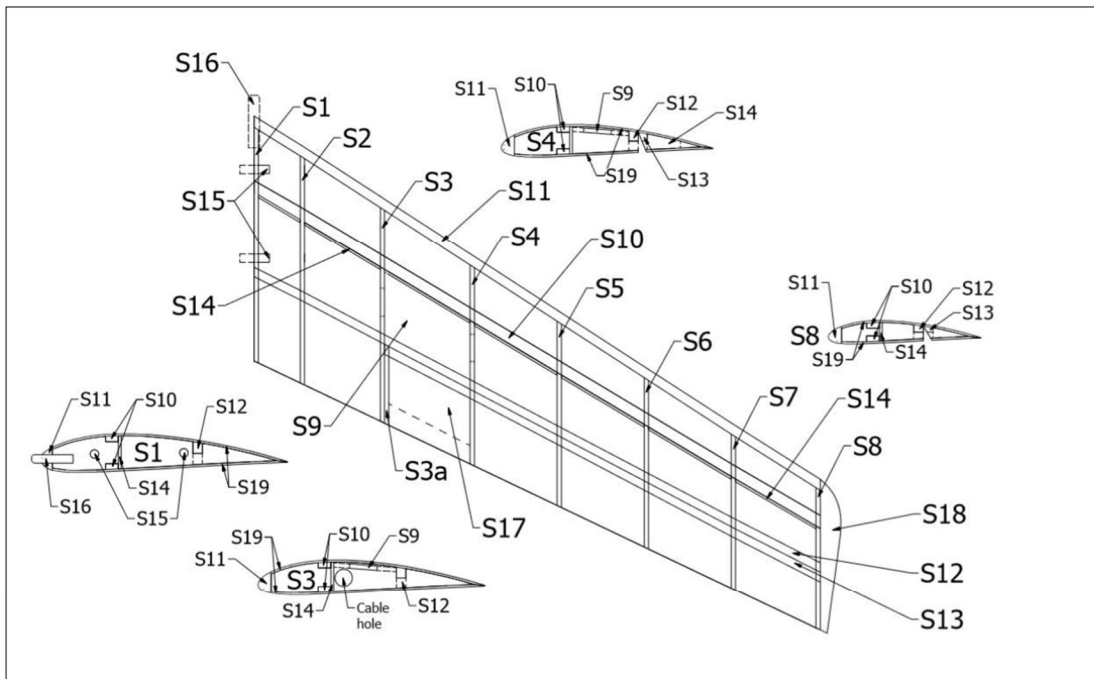






My next task was to remove all the parts required to assemble the front wing (or canards) from the Lite ply sheets, sanding the outside edges and interlocking cutouts to help make that assembly go smoothly.

## FRONT WING



In general:

The front wing will be built by using template “S”. In this template there have been made cut-outs for placement of the ribs, there for the correct angle of attack of the front wing can be guaranteed. Because the front wing has to be built in an angle of attack it is important to prepare the leading edge, main ribs and back list in an angle. They must be reworked slightly.

To correctly assure everything is nicely glued together and filled in the gaps it is advised to work with a good quality PU-glue.

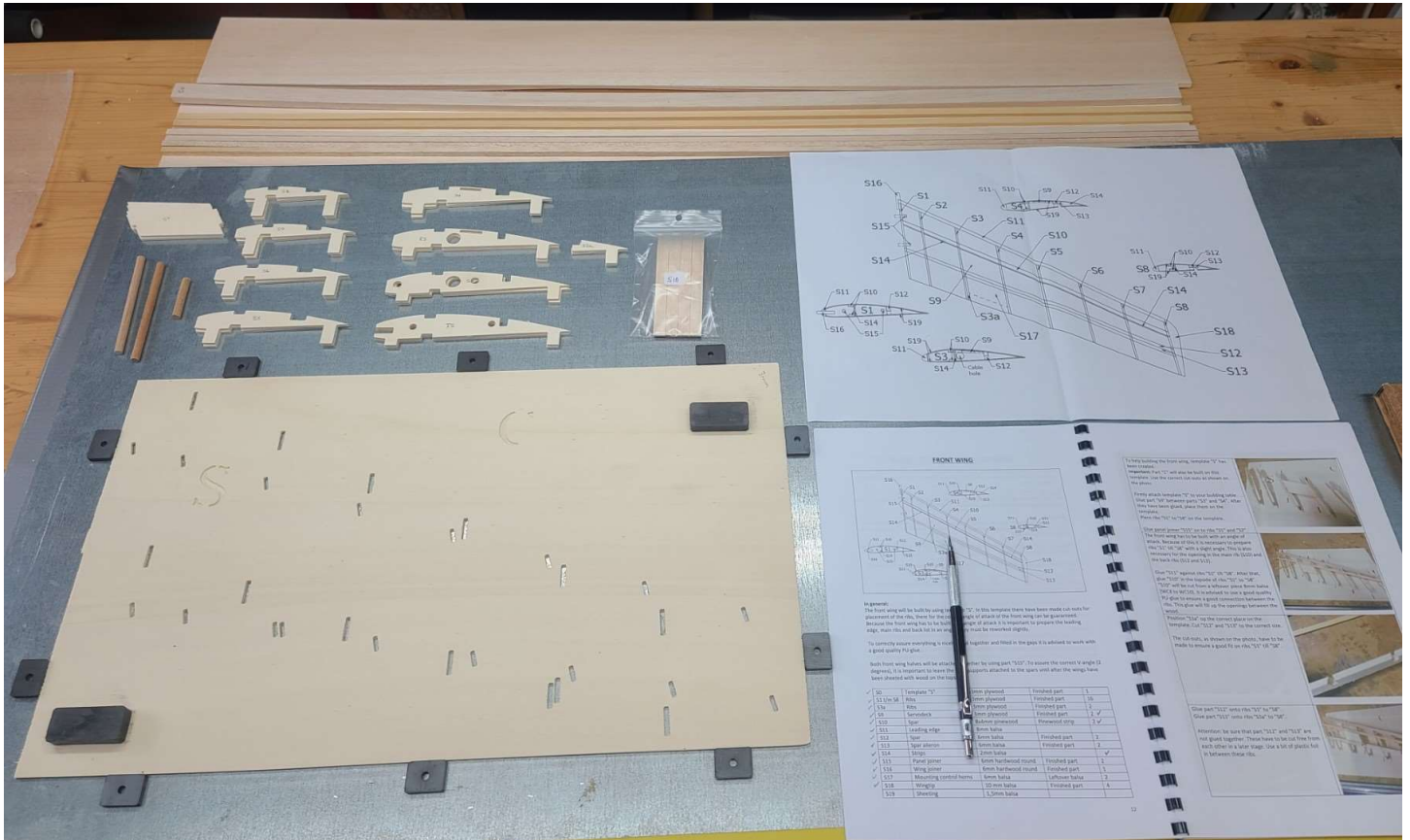
Both front wing halves will be attached together by using part “S15”. To assure the correct V-angle (2 degrees), it is important to leave the build supports attached to the spars until after the wings have been sheeted with wood on the topside.

S0	Template “S”	3mm plywood	Finished part	1
S1 t/m S8	Ribs	3mm plywood	Finished part	16
S3a	Ribs	3mm plywood	Finished part	2
S9	Servodeck	3mm plywood	Finished part	2
S10	Spar	8x4mm pinewood	Pinewood strip	2
S11	Leading edge	8mm balsa		
S12	Spar	6mm balsa	Finished part	2
S13	Spar aileron	6mm balsa	Finished part	2
S14	Strips	2mm balsa		
S15	Panel joiner	6mm hardwood round	Finished part	2
S16	Wing joiner	6mm hardwood round	Finished part	1
S17	Mounting control horns	6mm balsa	Leftover balsa	2
S18	Wingtip	10 mm balsa	Finished part	4
S19	Sheeting	1,5mm balsa		



Below you can see all the finished parts and other materials needed to assemble the front wing (canards), including the plywood template "S". I used a Dremel tool with a small fine saw blade to remove the various pieces from the Lite ply sheets.

**Two Builders Notes** – 1) Ribs S2 did not have holes to accept the S15 panel joiner 6mm hardwood dowels. Determine the correct location for these holes and drill them in both S2 ribs prior to starting the front wing build. 2) Use a S9 servo deck part to make a paper template (minus the two side tabs) for the elevator servo hatch covers needed later in the build.



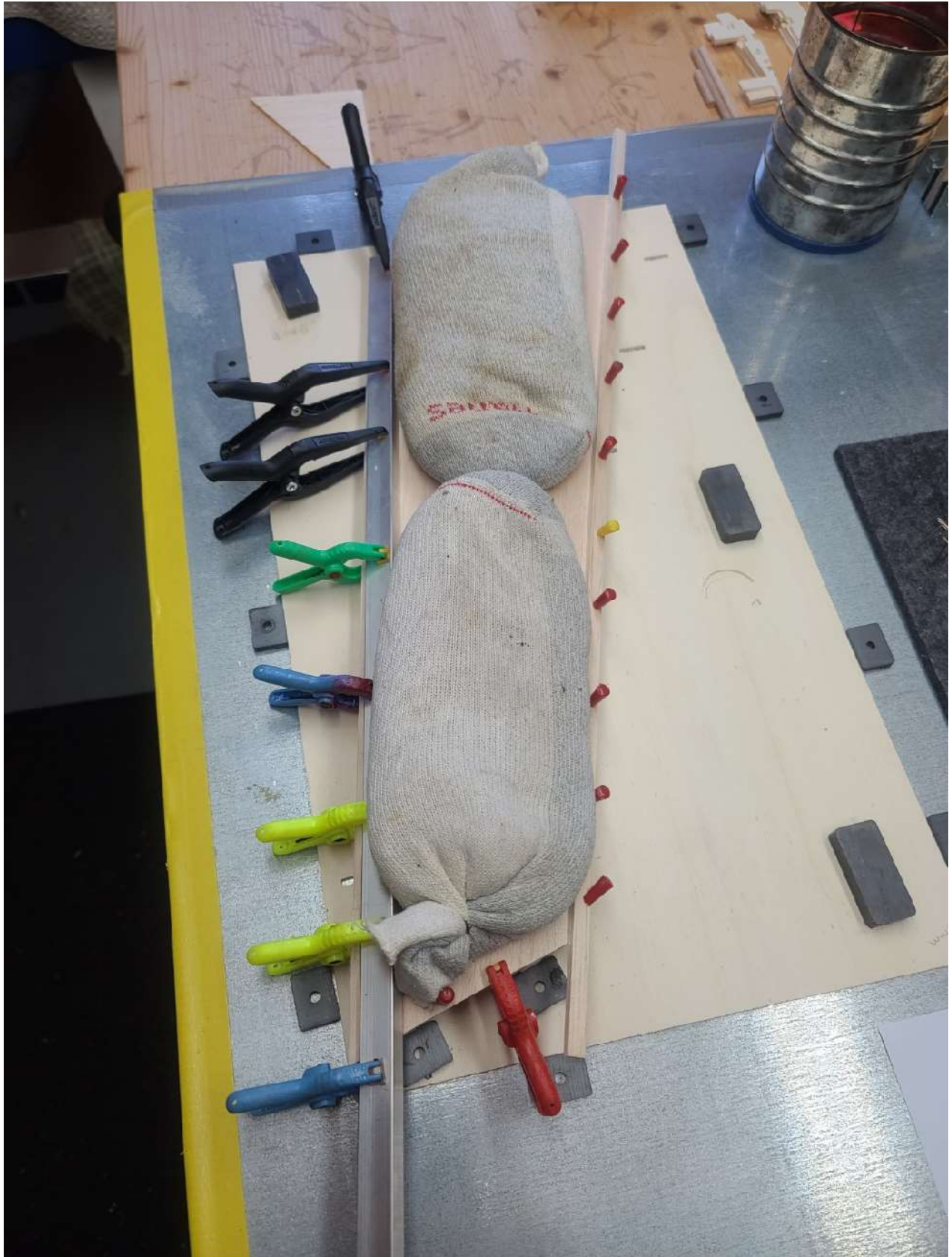
This next image shows the start of the right canard build. Magnets are used to keep all the ribs in place and perpendicular to the ply template. I use Titebond III Ultimate wood glue for all the joints, and after parts have been initially glued in place, I go back and put a small bead of glue along all joints using the syringe you can see in the image. Once the glue had dried, I removed some magnets to allow for the installation of another S10 pinewood main spar along the bottom of the eight ribs. I also glued two 1.5mm balsa sheets together (edge-to-edge) to sheet the tops of each canard.

**Builders Note** – In order to get the top cover sheets for both canards out of these two 1.5mm balsa sheets, you need to stagger the ends of the sheets by 63.5mm, otherwise you cannot get the lengths needed to cover both canards.





After a complete sanding of the canard to the final top airfoil profile of the ribs, the 1.5mm balsa sheeting was applied. The image below shows the gluing of this top balsa sheeting on the right canard. I use old socks filled with lead shot to apply weight evenly over the surface while the glue dries. These work great!

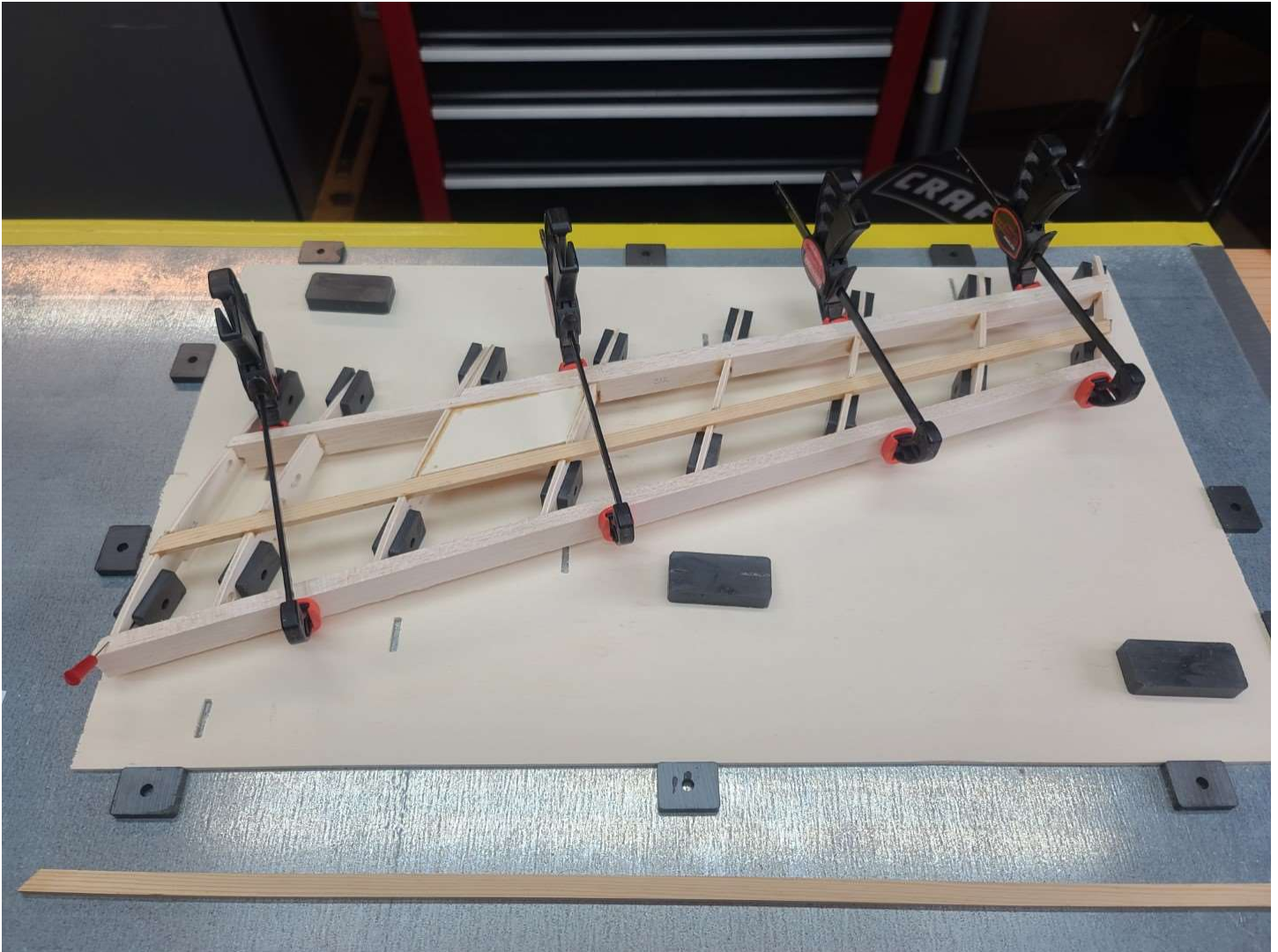




The image below is the right canard removed from the plywood build template "S". You can see the 2mm vertical grain balsa shear webbing has been cut and installed along the aft side of the main spars. I temporarily set the elevator servo in place for a fit-check, only to find that it is too thick to allow for proper fitting of a 2mm ply hatch cover. Looks like we will need to see about getting a couple thin wing servos.

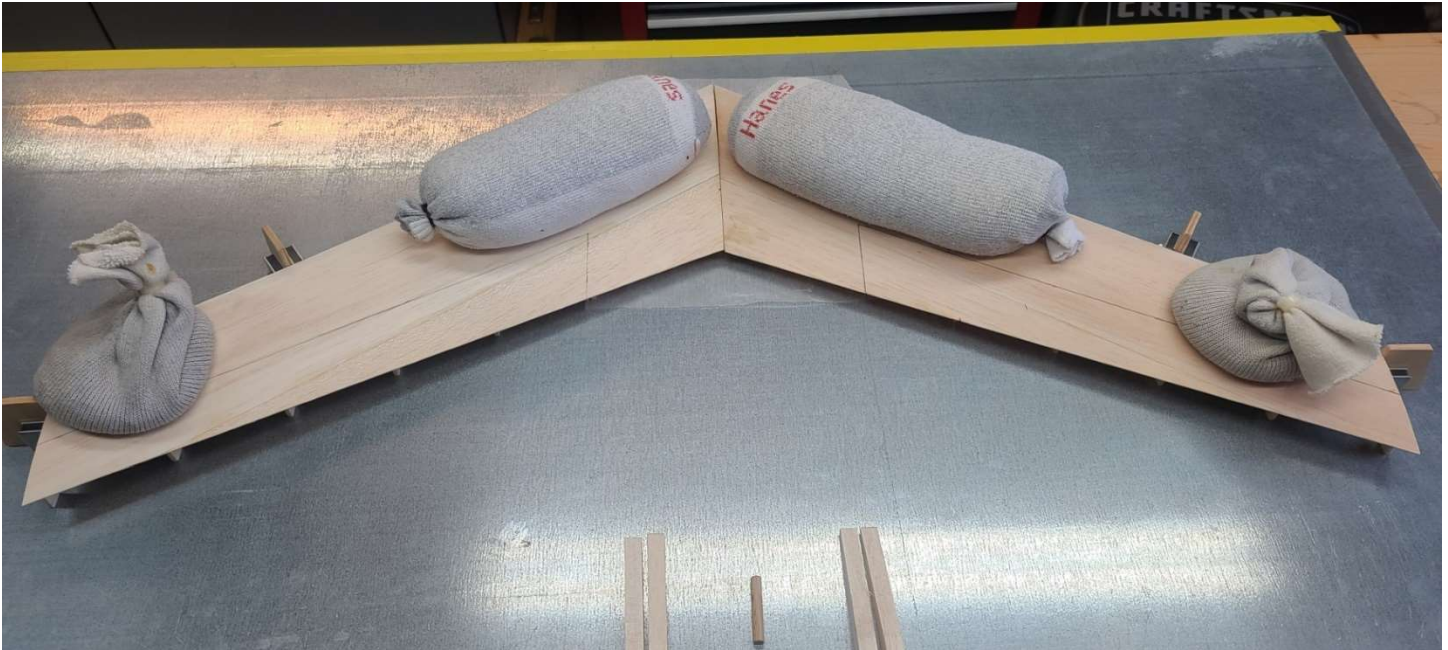


After flipping the plywood template “S” over, I started the build of the left canard. The image below shows that build in progress. Those mini bar clamps are one of the best purchases I have ever made. Over the many years, I’ve used them on all my scratch builds. I just wish Craftsman was still making them. I jointed two more 1.5mm balsa sheets and then cut out the top and bottom sheeting for the left canard.



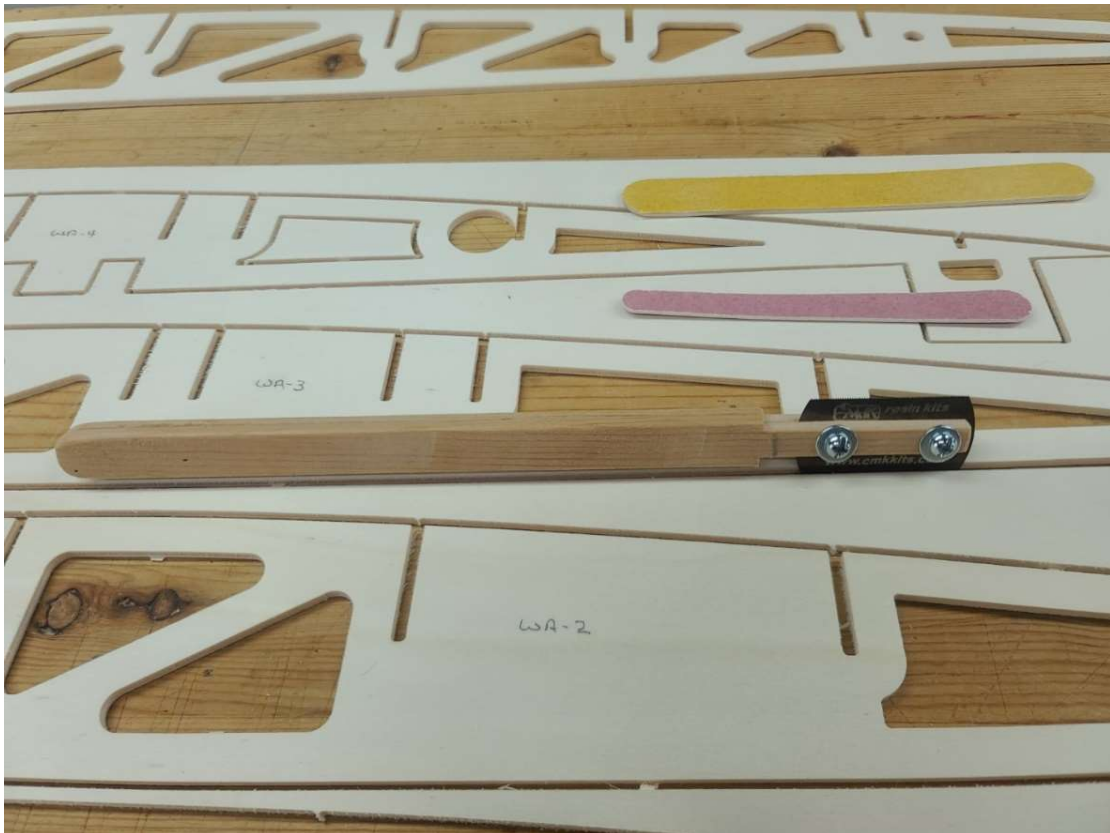


This next image is the canard wing in what we use to call in the C-17 program “a major join”. After inserting the two S15 6mm hardwood dowels into ribs S1 and S2, the two front wing halves are joined together using 30-minute epoxy, and to ensure all the rib tabs remain in contact with the building board during the cure, I once again use my trusty sock weights.

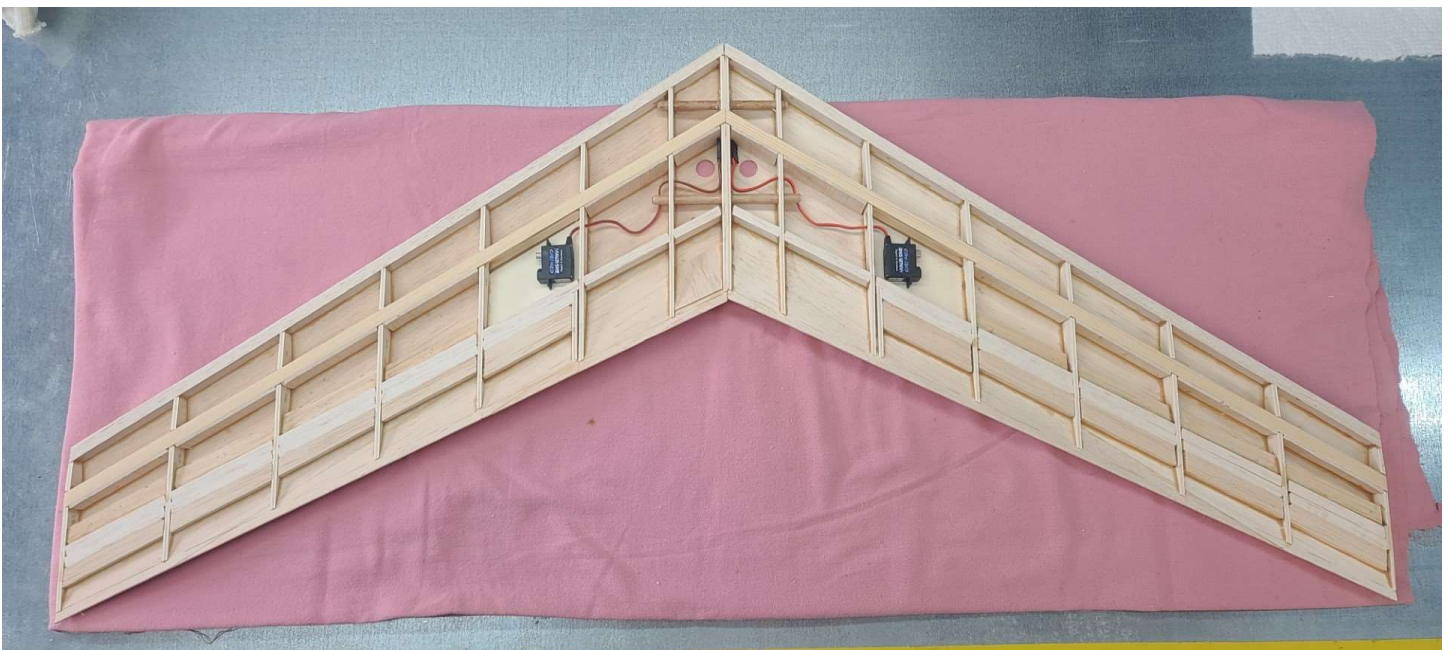


While the canards were in-join, I decided to start the prep for the build of the Main Wing Part A by removing all the required pre-cut parts from the Lite plywood sheets. The image below shows a nifty little tool I made to cut the small ply tabs holding each of the parts in the sheets. This is a very sharp and very thin razor saw blade sold by Micro-Mark Tools @ <https://www.micromark.com/mini-hand-tools/knives-and-cutters?page=4&mini-hand-tools%25252Fknives-and-cutters=>. After each part is removed from the larger Lite ply sheet, I take the large tongue depressor sanding bar covered with 100 grit sandpaper to clean up the outside edges of each part, and the small fingernail file to clean out each of the interlocking notches.





Once the canard epoxy has completely cured, you can remove all the rib tabs; install balsa fillers between the ribs for the elevator control horn and the four hinges; cut the holes in the top sheeting to run the elevator servo leads; plane the leading edge; and then sand everything until you get a nice flat surface across the entire front wing that matches the rib profiles. You can see all this completed in the image below, along with the two elevator servos that will be mounted on the servo bay hatches. They are Blue Bird BMS-127WV+ servos from <https://www.bluebirdservousa.com/product-page/bms-127wv/> and these little things give us a torque of 4.7 kg-cm / 65.3 oz-in at 7.4 volts. Next, I will run some temporary cord from the servo bays out thru the top surface holes, and then sheet the entire bottom side of the front wing using the two 1.5mm balsa sheets I cut earlier.



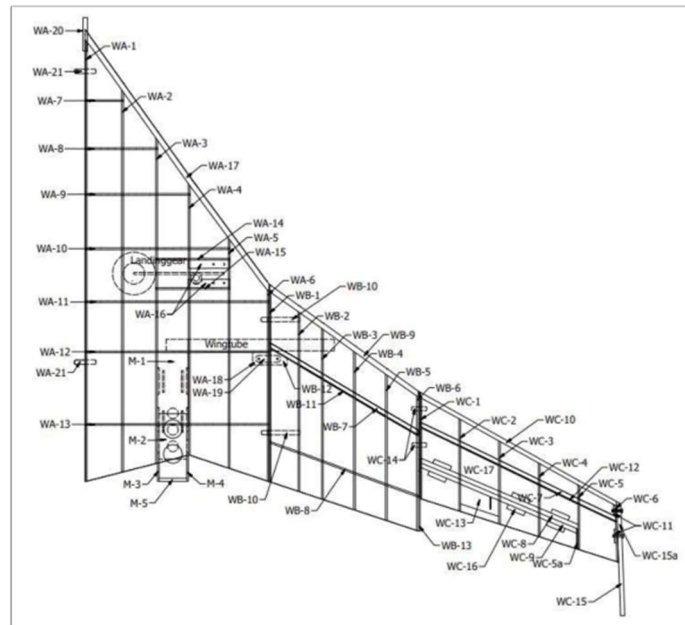
With the front wing bottom side sheeting installed, the S18 soft balsa wingtips are attached and sanded to match the S8 rib/elevator profile. The leading edge is then planed and sanded to the final shape; elevators are cut-out from the front wing and their leading edges beveled to provide clearance for deflection; elevator servo bay openings are cut-out; and the S16 nose 6mm hardwood dowel gets installed. The results of all this are shown in the image below which is the bottom side of the front wing.



This completes the front wing build for now, so let's see about building the Main Wing.

The first task in the build of Main Wing Part A (or inboard-wing panel) is to remove all the finished parts required for assembly from the Lite ply sheets, sanding the outside edges and interlocking cutouts to help make the assembly go smoothly. The bottom image shows all the parts needed for both inboard-wing panels.

MAIN WING.



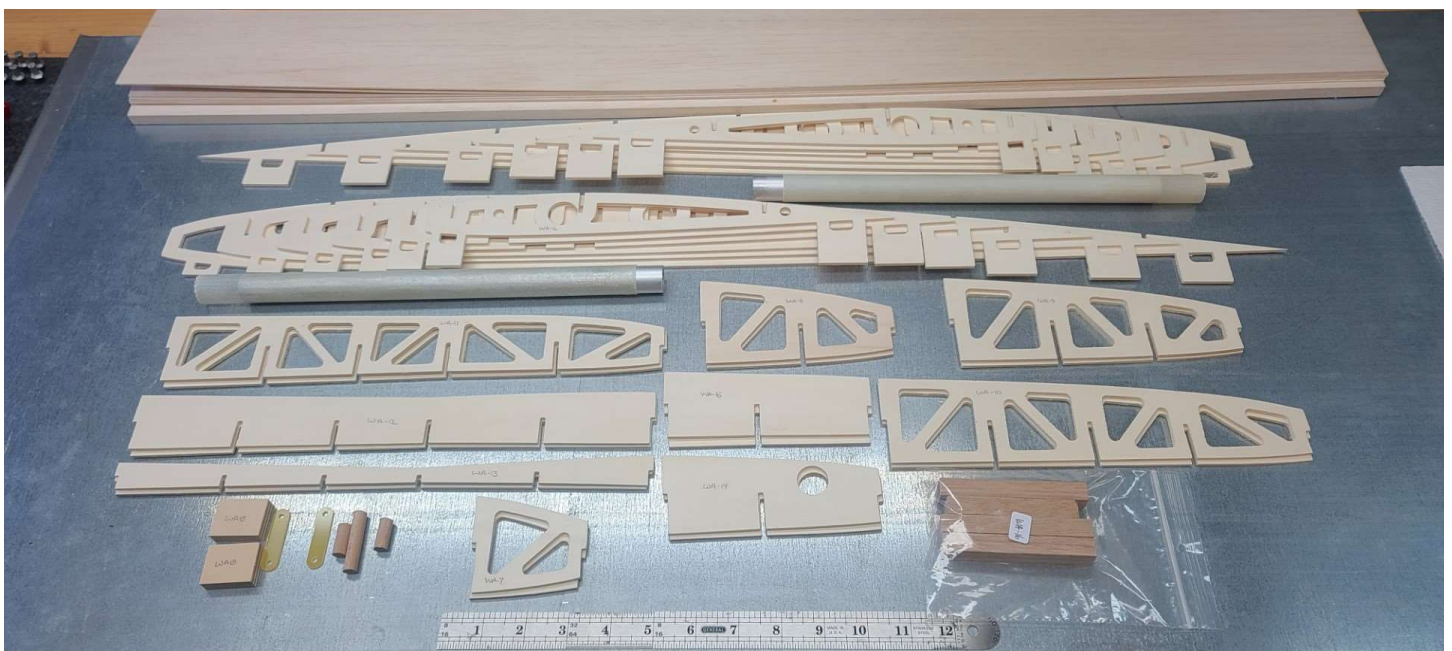
In general:

The main wing consists of 3 parts: A, B and C.

Part A will be glued in the fuselage. Part B and C will be glued together. Note that part B/C will be connected to part A with a wingtube.

To assist in the build of part B and C there is a template supplied in the kit. The ribs for part A are constructed in a way there will be no need for a template.

Part C has a negative angle of 1,5° relative to part B. Because of this negative angle the topside of the wing will be aligned with the topside of part B. This is needed to provide enough lift to the airplane during flight. If not, the airplane will not have enough lift and will dive to the ground. To increase the stability, part C has a washout of 1,5° negative to part B. It is also to be noted that the most outer rib of the wing is placed under an angle of 2° to the inside. It is also placed that the tip has an angle of 6°.



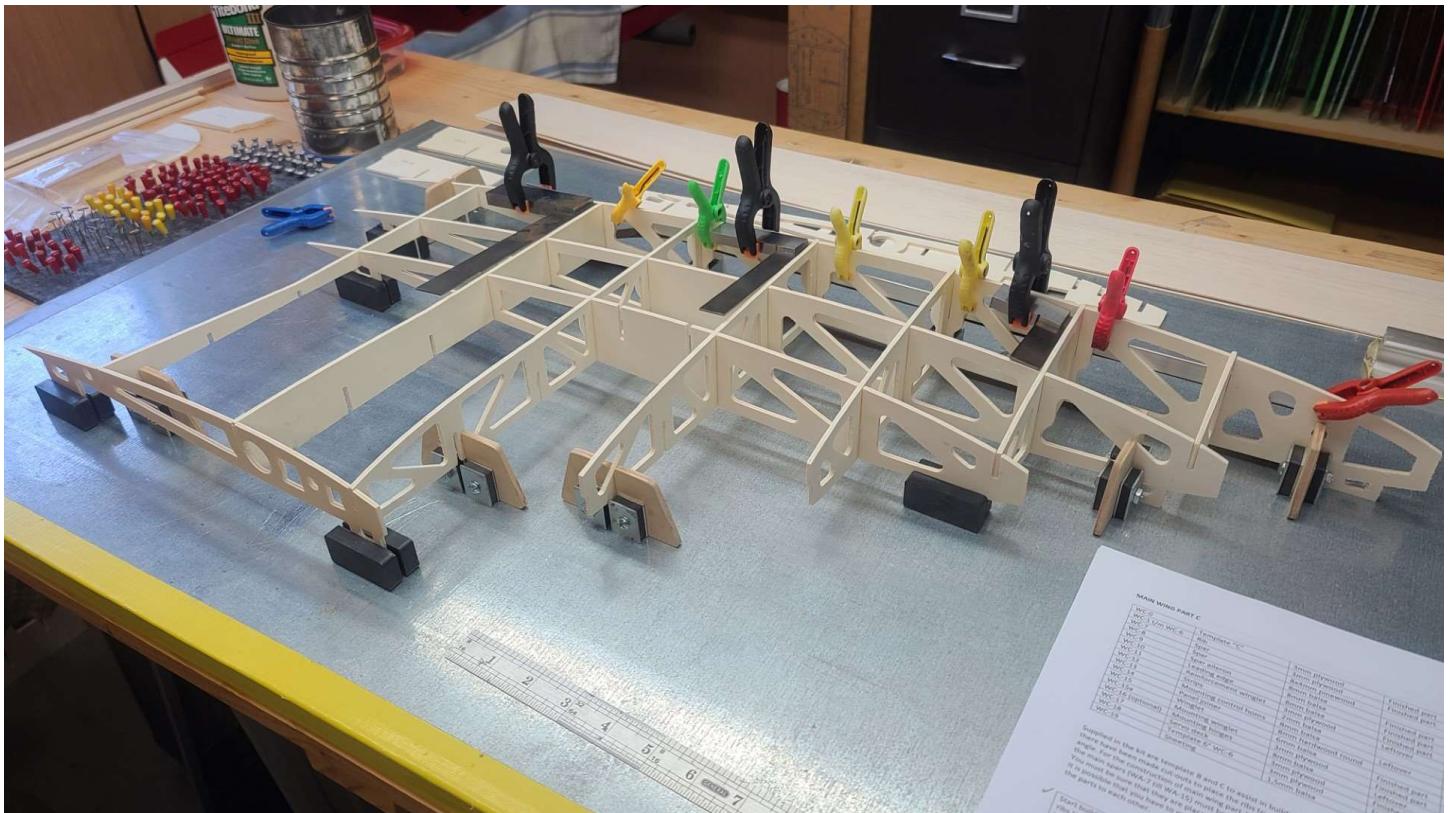


**Builders Note** – If you plan to install the WA-20 8mm hardwood dowel in the nose of the Main Wing, now would be the time to cut 8mm notches in both WA-1 ribs for the dowel to fit into.

In this next image you can see my magnetic board jig set-up and a dry-run test fit of ribs WA-1 through WA-3, and main spars WA-7 through WA-13. Various magnetic fixtures are used to hold the ribs perpendicular to the building board, and to ensure each of the seven spars are positioned 90 degrees to rib WA-1. This AMTN kit is awesome. The Lite ply parts fit together like no other kit I have ever built. With the jig and test-fit verified, each main spar can be lifted out, one at a time, to apply the Titebond III wood glue to each joint, and then set back down into the ribs. Just as I did in the assembly of the front wing, I take my glue syringe and put a small bead of glue along all the interlocking rib/spar joints, and there are a lot of them.

**Builders Note** – I clamp a small aluminum “L” bar along the length of rib WA-1 to ensure it is kept straight during the panel assembly.

Once WA-7 through WA-13 are all glued in place, this partial assembly is allowed to set overnight before I proceed any further.

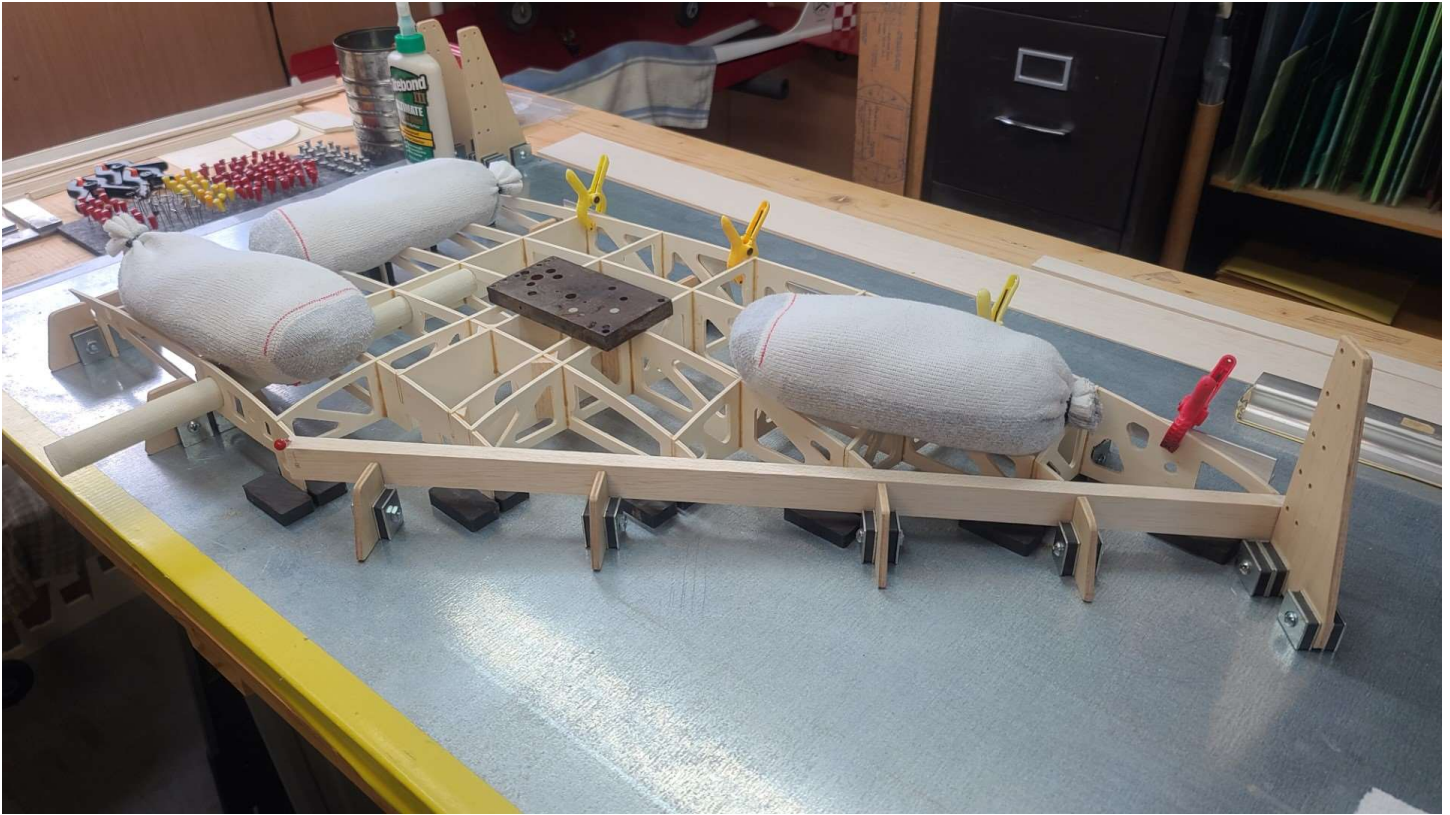


Next, this partial assembly of the right inboard-wing panel is temporarily removed from the mag fixture jig and flipped over so ribs WA-4 thru WA-6 can be glued into the wing spars WA-9 through WA-13. With these three outer ribs initially glued in place, flip the panel back over and reinserted it into the mag fixture jig. Place some more mag fixtures along the outer three ribs to ensure they are held in their correct positions while the glue dries. Now glue spars WA-14 and WA-15 into the interlocking slots of ribs WA-3 through WA-5. This forms the bay for the main landing gear (MLG) retract. Again, I used my sock weights to keep all ribs resting on their support tabs.

**Three Builders Notes** – 1) This is a good time to verify the fit of the fiberglass wing-tube sleeve through ribs WA-4 thru WA-6. 2) To help strengthen the MLG bay, I glued some 10mm balsa triangle stock in the outside corners of the rib/spar joints. 3) Finally, it is critical that ribs WA-1 and WA-6 are perpendicular to the building

board surface. This is to ensure a good matting of the inboard-wing panels to the mid-wing panels, and the join of the two inboard-wing panels.

Now I cut-out the WA-17 leading edge of this panel from a 10mm balsa sheet and glued it to ribs WA-1 through WA-6. Make sure you grind an angle to the ribs leading edge to improve the glue joint between the WA-17 leading edge and six ribs. The image below shows the right inboard-wing panel at this stage of the build.





After going through all the same steps again to build the left inboard-wing panel, I pulled that panel from the mag jig and as you can see in the image below, we now have both panels needed for the Main Wing inboard section. Next up is to start the build of a Main Wing mid-wing panel.

