My Balsa & Glass Workshop

Miss Vintage Build Description

Updated as of 16 July 2025

While working on the coding for the April 2024 edition to my "Build of the Month Series," I found the model selection so interesting that I decided to make it another scratch build project.

Quote[1]: "Miss Vintage, designed around .25 to .35 size engines, George Jennings vintage type aircraft will help you capture the yesteryear of aviation...a time when aviation was in its infancy before the airplane went to war. What romance those early machines must have wrought with flying wires singing, empennage vibrating and the smell of hot engine exhaust permeating the nostrils. Yes, that was really flying! Imagine what it must have been like to fly with no airspeed indicator, engine monitoring devices, or other modern-day instrumentation. Just a stick, rudder bar, throttle, deafening roar, and the sting of the wind in the face were all the pilot had to keep him company.

Those days are gone forever, and we can only thrill with the written accounts of those aerial pioneers or reconstruct such bold and daring ventures in our own daydreams. Unless we fly RC! Through the medium of RC, we can re-create such an exciting era. Miss Vintage will help you capture that feeling, that romance, that *return flight to nostalgia*. Miss Vintage is a thoroughly tested and practical machine. Designed around the economical .25 to .35 sized RC engines, it duplicates the looks, slow, deliberate, flight characteristics and realism of an old-timer. It is completely reliable, easy to fly and designed to look complicated and yet be quick and economical to construct.

Wing construction is a snap with a high lift flat bottom airfoil for easy building on a flat surface. Half ribs and diagonal braces are used for strength as well as looks. They require very little time to install and, as a plus, you don't have to sheet the leading edge of the wing. Ailerons are of the simple and effective strip type, making the choice of three or four channels an easy one for the builder. Little extra effort is required to add ailerons. The fuselage is constructed almost entirely of hardwood. Fuselage sides are cut from 1/8th Lite Ply and are as light as balsa with far greater strength. The open framework is built from 3/16th square spruce which is also very light and strong. The only balsa contained in the fuselage is one bulkhead and the top block. The main advantage to this type of structure, in addition to its ruggedness, is economy! The tail surfaces are primarily constructed of laminated spruce and provide protection from warping and, again, are economical to build as well as rugged and light. Finished with see-through covering, Miss Vintage is a real showstopper guaranteed to attract attention from fellow RC'ers and spectators alike.

Flying capabilities are extremely good. Miss Vintage is capable of many aerobatics including inverted flight and yet is very gentle and easy to fly. Because of the easy take-off and landing characteristics, Miss Vintage could be used

as a trainer and first airplane. If you have built at least one RC plane and understand basic construction techniques, you can build Miss Vintage – so let us get started!" **[1]: Miss Vintage 1976 RCM article.**

Miss Vintage Model Specifications:

Model Type: RC Sport Old Timer

Wingspan: 59 inches

Total Wing Area: 600 square inches

Wing Chord: 11.25 inches

Airfoil: Flat Bottom

Wing Location: Shoulder Wing

Fuselage Length: 35 inches

Stabilizer Span: 18 inches

Stabilizer Area: 130 square inches

Number of Channels: 4 – ailerons, elevator, rudder and throttle

Weight: approx. 4 - 4.5 lbs. depending on the power system used

Glow Fuel Engines: .25 - .35 2-cycle

Electric Powered: Output of 500 - 700 Watts, 60 amp ESC, 3 or 4-Cell 45C LiPo pack of around 4,000mah.

My Miss Vintage was built using a great set of Radio Control Modeler (RCM) plans (Figure 1) and an RCM article which you can download for free from Aerofred.com @: https://aerofred.com/details.php?image_id=96793, and/or Outerzone.co.uk @: https://outerzone.co.uk/plan_details.asp?ID=4746. Both sites are a GREAT source for free RC model plans.

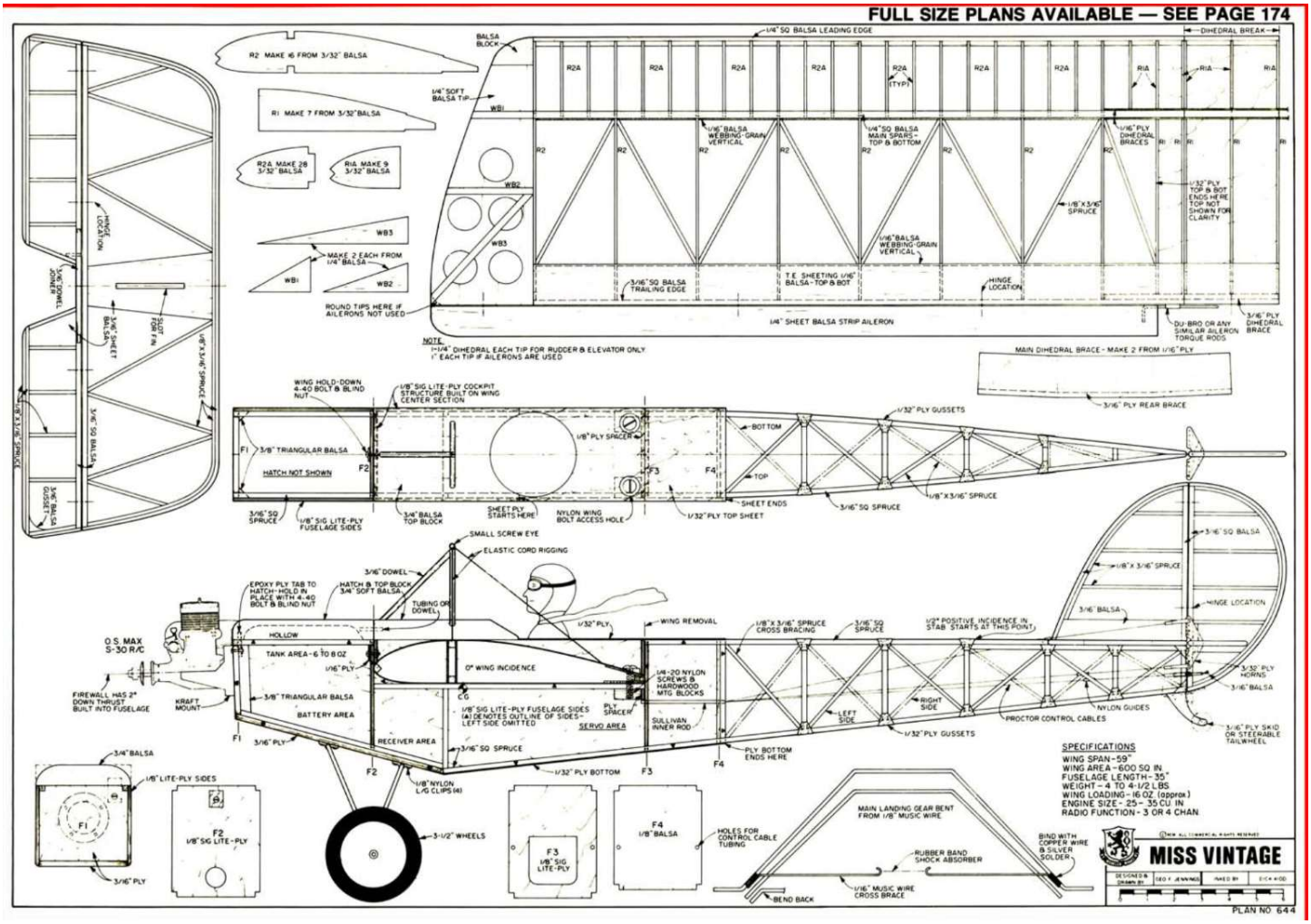

Figure 1 - Miss Vintage Plan Sheet

Image Source: An extract from the Miss Vintage 1976 RCM article.

As with all my scratch builds, my first task is to print out the full-size plans using my Canon TS9120, and then I put all the pages together resulting in a full-size set of plans. As seen in Figure 1 above, the RCM plan only has the left wing. To get the right wing I used an ***AWESOME graphics program called GIMP*** (https://www.gimp.org/) to flip the .pdf file over and then cropped the resulting file for the right wing. A list of the required materials is contained in the RCM article that you can download from the Outerzone webpage. Any balsa, basswood, and lite plywood that I did not have in my back stock was ordered from Balsa USA. I picked up the hardware, servos, fuel tank, etc. from my local hobby shop, Anderson RC. I will use an old O.S. .35 SX 2-stroke that I had sitting on the shelf for power. She will be covered using blue transparent Ultracoat film so all the work I put into the wings and tail feathers can be seen. I also think the open fuselage structure with wire pull-pull control cables is cool.

Miss Vintage Materials and Hardware List

Amount	Description	Use
Balsa		
9	3/32" x 2" x 36" med. balsa sheet	wing ribs
1	¼" x 4" x 36" soft balsa sheet	wing tips, braces
1	¼" x 1-1/4" x 36" Aileron/Elevator Stock	ailerons
3	1/16" x 3" x 36" med. balsa sheet	wing trailing edge sheet, vertical grain webbing
1	3/16" x 2" x 36" med. balsa sheet	tail surfaces
1	¾" x 4" x 12" soft balsa sheet	fuselage top block
2	¼" x ¼" x 36" med. balsa sticks	leading edge
4	1/16" x 3/16" x 36" balsa strips	tail feathers curved outer profiles
4	3/16" x 3/16" x 36" med. balsa sticks	rear spars, tail surfaces
1	1/8" x 4" x 4" scrap balsa sheet	F-4
1	3/8" x 36" triangular balsa stock	firewall backup brace
Basswood		
4	¼" x ¼" x 36" basswood sticks	top and bottom main spars
8	3/16" x 3/16" x 36" basswood sticks	fuselage longerons, and cross members
13	1/8" x 3/16" x 36" basswood sticks	diagonal braces, tail surfaces
Plywood		
1	1/8" x 12" x 24" 24" Poplar Lite Plywood	fuselage sides, cockpit structure, F-2, F-3
1	1/32" x 12" x 24" Birch plywood	wing center section, fuselage sheeting gussets
1	1/16" x 6" x 12" Birch plywood	main spars dihedral braces
1	3/16" x 6" x 12" Birch plywood	fuselage firewall, bottom, rear dihedral brace
1	3/32" scrap Birch plywood	rudder/elevator control horns, aileron hatch covers
2	3/8" scrap Birch plywood	wing hold-down blocks
1	1/64th scrap Birch plywood	strengthen elevator/rudder control horn areas
Flight Control System		
1	Spektrum RC AR400 4-Channel 2.4GHz DSMX receiver	
5	Hitec HS-225BB 27.7g Cored Nylon Gear 24T Analog Mini Servos	
1	6-volt 5-cell 2,000mAh NiMH receiver battery pack	
1	"Y" harness	aileron servo leads
1	6" servo extension lead	receiver aileron channel lead to "Y" harness
1	receiver power/battery charging switch harness	
Glow Fuel Power System		
1	.25 to .35 2-stroke RC engine & mount	
1	6-8 oz. Sullivan Flex-Tank slant style	
1 set	Du-Bro #892 Medium Silicone Tubing	engine fuel/air lines
1	10x6 wooden prop	
Miscellaneous Items		
8	¼" thick small hardwood corner blocks	wing and tail wire rigging attachment points
1	3/16" x 36" hardwood dowel	wing flying wires tripod on top of fuselage
1	1/8" x 36" music wire	main landing gear

4	1/8" wheel collars	main landing gear wheels
1 set	3.5" to 4" main wheels	
1	1/16" x 36" music wire	main landing gear cross brace
1	1-2" small metal spring	main landing gear cross brace shock absorber
1	soft copper wire and 50/50 solder	main landing gear assembly
1	brass flat stock	fabrication of flying wires mounting fixtures
1	Du-Bro #517 2-56 Pull-Pull System	wire control cables/connectors for the rudder/elevator
1	Sullivan Gold-N-Cable #508 Control Rod Set	throttle control cable
1	Du-Bro #121 E/Z Connectors	throttle cable connections
12	Du-Bro #116 Standard Nylon Hinges	hinging of rudder, elevator, and ailerons
2	Du-Bro #237 T-style Nylon Control Horns	aileron rigging
26	Du-Bro #600 2-56 Spring Steel Kwik-Link Clevises	aileron, flying wires, and pull-pull cables rigging
2	Du-Bro #855 E/Z Links	aileron rigging
2	6" 2-56 control rods	aileron rigging
1 pack	Aanraku Stained Glass black covered hanging line and crimps	flying wires
24	Du-Bro #201 2-56 Rigging Couplers	connect flying wires and pull-pull cables to clevises
24	2-56 nuts	connect flying wires and pull-pull cables to clevises
8	Du-Bro #895 Crimps	connect pull-pull cables to clevises
1	Du-Bro #375 steerable tail wheel assembly	steerable tail wheel bracket
1	Du-Bro #75TW ¾" tail wheel	tail wheel
3	1/16" wheel collars	tail wheel mounting
6	Du-Bro #135 4-40 blind nuts & bolts	engine mounting and wing hold-down
2	¼" x 20 nylon wing bolts	wing hold downs
2	¼" x 20 brass threaded inserts	wing hold-down blocks
4	Du-Bro #238 1/8" Nylon Landing Gear Clips	attach landing gear to fuselage
1	8" scrap of Sullivan inner Gold-N-Rod	wire control cable guides thru F3 and F4
1	pilot figure of your choice	
10	#2 x 5/16" button head screws	attach wing flying wire fixtures
8	#1 x 3/8" pan head screws	aileron hatch covers
1 bottle	Titebond Ultimate III wood glue	
1 set	15-minute epoxy	
1 can	Krylon Matt Finish Clear Lacquer spray paint	used on fuselage open truss structure
1 jar	Flat Black Enamel	use to paint cockpit interior
1 can	Coverite Balsarite or Deluxe Materials Cover-Grip	preps plywood surfaces for covering
1 roll	Flat Tan Top Flite MonoKote Covering Film	for fuselage
2 rolls	Transparent Blue Ultracoat Covering Film	for wing and tail feathers

The only modifications that I currently see needed for this scratch build will be to substitute basswood for anything that is called out in the plan requiring spruce, some lightening holes in the ribs, and I will put an aileron servo in each wing versus the single center wing aileron servo in the plan. I also plan to add full-up wing rigging top and bottom. Figure 2 on the next page shows everything that will be needed for this scratch build.

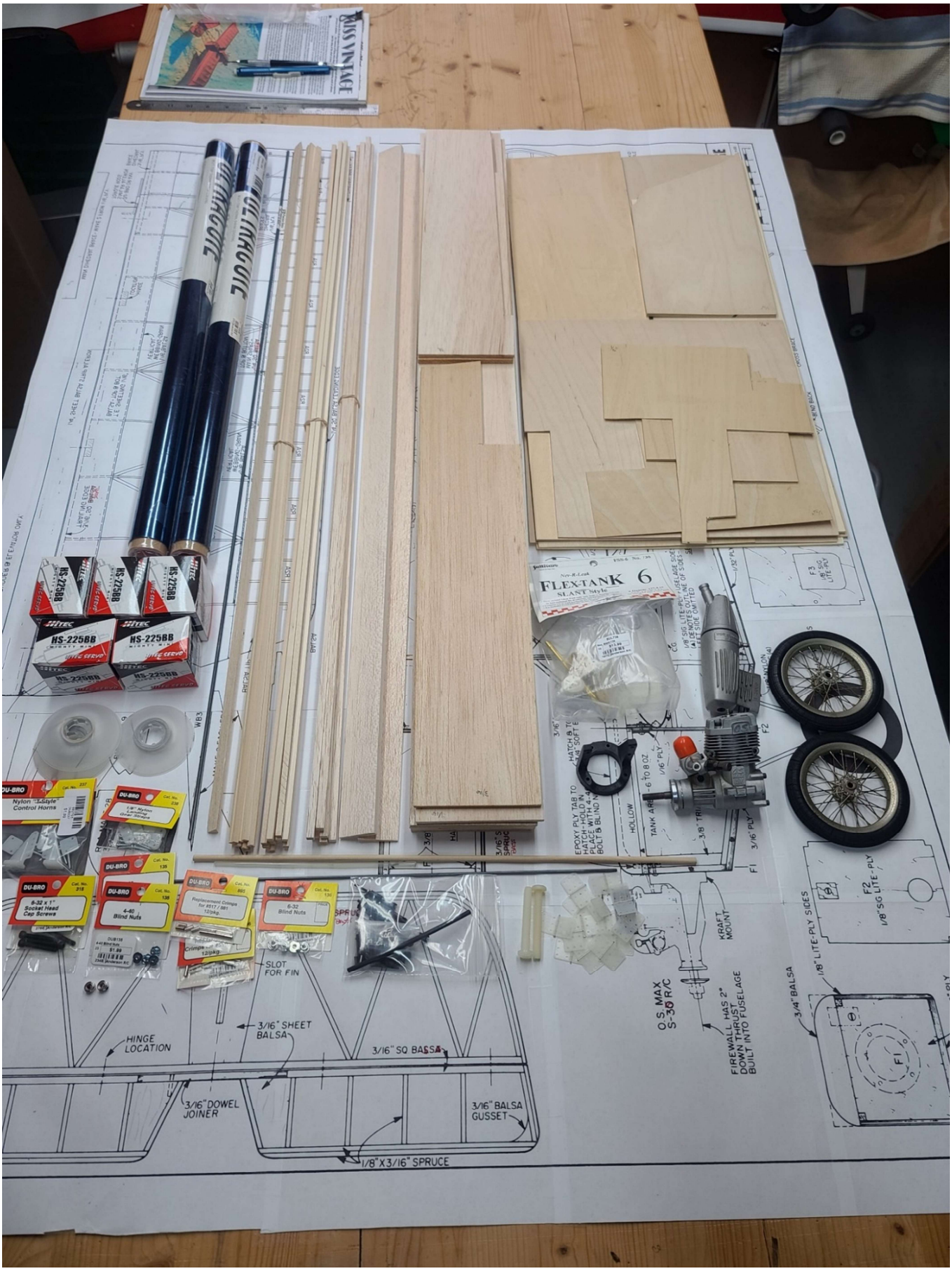

Figure 2 - Miss Vintage Material and Hardware

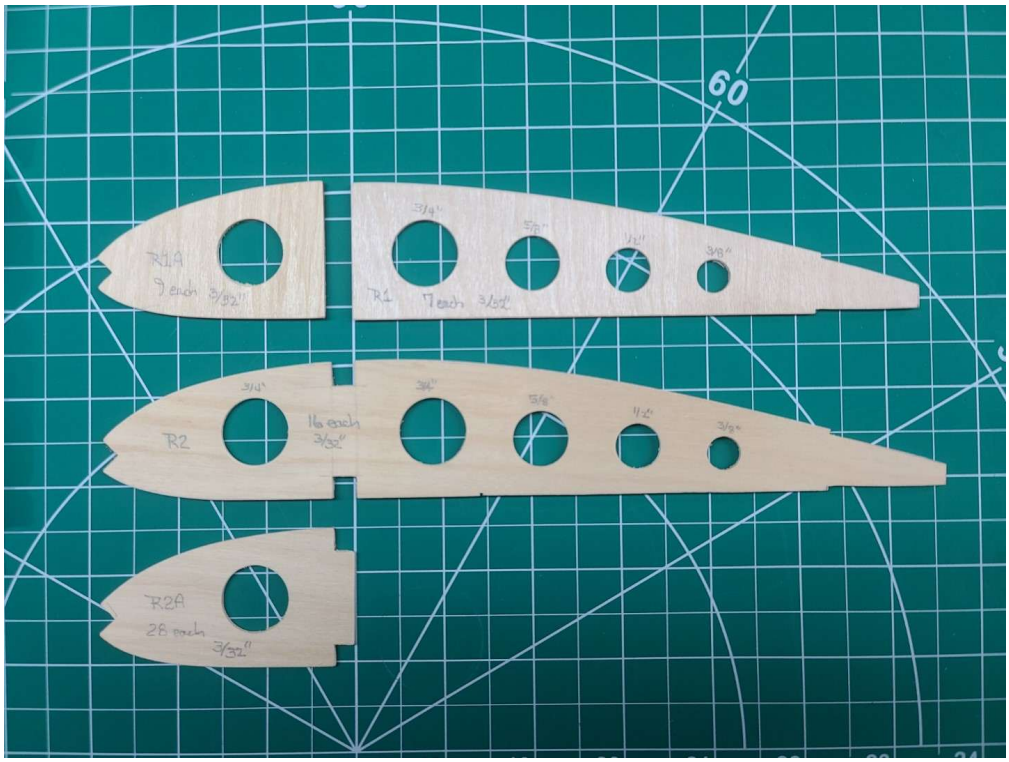

Figure 3 - Rib Profile Templates

To start this build, I took the wing rib profiles from the plan and transferred them to 1/16th plywood, which I then added some lightening holes as can be seen in Figure 3 above. Using these templates, I could quickly cut out each rib from 3/32nd balsa sheets with a couple passes of a #11 X-Acto knife along the outline of the template. Shown in Figure 4 are all the wing ribs, wingtips and support braces from ¼th balsa sheet, and the front and rear wing dihedral braces cut from plywood sheets. So, the next step is to start building the left-wing panel using my magnetic build board and fixtures.

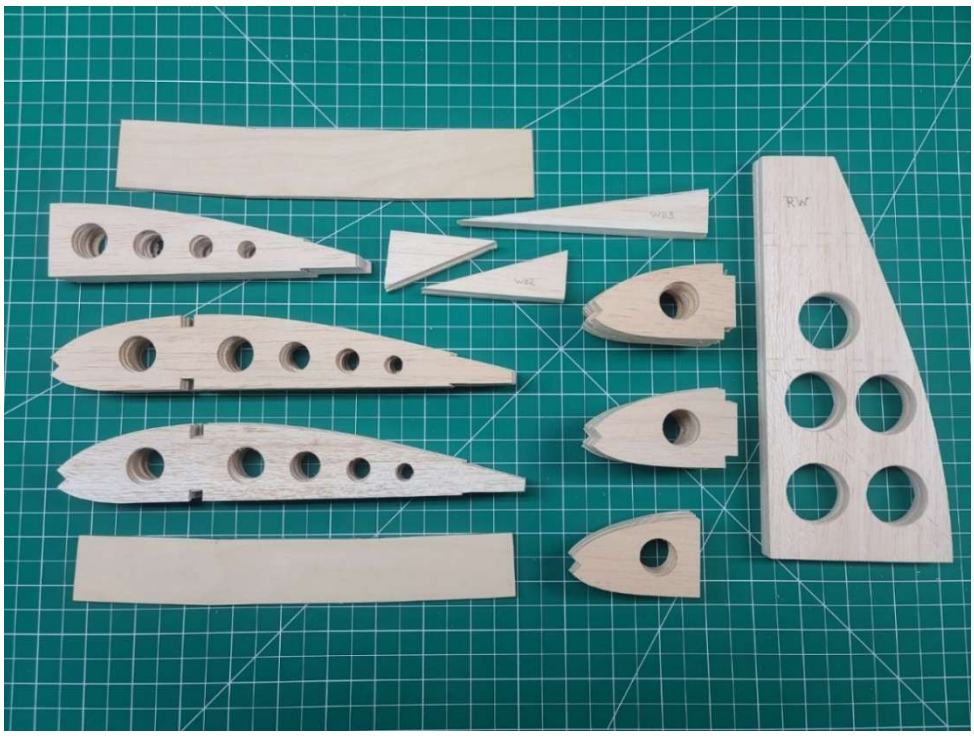

Figure 4 - Wing Ribs, Wingtips and Support Braces

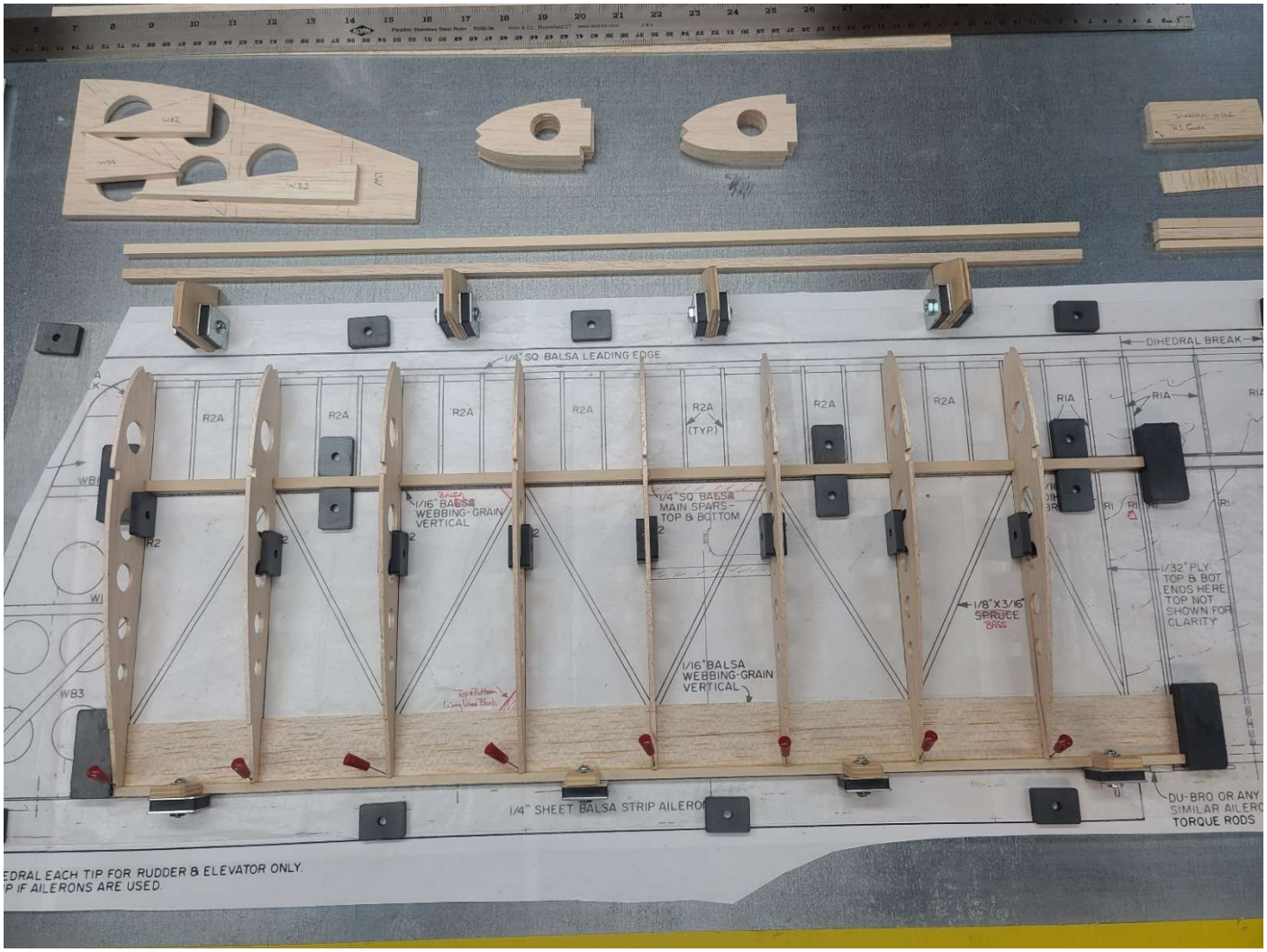

Figure 5 - Left Wing Panel Build

Figure 5 above shows the start of the left-wing panel build with the eight R2 ribs glued to the lower ¼th square basswood spar, 1/16th balsa sheet and 3/16th square balsa trailing edge. Small magnets are used to keep each R2 rib vertical and in position while the Titebond III Ultimate wood glue dries overnight. You can see where I plan to put the HS-225BB aileron servo between the 3rd and 4th R2 ribs, which will also alter the 1/8thx3/16th basswood diagonal bracing between some of the R2 ribs.

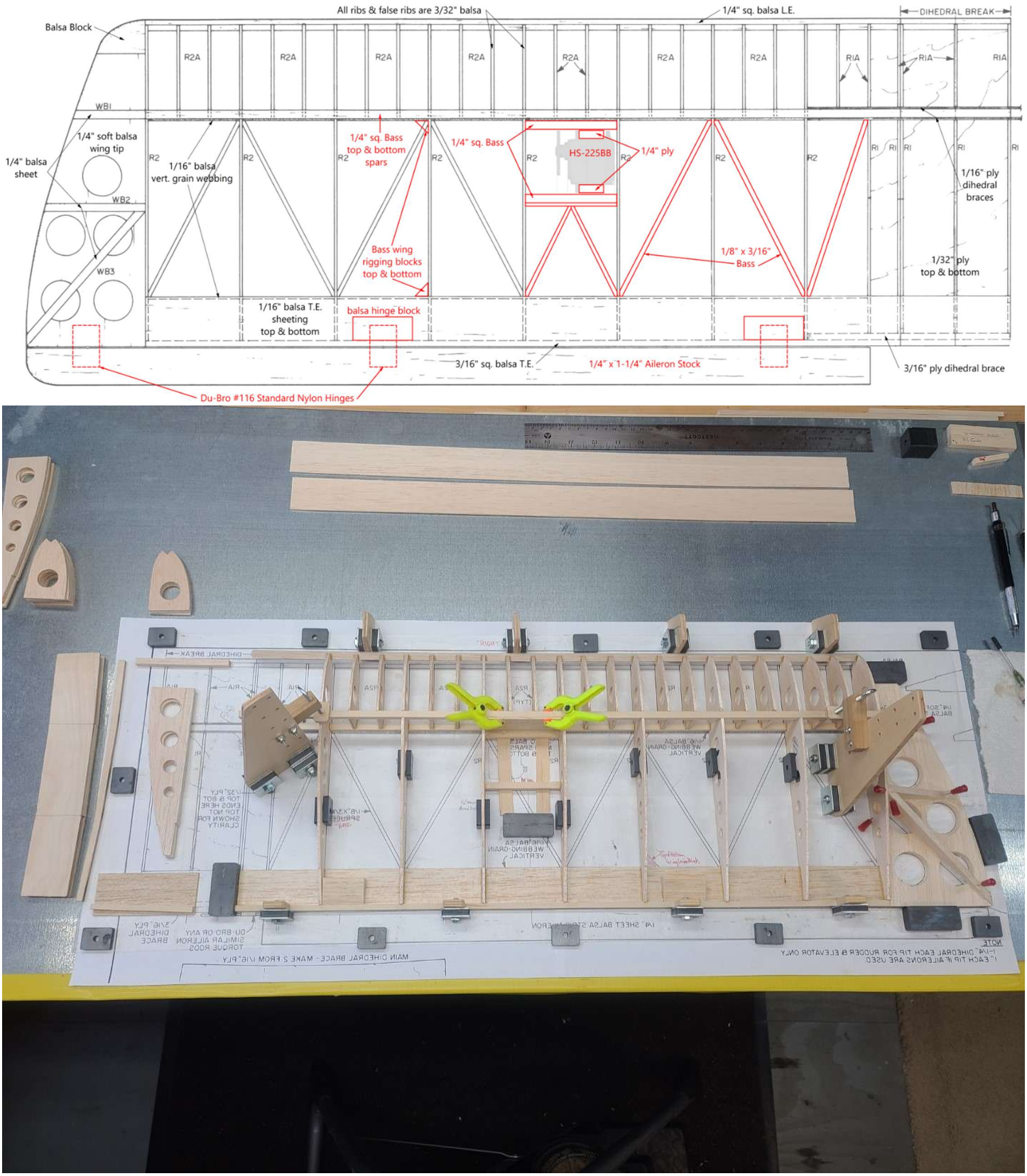

Figure 6 - Right Wing Panel Build

In Figure 6 above you see the right-wing panel build. Here all eight R2 ribs were first glued in place, followed by the ¼th square balsa leading edge and then the ¼th square basswood top spar. Then all 14 R2A ribs were glued in place along with the right wingtip and support braces. You can see the aileron hatch support bracing which is held

3/32nd above the bottom of the wing to allow for the aileron hatch thickness. I also added two balsa filler blocks between the trailing edge sheeting to provide more surface area for the aileron hinges gluing. Next up is the buildup of the wing center section using R1 and R1A ribs, main dihedral plywood bracing, and the other pieces seen at the left of the above image. This center section will be used to join the two wing panels together.

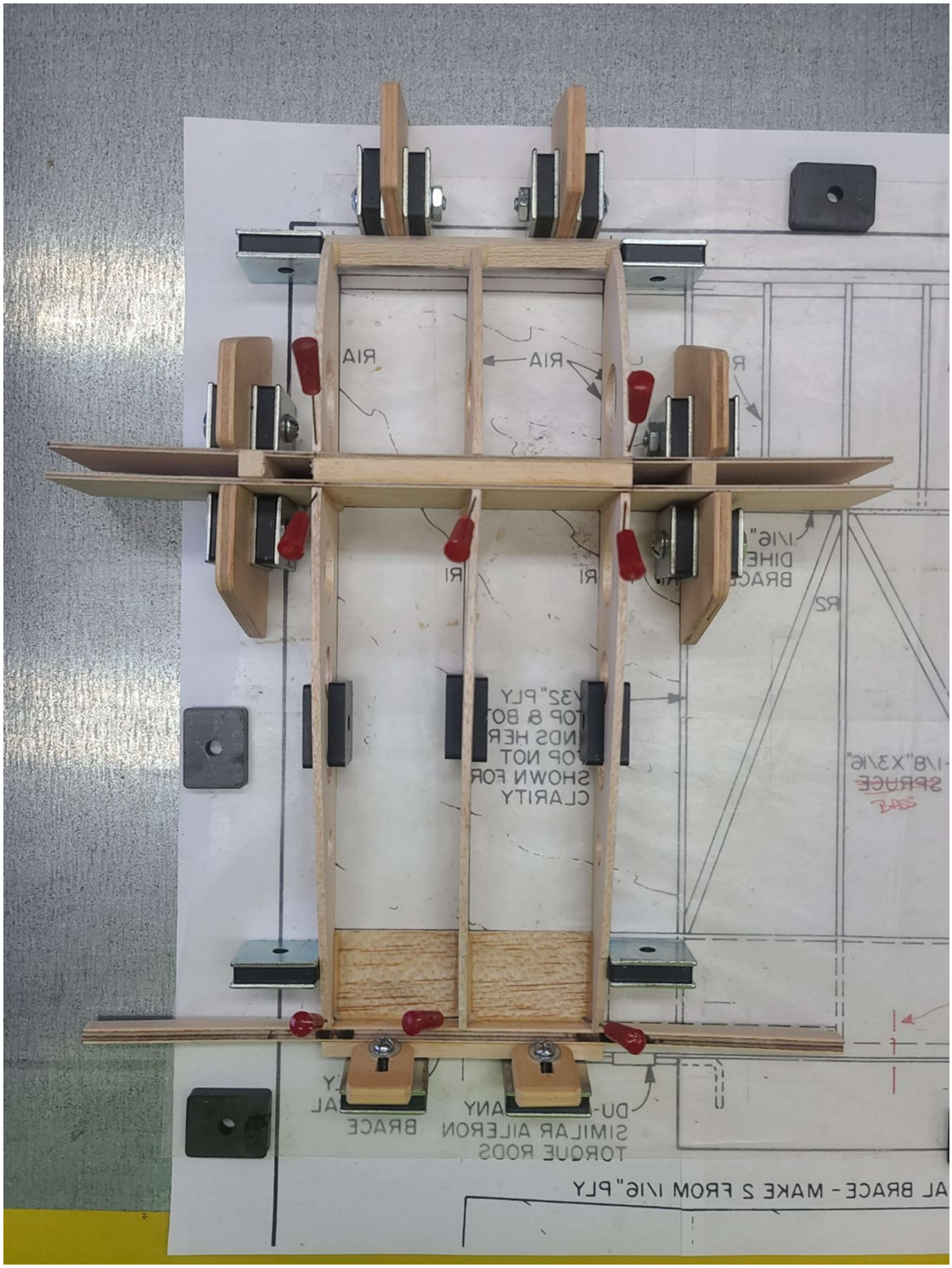

Figure 7 - Wing Center Section

Seen above in Figure 7 is the build-up of the wing center section directly over the right-wing panel plans.

Figure 8 - Wing Panels Joined Together in Jig

In Figure 8 above you see all three wing sections in a jig I set up on my wood workbench for a dry-run test fit. Only some minor adjustments to the main spar ends were needed to get a nice fit. Looking good so far. Next comes mixing up some epoxy and putting these beauties together for a total wingspan of 59 inches. I used the 1-inch dihedral at the end of the main spars as called out on the plans. Once the wing join epoxy has cured, I'll complete the wing build with installation the remaining R1 and R1A ribs, top and bottom 1/32nd plywood sheeting over the entire wing join area, some 1/16th balsa vertical grain shear webbing on the aft of the main spars and between the trailing edge balsa sheeting, *eight small hardwood corner blocks for the wing wire rigging attachment points,* basswood diagonal braces between the wing ribs, soft balsa wingtip nose blocks, and an overall sanding to get the final shape needed. The plan for the fuselage and tail feathers will now go down on my magnetic build board in preparation of their assembly.

OK, after a four month hold for this build due to the AMTN Beechcraft Starship kit build for a flying club friend, as of 10 August 2024 I'm now back working on Miss Vintage once again. Completed all the items listed in the paragraph above including an overall sanding of all wing surfaces and shaping of wingtip nose blocks. After putting the wing back into a jig again on my magnetic build board to maintain the proper dihedral, I used some 0.025-inch-thick birch plywood to cover the center section ribs from the leading edge back to the training edge. Figure 9 below shows this setup with the top ply sheeting completed. Next, I will flip the wing over, install a "Y" harness for the aileron servo leads, and then cover the bottom of the center section with birch ply.

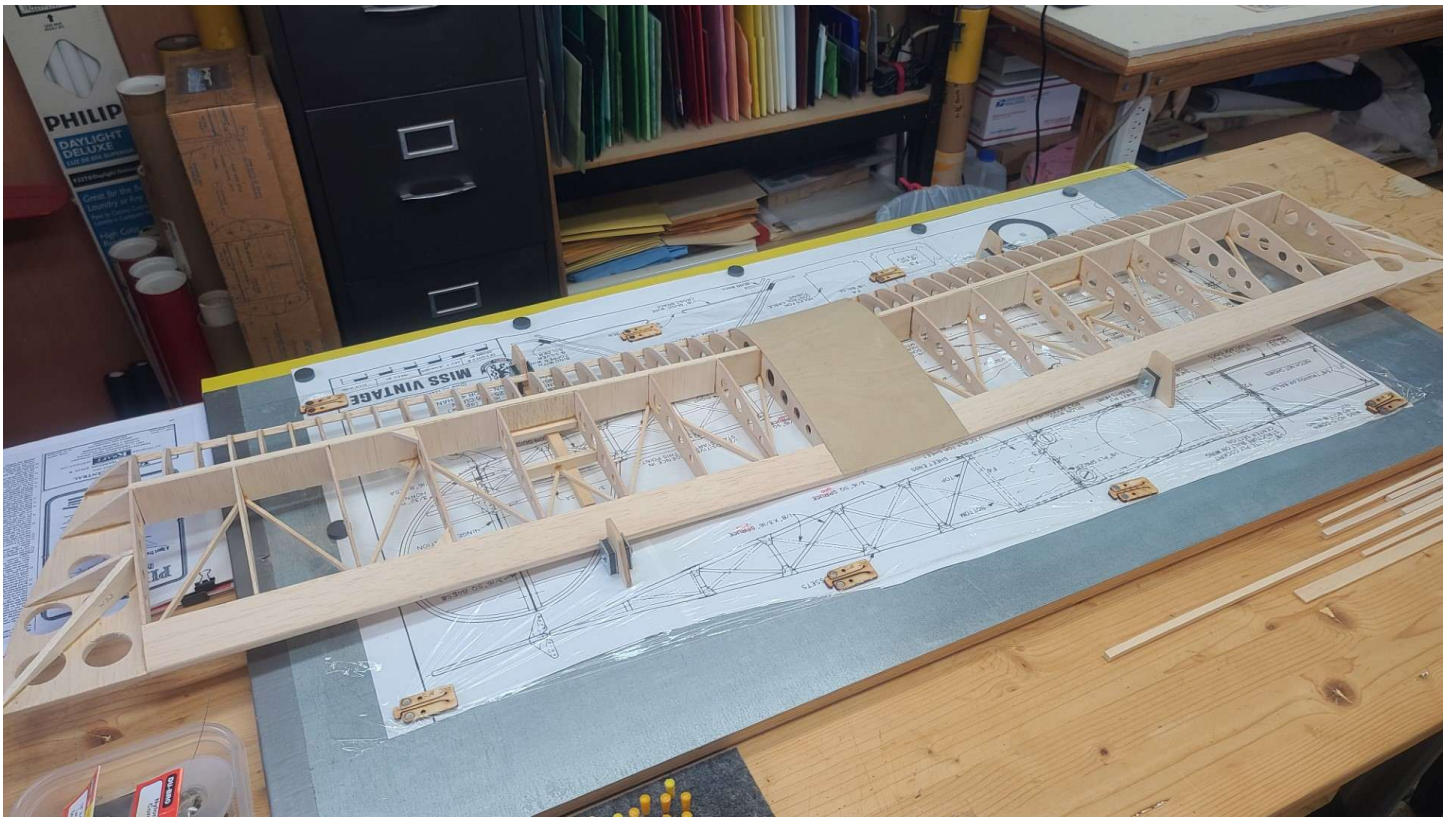

Figure 9 - Wing on Magnetic Building Board

While waiting for the glue to dry on the bottom center wing section plywood sheeting, I decided to start on the fuselage. The first parts needed were two 1/8th Lite Plywood sides; 3/16th birch plywood former F1 (firewall); 1/8th Lite Plywood formers F2 and F3; and 1/8th balsa former F4. I fabricated these using templates from the plans. All the parts are shown in Figure 10 below.

Builders Notes – 1) Before starting the fuselage assembly, the firewall (former F1) needs to have four holes drilled using the engine mount you plan to use as the template, with 4-40 blind nuts installed on the back side for the engine mount bolts. 2) Additionally, you need to drill holes for the fuel/vent tubes and throttle cable to pass through the firewall. A throttle cable pass through hole is also needed in former F2. 3) While not shown on the plans, I plan to add a removable shelf in the bay area between formers F1 and F2 for the fuel tank to rest on above the receiver battery. This will require adding some 3/16th square bass support bracing on the two Lite Plywood sides. Same applies for a servo tray that will go in the servo area between formers F2 and F3. 4) Finally, check the fit of the wing bottom against the fuselage Lite Plywood sides to make any adjustments needed. Initially, my wing would not sit all the way down into the fuselage side openings between formers F2 and F3.

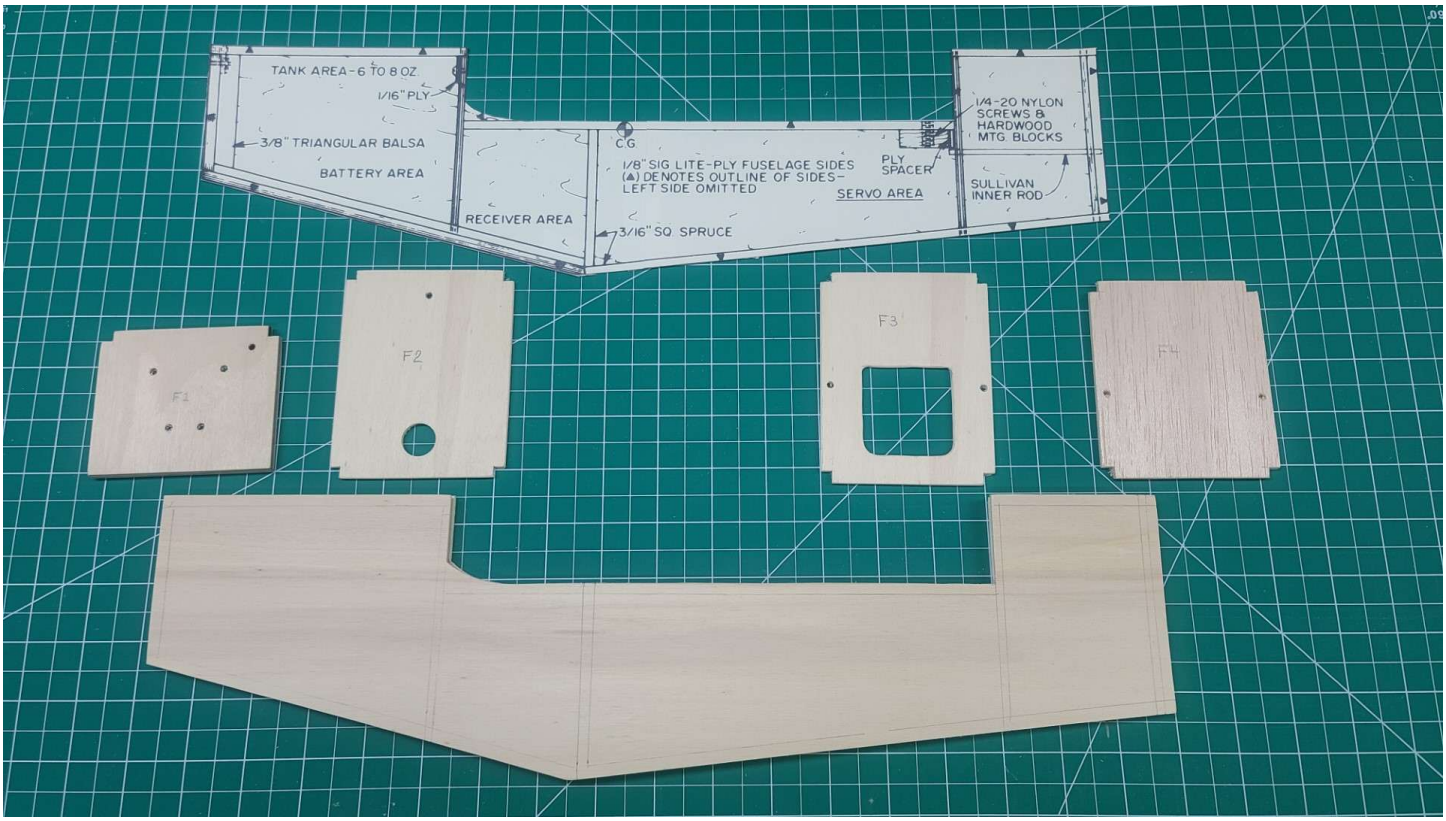

Figure 10 - Miss Vintage Fuselage Sides and Formers

I started my fuselage build by placing the right fuselage 1/8th Lite Plywood side directly over the plans on my magnetic build board where I used various magnets, pins, and clamps to hold pieces in place while the Titebond Ultimate III glue dries. I glued in 3/16th square basswood braces as well as the 3/8th triangular balsa firewall brace and the two 3/16th square bass longerons. I then added all the vertical 3/16th square bass bracing. *Don't forget to add the 3/16th square bass support bracing on the fuselage Lite Plywood side for the fuel tank removable shelf and the servo tray rails.* After all that had dried overnight, I attached formers F1, F2, F3 and F4 to the fuselage right side using 15-minute epoxy and my magnetic fixtures to ensure all formers were placed perpendicular to the fuselage side. Figure 11 below shows this stage of the fuselage build.

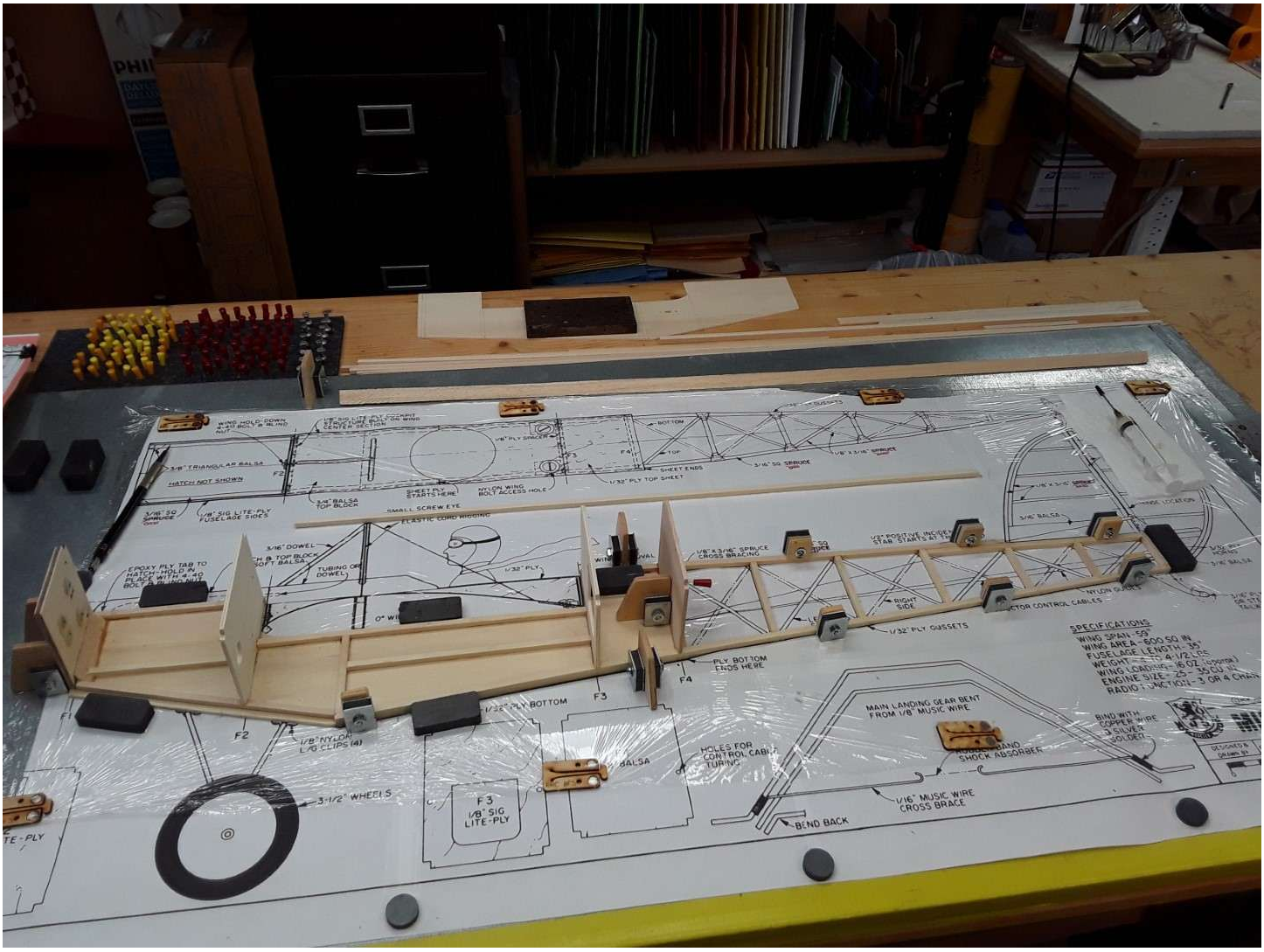

Figure 11 - Start of Fuselage Right-Side Build

The RCM build article says to build the fuselage left side directly over the right side, so they are matched. But I once again used my graphics program GIMP to flip the RCM plan .pdf file over horizontally, cropped the resulting file for the fuselage left side, and placed the fuselage 1/8th Lite Plywood side directly over the flipped plan on my magnetic build board.

Builders Note – Before placing the fuselage left side down on the magnetic build board, determine a location for mounting of your receiver power switch harness on the Lite Plywood, and then drill/cut any holes needed.

With the fuselage left side completed, the next step was to join the two fuselage sides. This was done by placing the two sides upside down directly over the *fuselage top view* on the plan. As you can see in Figure 12 below, I used various magnetic fixtures, steel bar weights, and my trusty Craftsman small bar clamps to join the two fuselage sides together using 15-minute epoxy.

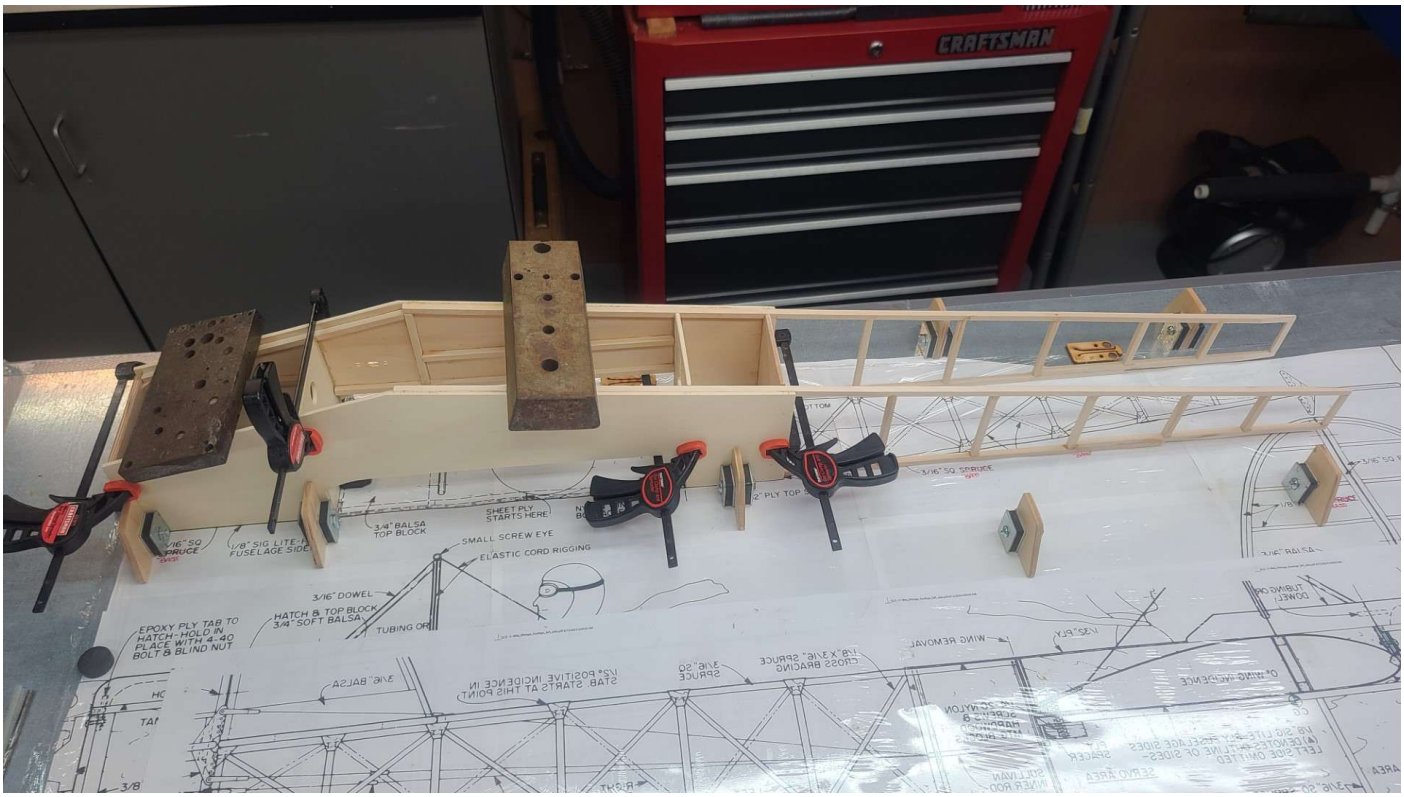

Figure 12 – Start of Fuselage Sides Join

With the two sides joined at formers F1 through F4, I then sanded a bevel on the inside of the fuselage sides at the rear join so they would fit flat against each other when joined together. Using my mag fixtures, I pulled the two sides inward and carefully lined them up against the top view on the plans. I then shaped and glued all the top and bottom 3/16th square basswood cross braces and the 1/8th x 3/16th basswood diagonal braces between the fuselage bottom cross braces. As shown in Figure 13 below, I also installed the forward 3/16th hardwood ply fuselage bottom. This will provide a solid anchor point for the main landing gear (MLG).

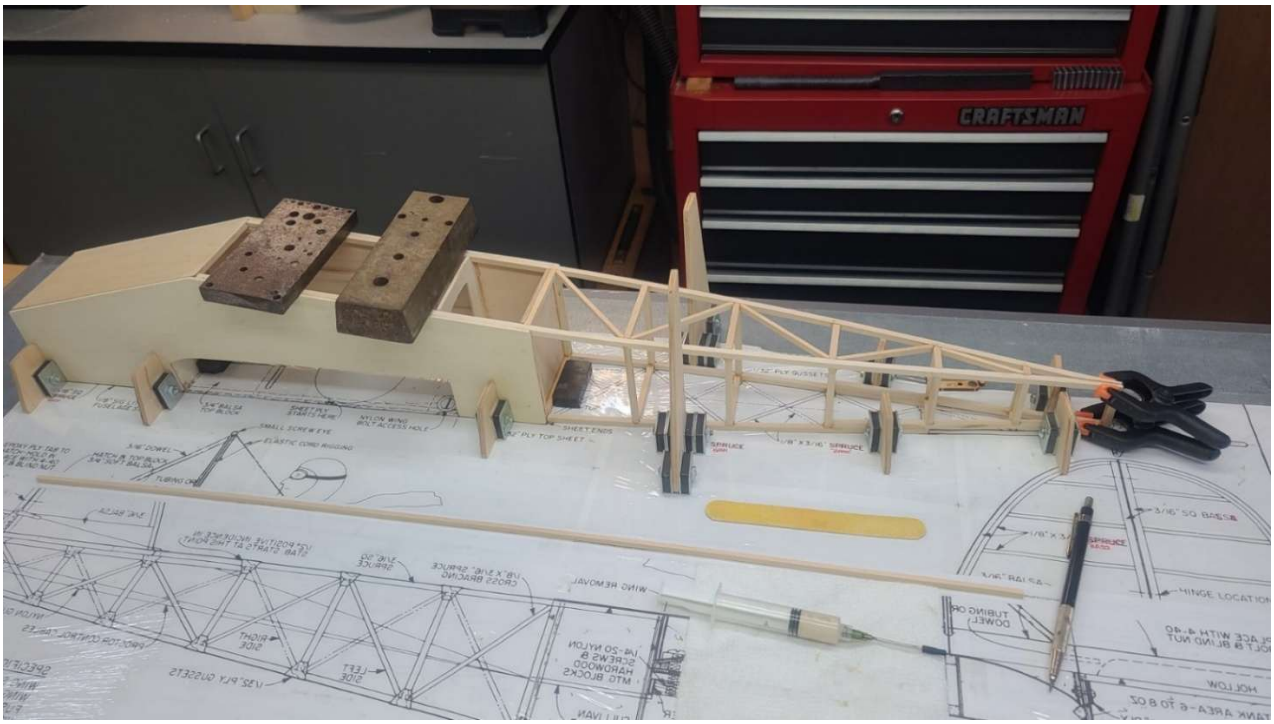

Figure 13 - Fuselage Build Continued

After having set overnight, I removed the fuselage from the mag board and finished the installation of all 1/8th x 3/16th basswood diagonal braces on the two sides and fuselage top. Then I added all the 1/32nd plywood gusset plates to the aft fuselage as shown on the plans, ***and there were a LOT of them***. As seen in Figures 14 & 15 below, the top of the fuselage area between F3 and F4 was covered with 1/32nd ply. Remember to install the rudder and elevator pull-pull control cable guide tubes between these two formers. Using some 7-layer 3/8th aircraft plywood, I installed the two wing hold-down blocks at the aft of the fuselage saddle. Note, I used ¼x20 threaded brass inserts in these blocks versus trying to cut threads into the wood blocks.

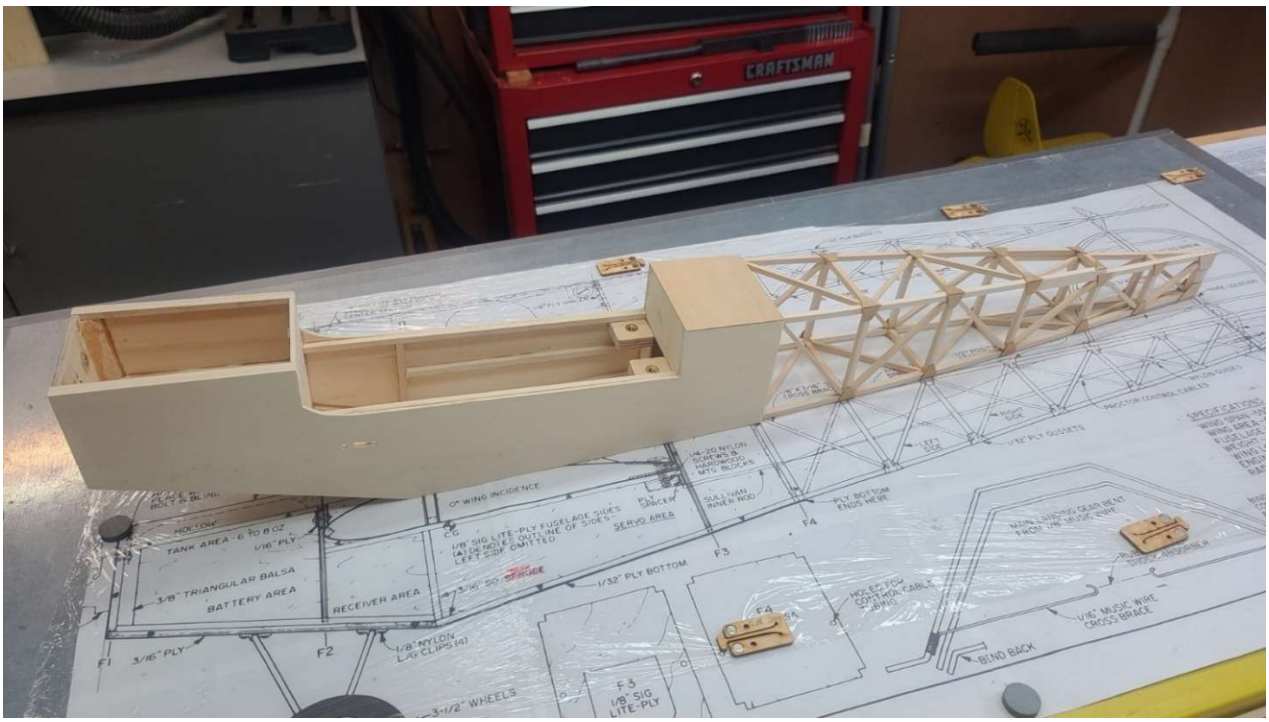

Figure 14 - Fuselage Build Completed

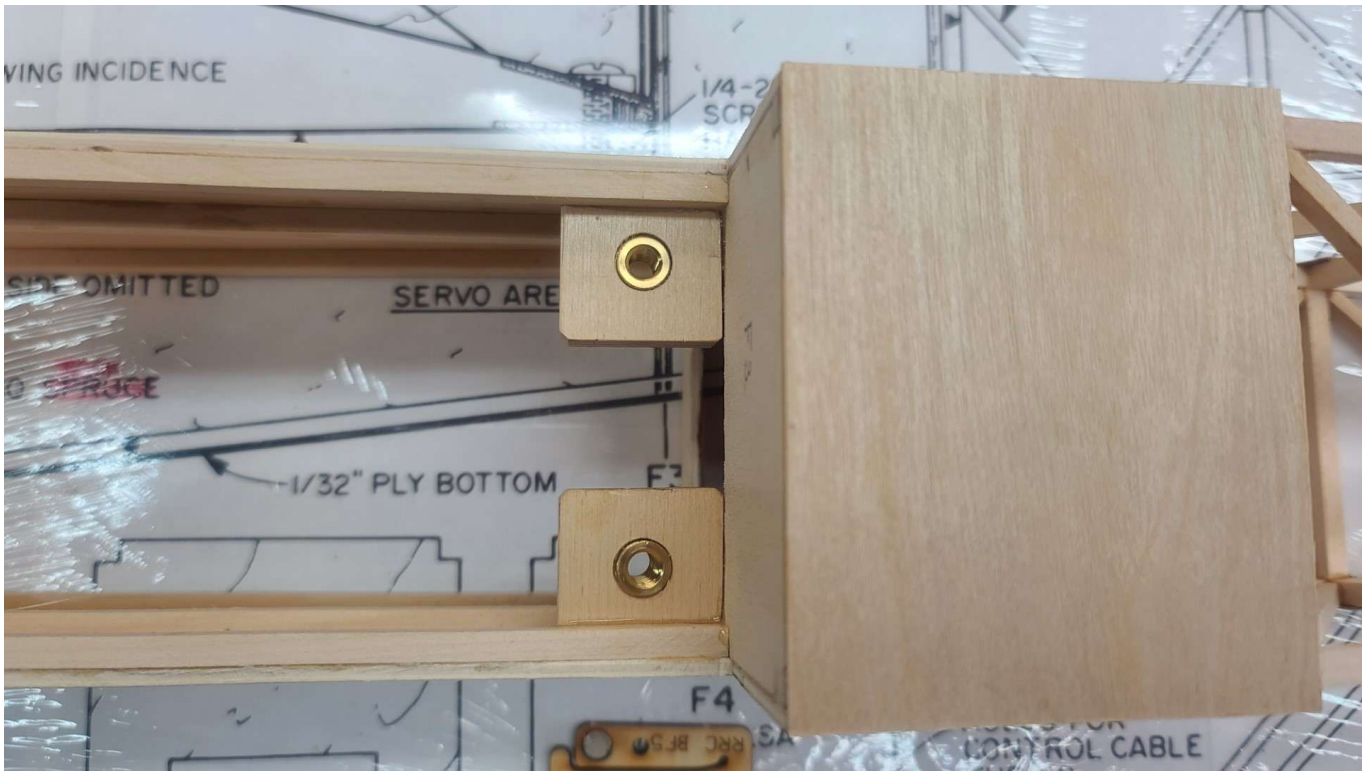

Figure 15 - Wing Hold-Down Blocks and Brass Inserts

With that finished, I then placed the wing into the fuselage saddle and turned the airplane upside down. After making sure the wing was properly aligned, I marked the location for drilling 9/32nd holes through the wing to accept ¼x20 nylon hold-down bolts by inserting a drill bit that just fit inside the threaded brass inserts and twisted it with my fingers to make a mark on the wing bottom surface. Then I drilled the two 9/32nd holes through the aft edge of the wing center section.

I used the plan side view to make templates for cutting out the 1/8th Lite Plywood side pieces of the cockpit structure on top of the wing center section. With the wing bolted in place to the fuselage, the cockpit sides and the front and rear 1/8th Lite Plywood bulkheads were then glued to the top of the wing center section. Once the glue was dry, I installed a 4-40 blind nut and bolt through former F-2 and into the front bulkhead of the cockpit structure. This 4-40 bolt serves as the front wing hold-down. Remember to reinforce the front surface of F-2 by gluing a small scrap of 1/16th plywood where the 4-40 bolt passes through the former.

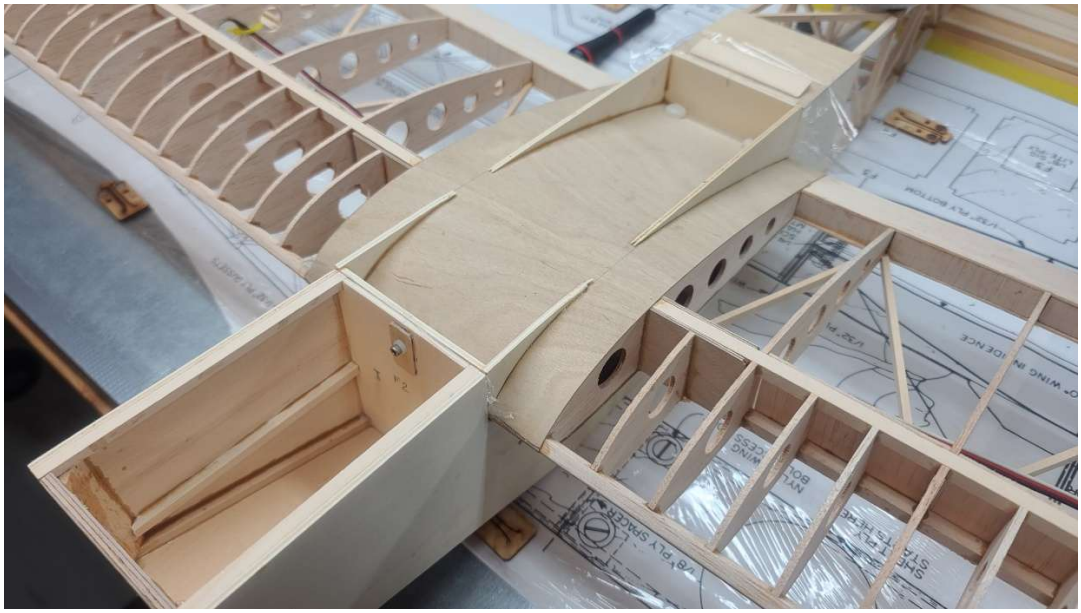

Figure 16 - Wing Bolt-On Installation

After cutting out a 3-inch cockpit hole and two ¾th access holes for the wing hold-down bolts, I added the top 1/32nd ply sheeting to the cockpit. Note that I painted the inside of the cockpit area using flat black enamel to help seal it up from any nitro fuel or oil coming off my O.S. .35 2-stroke. For the forward fuselage top I glued two sheets of 3/8th balsa together and then rough carved the resulting soft balsa block and cut out the forward part of the 3-inch cockpit hole. This balsa block was then cut into two pieces at the joint between the fuselage saddle and the front of the wing. The aft part of the block was then glued to the cockpit area, and the forward part becomes the access hatch to the fuel tank and receiver battery compartment. While the plan calls for using a dowel at the rear of the fuel tank hatch, I used two small hatch magnets, and then a 4-40 blind nut and bolt at the front to hold the hatch in place.

Before closing the bottom of the fuselage with 1/32nd plywood, plan your servo installation and drill appropriate holes for pushrods, or as I plan to use, nylon covered braided control cables, which will run through sections of inner Gold-N-Rod tubing between fuselage formers F3 and F4. The progress of the build is shown in Figure 17 below.

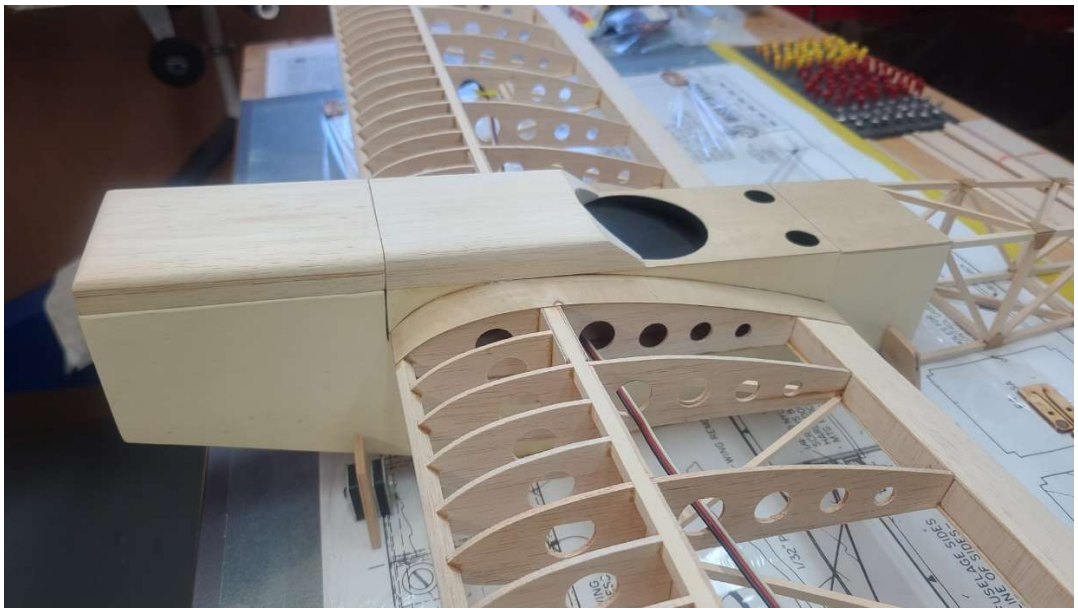

Figure 17 - Fuselage Cockpit Build Completed

Ok, lets move on to the build of the tail feathers, or in more technical terms, the horizontal and vertical stabilizers. My first task was to lay-up the laminated outer contours for both stabs. While the plans call for using two 1/8th x 3/16th spruce pieces, I used four 1/16th x 3/16th balsa strips which are much easier to bend around the curved outer profiles, and glued them together using my Titebond III wood glue which produces a good solid outer contour. To ensure everything was held in place while the glue dried, I used the heavy metal pins that I use for stained glass panel lay-ups on my wooden workbench. This lamination lay-up can be seen in Figures 18 & 19 below.

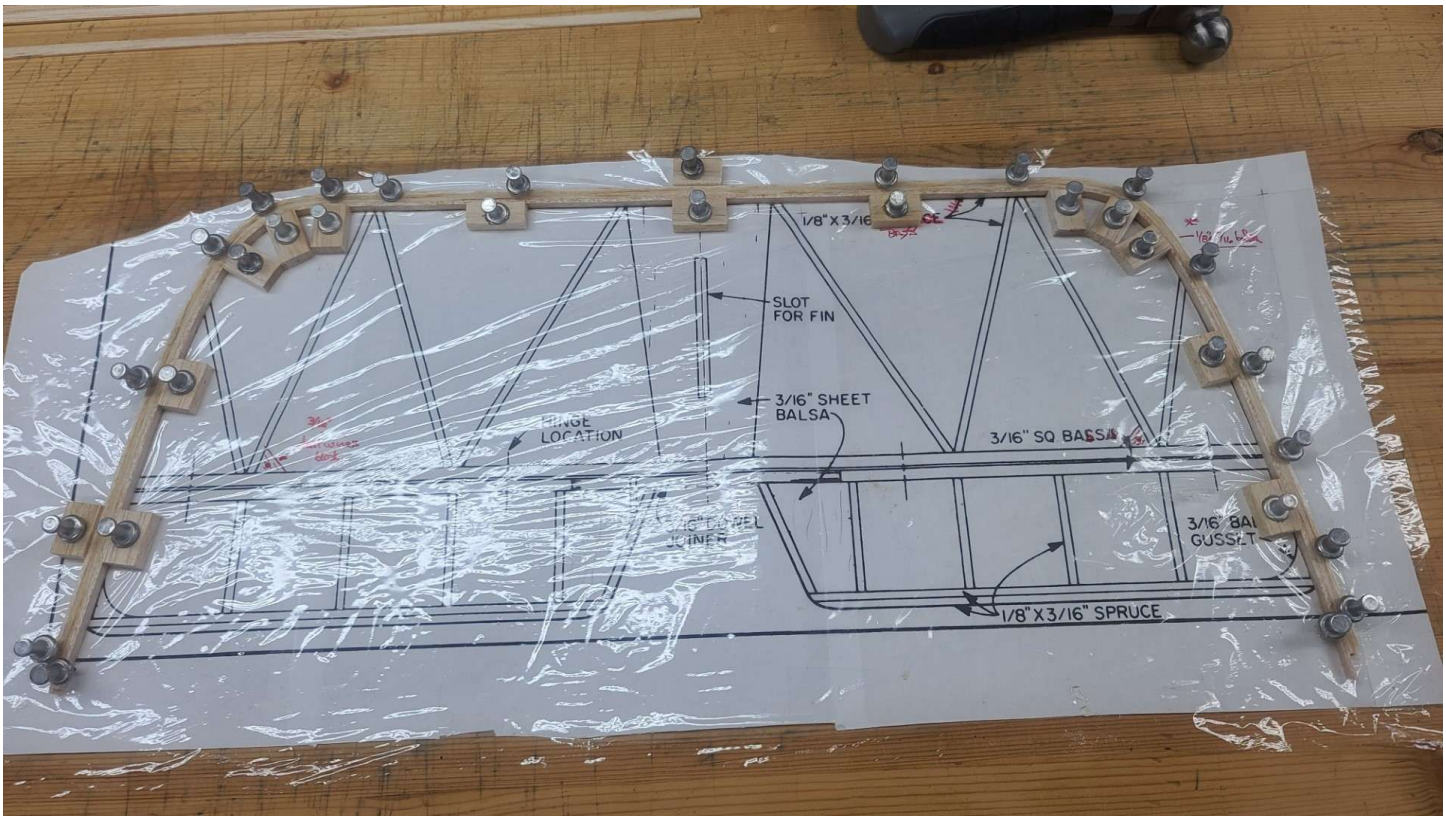

Figure 18 - Horizontal Stabilizer Laminated Outer Contour

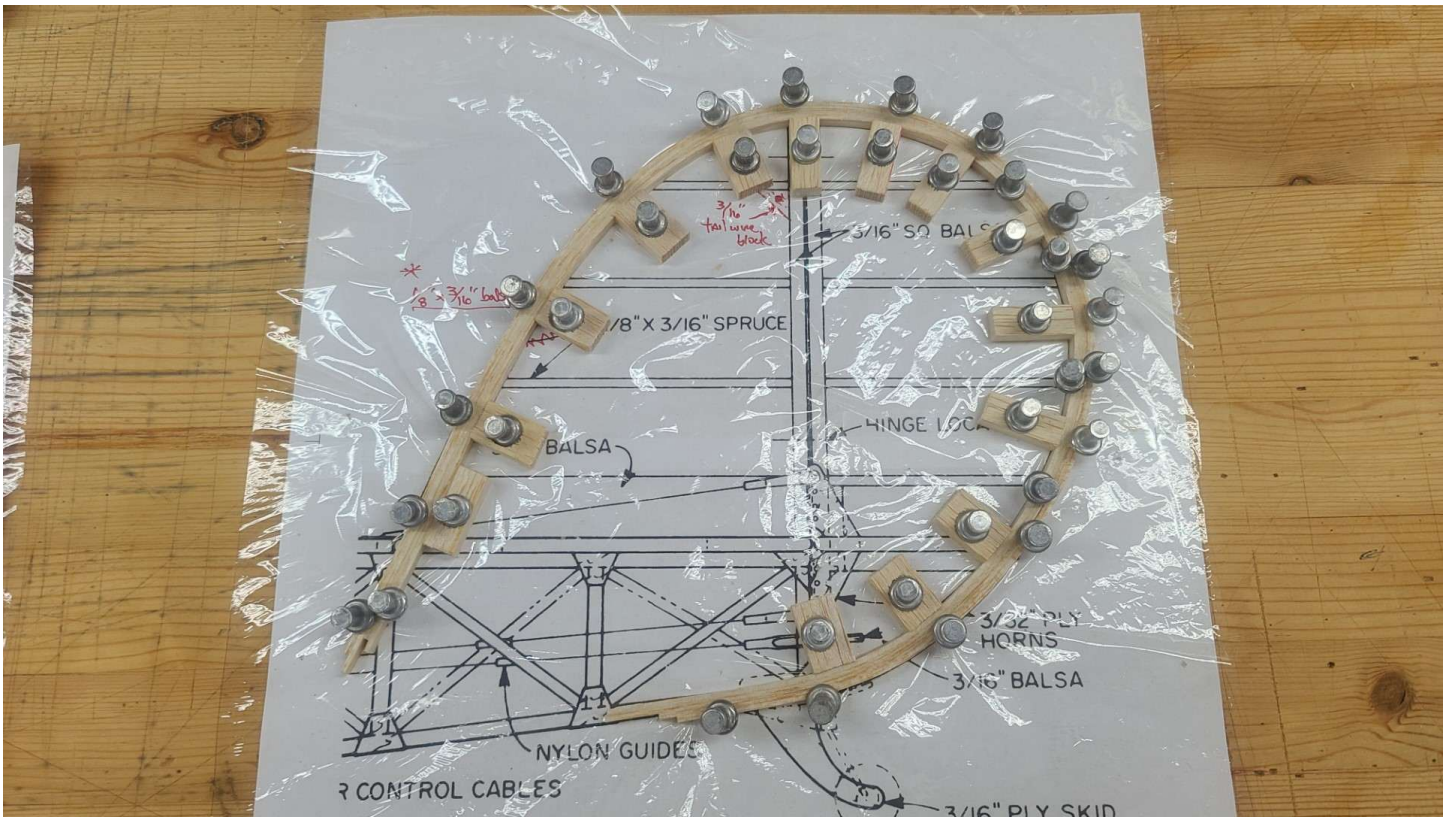

Figure 19 - Vertical Stabilizer Laminated Outer Contour

After everything had dried overnight, I then marked where the outer contours needed to be cut to separate the rudder from the vertical stab, and the elevator from the horizontal stab. Next, I added all the 1/8th x 3/16th basswood crosspieces shown on the plan. I used basswood versus balsa for the 3/16th square pieces. Pay close attention to the direction of the grain on the 3/16th sheet balsa parts — see plan. I also added 1/64th plywood over the balsa sheet where the 3/32nd plywood control horns will attach to the rudder and elevator control surfaces.

Once everything was thoroughly dry, I lightly sanded all tail feathers and round the outer edges on both stabs. Finally, I temporarily hinged the tail feathers using Du-Bro #116 Standard Nylon Hinges, however both stabs should be covered and installed on the fuselage before permanently hinging. The tail feather builds are shown in Figures 20 & 21 below.

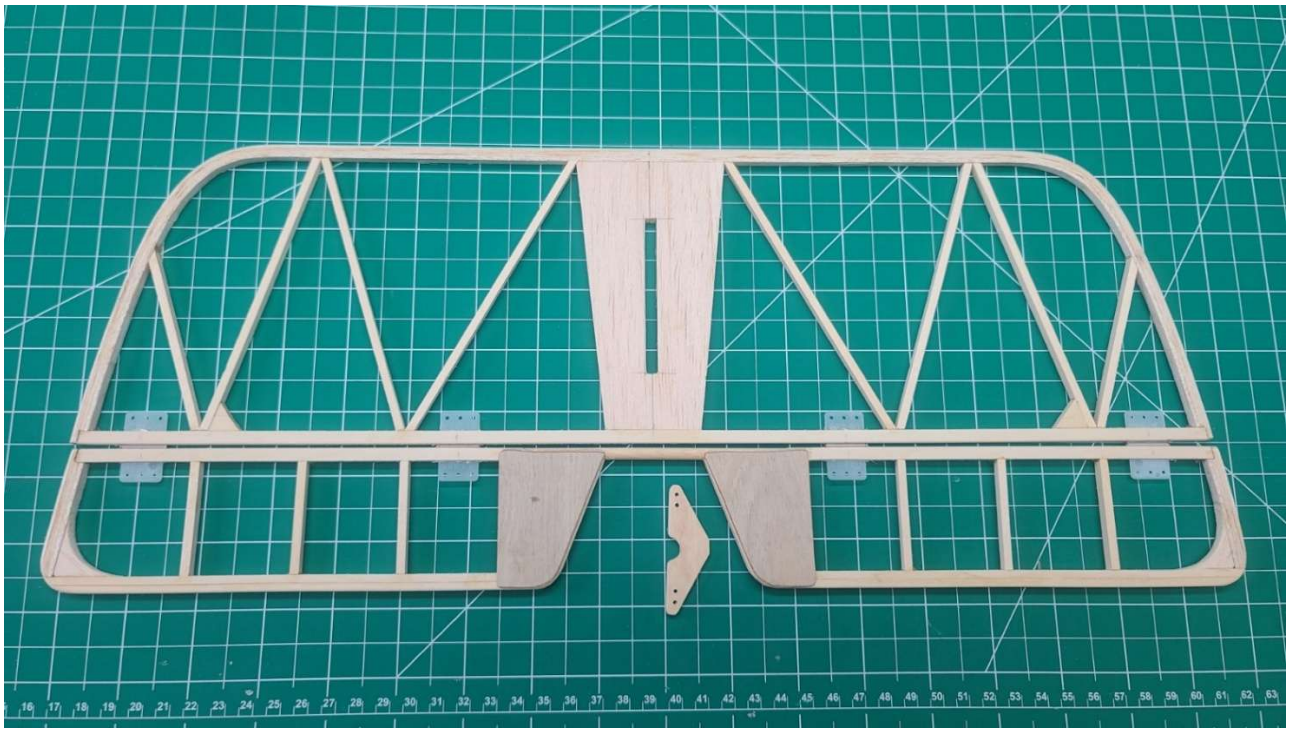

Figure 20 - Horizontal Stabilizer and Elevator Build

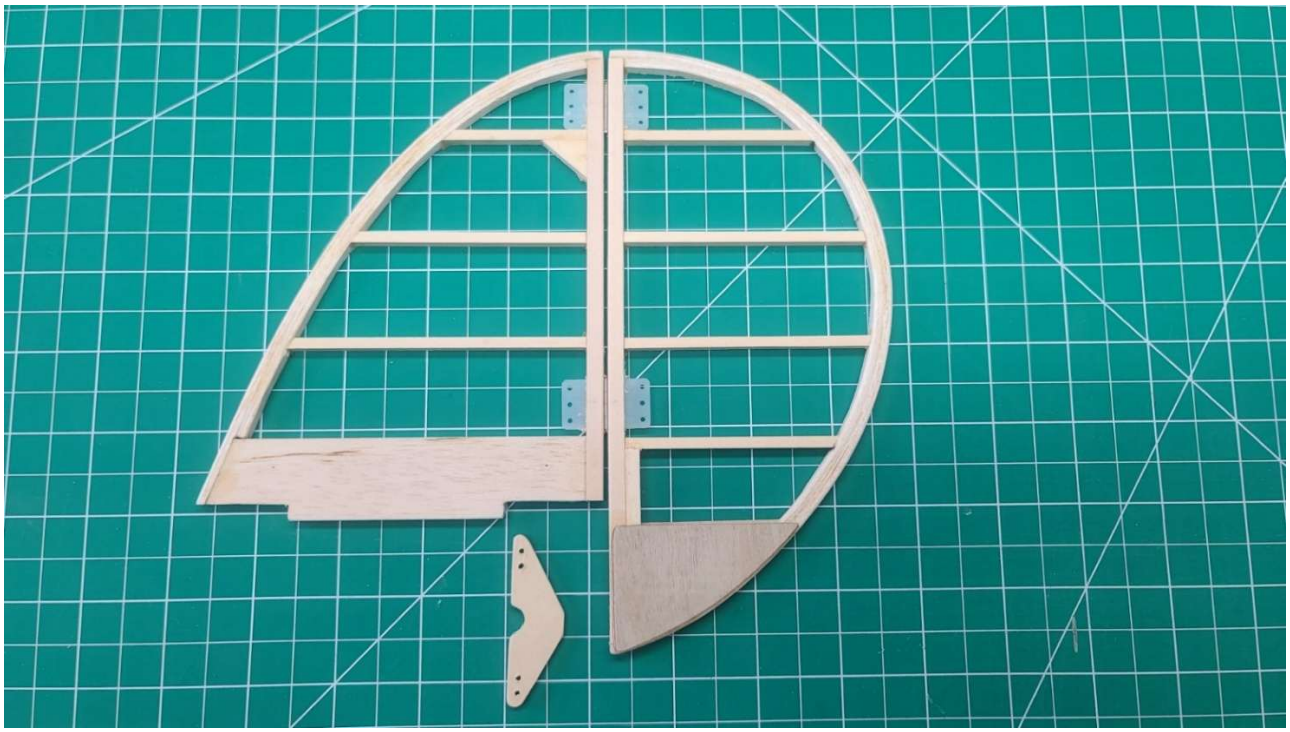

Figure 21 - Vertical Stabilizer and Rudder Build

Flight control of Miss Vintage will be provided using five Hitec HS-225BB 27.7g Cored Nylon Gear 24T Analog Mini Servos connected to a Spektrum RC AR400 4-Channel 2.4GHz DSMX receiver and all power by a 6-volt 5-cell 2,000mAh NiMH receiver battery pack. I made the fuselage servo tray using 1/8th plywood which, as you can see in Figure 22 below, rests on the 3/16th square basswood servo rails running along the fuselage sides between formers F2 and F3. This installation allows me to move the complete servo tray forward or aft to obtain the required center-of-

gravity (CG) location. The receiver will rest on the fuselage floor just aft of former F2, and the receiver battery pack just forward of former F2 and below the removable fuel tank shelf.

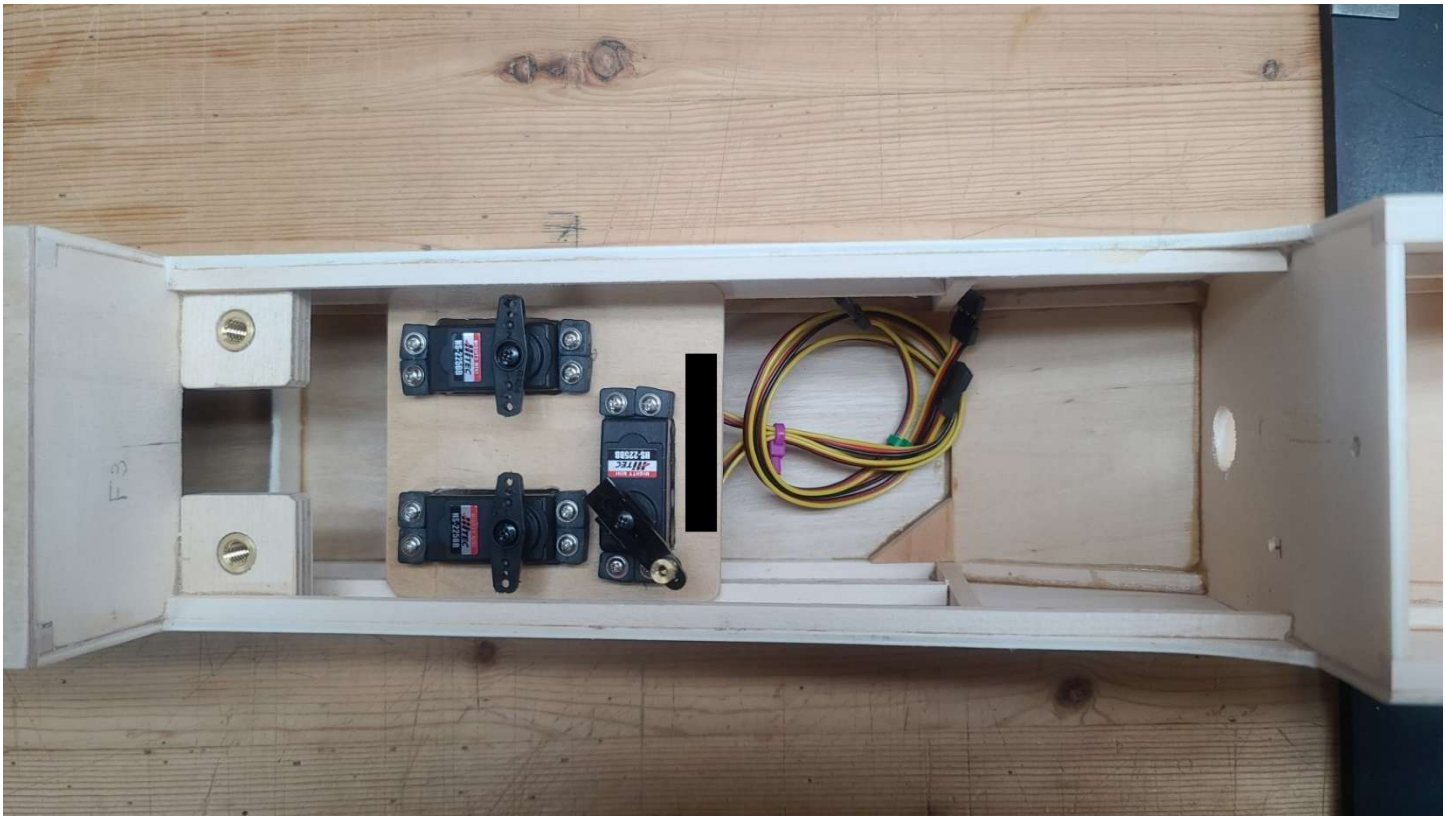

Figure 22 - Servo Tray in Fuselage Equipment Bay

I returned to the wing build by cutting the two ailerons to length, shaped their outside tips and leading edges, and temporarily installed three Du-Bro #116 Standard Nylon Hinges in each. Next, I cut two aileron hatch covers from 3/32nd plywood, cut out a slot for the aileron servo arms to pass through, and then epoxied ¼th plywood servo mounting blocks to the inside surface of each cover. The ailerons will be connected to the servo arms using Du-Bro #237 T-style Nylon Control Horns, Du-Bro #600 2-56 Spring Steel Kwik-Link Clevises, and Du-Bro #855 E/Z Links. Figure 23 below shows the aileron servo installation in the left wing.

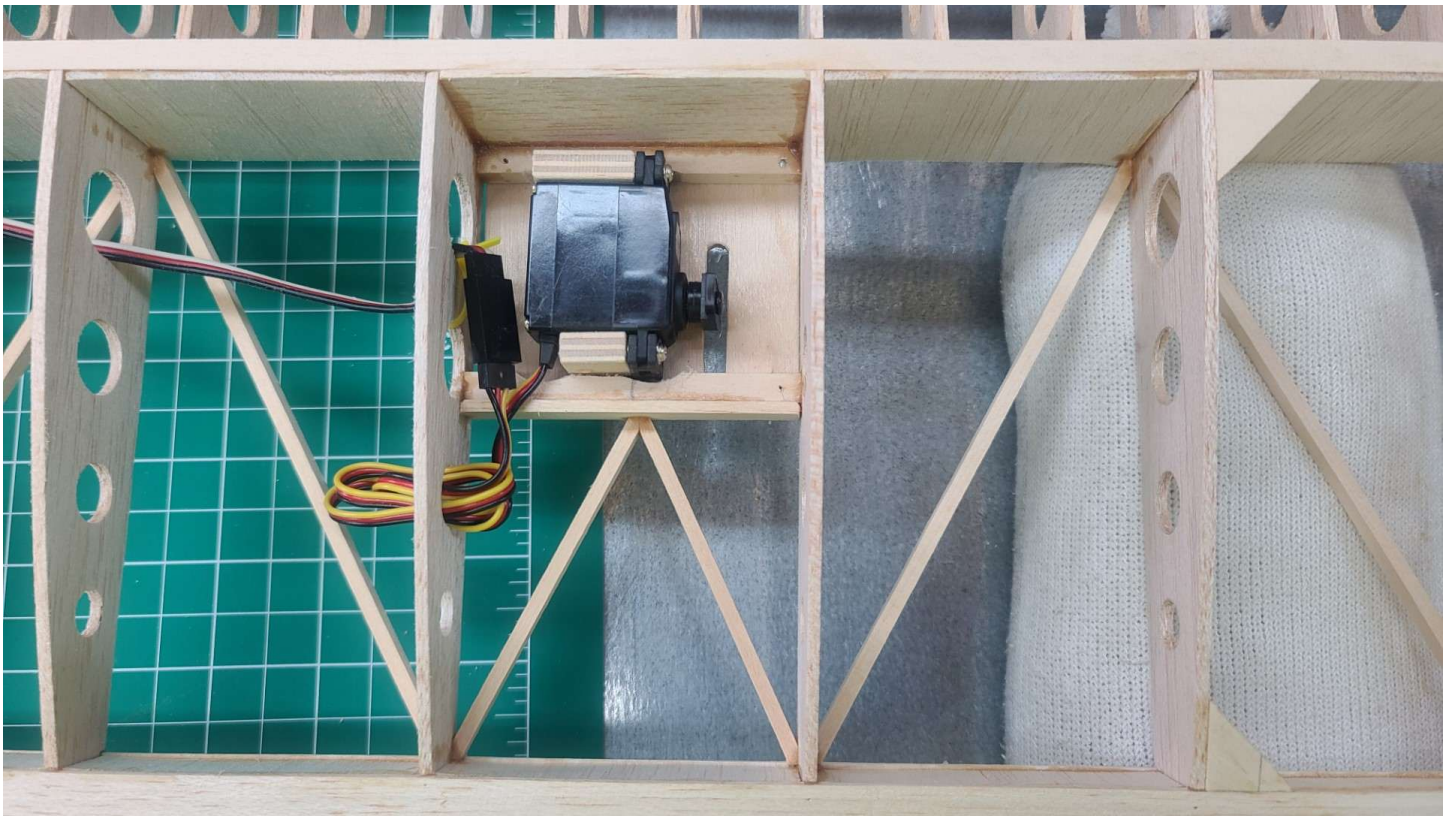

Figure 23 - Left Wing Aileron Servo Installation

Using 1/8th and 1/16th music wire, I fabricated the main landing gear (MLG) using the templates on the plan. The 1/16th music wire shock absorber crossbar is functional and helps with smoother take-offs and landings. The MLG joints are wrapped with soft copper wire and soldered together using 50/50 solder. Be sure to also use flux for a smooth and secure job. The plans call for a rubber band shock absorber, but I will be using a small metal spring instead. I trial mounted the landing gear using Du-Bro #238 1/8th Nylon Landing Gear Clips and wood screws. The placement of the MLG gear on a tail dragger is critical! With the fuselage lying upside down over the plans, I lined up the landing gear axles, so they were perpendicular, and in line, with the leading edge of the wing saddle in the fuselage. See the MLG assembly in Figure 24 below.

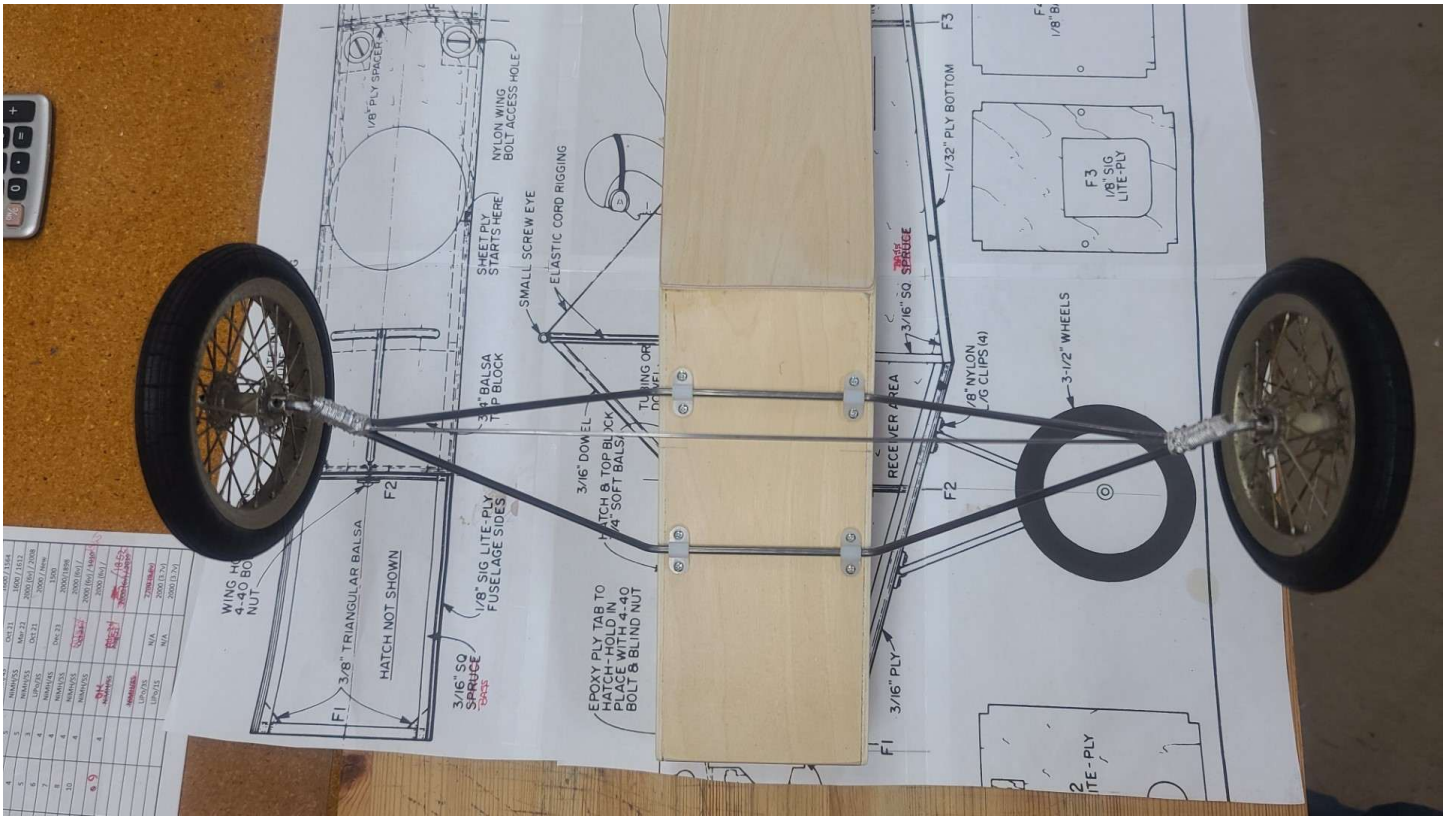

Figure 24 - Main Landing Gear Assembly

Alright, it is finally time to do an overall fit check and an initial determination of the resulting C.G. location. I first installed the motor mount and my O.S. .35 SX 2-stroke engine on the firewall along with a 10x6 wooden prop and silver metal spinner cone. I then assembled the Sullivan 6-oz Flex-tank slant fuel tank, cut-out a removable fuel tank support shelf from 1/8th Lite plywood, wrapped the 6-volt 5-cell 2,000mAh NiMH receiver battery pack and placed it in the lower bay between F1 and F2 with foam around the edges to keep it in place, and then installed the fuel tank platform, fuel tank with fuel and air lines running to the engine, and more foam padding around the fuel tank. I then installed both aileron servos in the wing, placed the fully assembled wing in the fuselage saddle, and installed the fuel tank bay hatch cover in front of the wing. Next, I installed the receiver just aft of F2, mounted the receiver/battery switch in the left fuselage side wall, and placed the servo tray with three servos mid-way on the servo tray rails between F2 and F3. Finally, I temporally mounted the horizontal and vertical stabilizers (tail feathers) to the fuselage. The results of these efforts can be seen in Figure 25 & 26 on the next page.

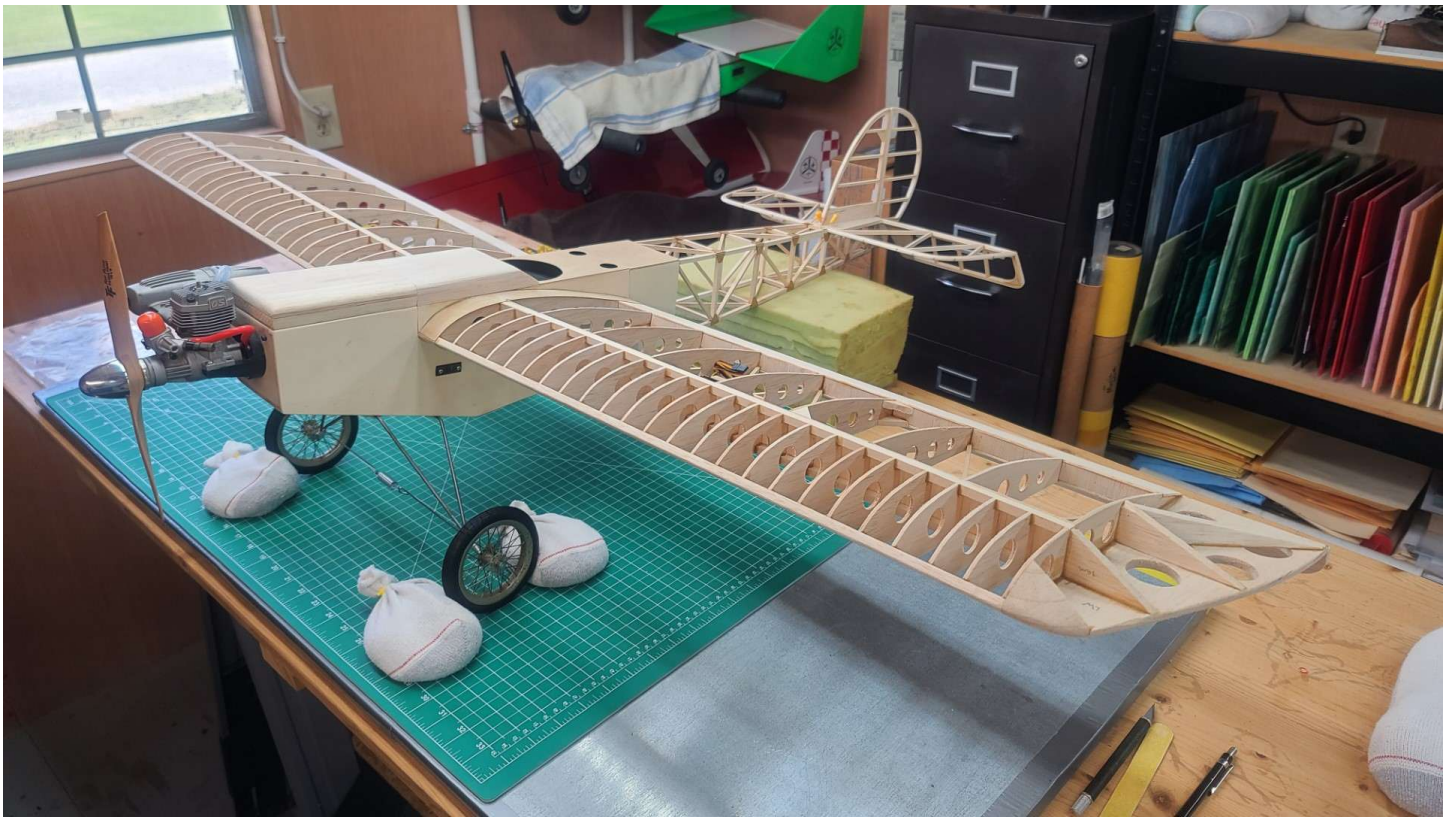

Figure 25 - Miss Vintage Initial Fit Checks

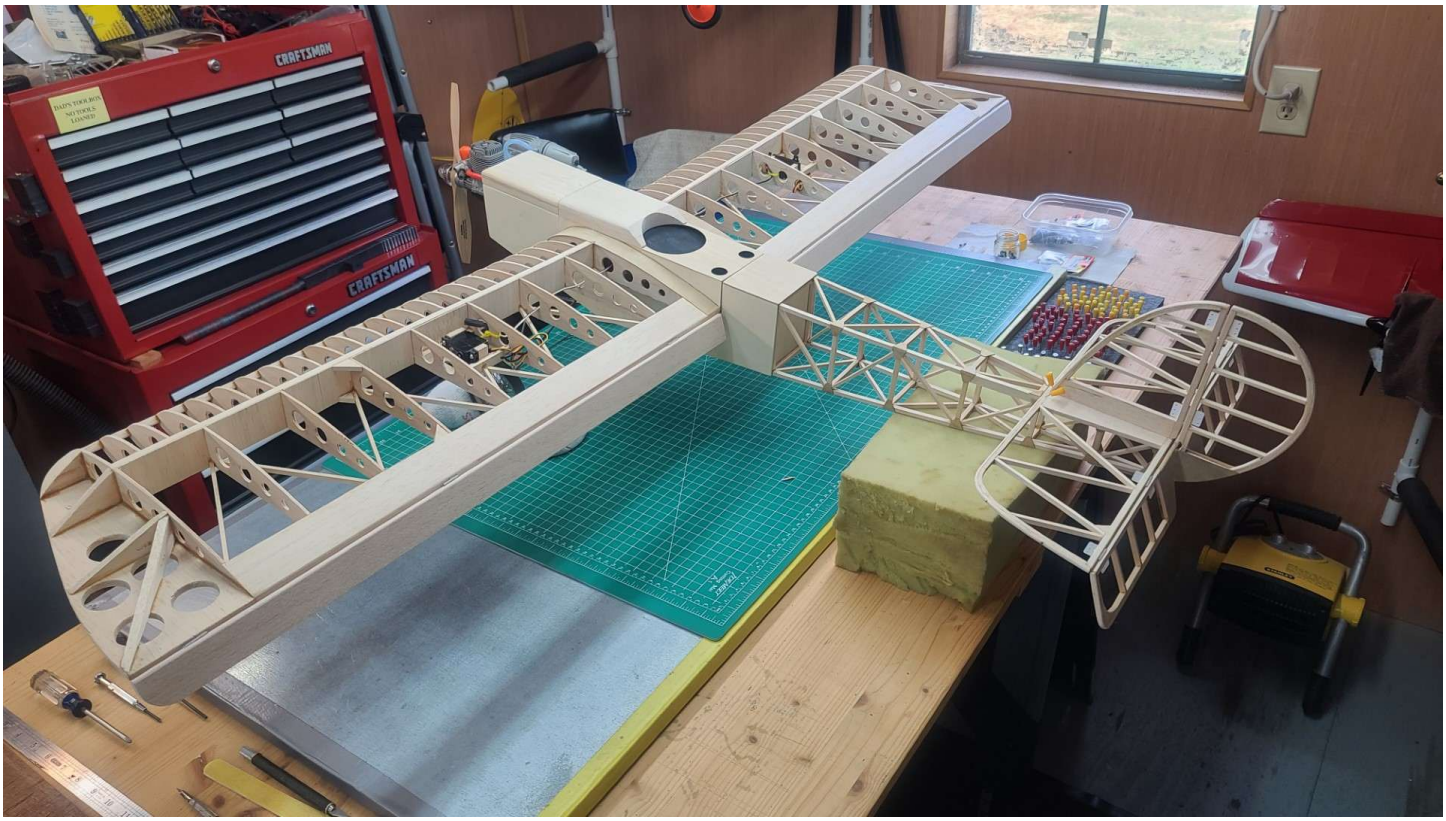

Figure 26 - Miss Vintage Initial Fit Checks

Now for the initial C.G. location measurement. To determine the resulting initial C.G. location, I positioned the assembled model on my three digital kitchen scales in a normal flying attitude (tail raised off the table for a wing zero angle of attack) and put the resulting weight measurements into my handy C.G. calculation spreadsheet. Note – To obtain a good lateral balance, I had to add ¾ once of lead to the left wingtip to offset the weight of the engine muffler hanging out on the right side of the fuselage. The spreadsheet results ***were not*** what I expected. She was ***significantly nose heavy*** and the initial C.G. was over 50mm off from the required location of no more than 80mm aft of the wing leading edge, or 84mm aft of the MLG axle. So, some internal component rearrangement was needed.

After several attempts to move things around to get a good C.G., the receiver battery pack now rests on the fuselage floor all the way back against the front side of former F3, with the servo tray sitting over the battery, and the receiver on the floor in front of the servo tray. Even with all that movement I still had to remove the silver metal spinner cone and add 1 once of lead to the tail to obtain the results in the C.G spreadsheet shown in Figure 27 below.

Miss Vintage RC Model CG Calculation by Weight

Model			Details			Weight:	4.15	lbs				
Miss Vintage			Tail dragger	Imperial								
D	740.0	mm	Distance between center point of main wheels and tail wheel	29.1								
CG(s)	84.0	mm	Distance of specified CG location from main wheels	3.3								
W(p)	836.0	g	Measured weight at left wheel	29.5								
W(s)	831.0	g	Measured weight at right wheel	29.3								
W(t)	215.0	g	Measured weight at tail wheel	7.6								
W(total)	1882.0	g	Total weight of plane: W(p) + W(s) + W(t)	66.4								
CG(a)	84.5	mm	Actual CG location from main wheels: W(t) x D / W(total)	3.3								
W(t)	213.6	g	Weight required at tail wheel for balanced CG: W(total) x CG(a) / D	7.5								
W(delta t)	-1.4	g	Delta from weight required at tail wheel	0.0								
CG(diff)	0.5	mm	Difference between actual and specified CG: CG(a) - CG(s)	0.0								

Legend:		
		Aircraft-specific; enter once and do not alter for this aircraft
		Measured weights; change with every weight session
		Calculated values; do not edit these fields

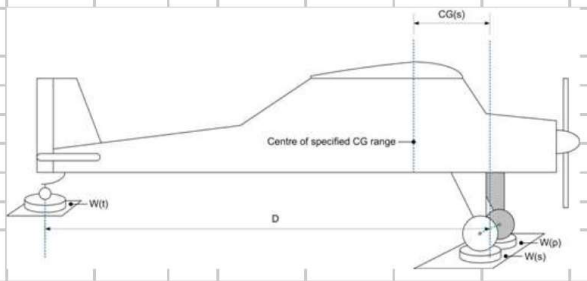

Figure 27 - Miss Vintage Initial C.G. Location Calculations

This will be good enough for now. Once the model is covered with Ultracoat and I have all the tail feather control cables and wing rigging lines installed, I will accomplish another C.G. location determination to establish the final position of the fuselage servo tray. I expect some forward movement of the servo tray will be required, or removal of some of the lead weight I placed in the tail.

So, it is now time to prepare for covering and final finishing. After disassembling everything, I first went over the entire fuselage with 320 grit sandpaper. I then vacuumed all the surfaces and finished up by wiping everything down with a painter's tack cloth to remove any remaining sanding dust. To protect the open truss aft section of the fuselage from glow fuel/oil blowback from the engine, I masked off the forward fuselage and then sprayed the open truss fuselage section using Krylon Matt Finish Clear Lacquer spray paint. I applied two coats to ensure good coverage. With the entire forward fuselage section being plywood surfaces, to help the covering film stick to the plywood, I brushed on a coat of Coverite Balsarite (https://www.flyhobbies.com/Coverite-Balsarite-Fabric-8-oz), or Deluxe Materials Cover-Grip (https://deluxematerials.co.uk/products/cover-grip). Both clear coatings absorb into the wood, water/fuel proofing it, strengthening it, and react with adhesives to lock coverings on with an unbreakable bond. I also applied a coating of Balsarite to the inside of the fuel tank bay between formers F1 and F2, and the inside of the hatch cover.

I then applied Flat Tan Top Flite MonoKote Covering Film to the fuselage, starting on the bottom, followed by the two sides, then the top of aft fuselage, front of the firewall, and the inside front and aft surfaces of the fuselage wing saddle. This was followed by applying film to the fuel bay hatch cover. With all that finished I reinstalled the receiver power/battery charging switch harness. Results are shown in Figure 28 below.

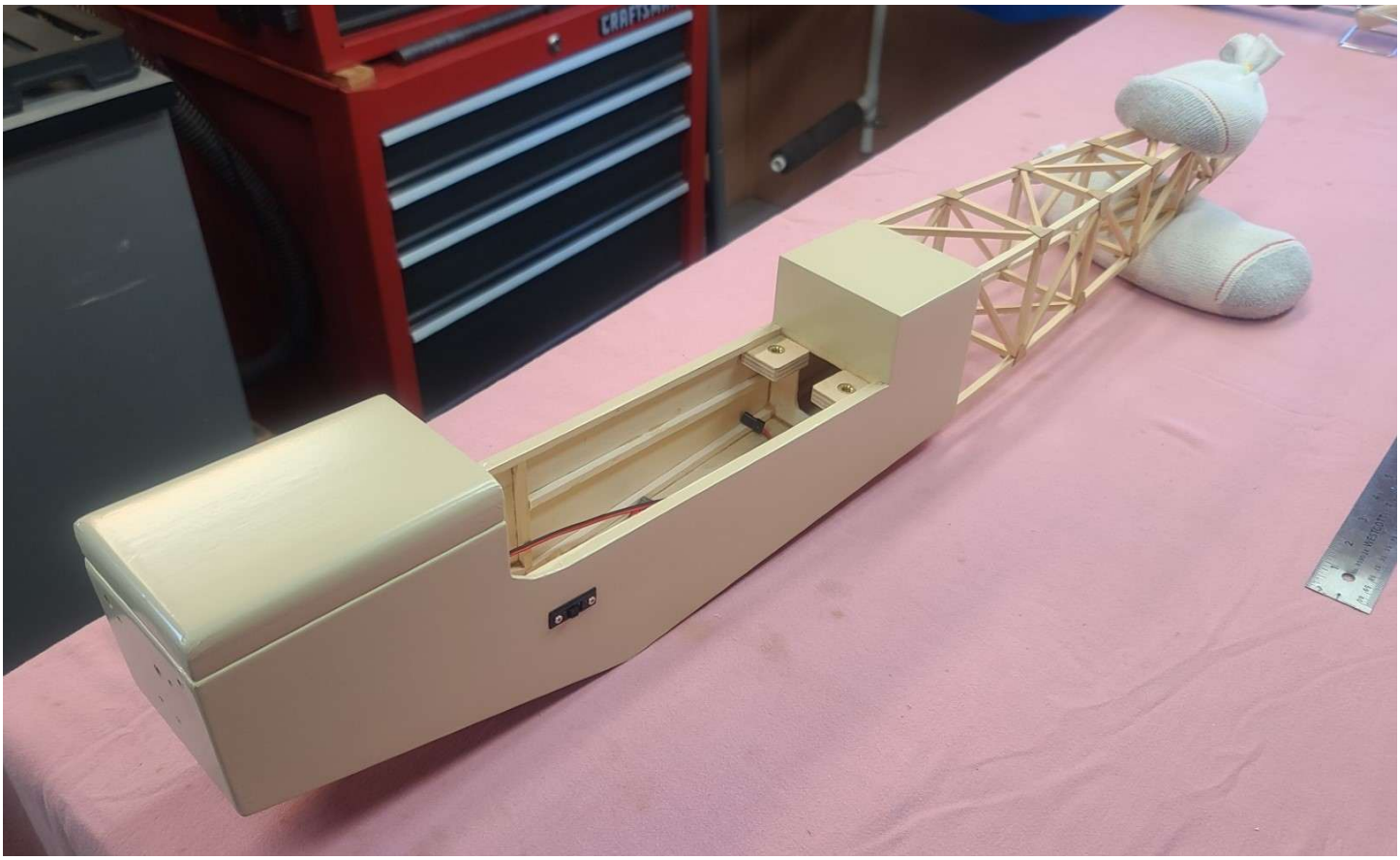

Figure 28 - Fuselage Covering Completed

How about covering those beautiful tail feathers? Since the initial C.G. measurement found that I need to add weight to the tail, I decided to install a Du-Bro #375 steerable tail wheel assembly with a Du-Bro #75TW 3/4th tail wheel.

Builders Note – Before you start to cover the tail feathers, first cut-out 3/32nd slots in both the elevator and rudder for installation of the 3/32nd plywood pull-pull control horns. On the rudder, make sure you first drill the hole needed for the steerable tail wheel wire so the control horn location can then be determined.

As with the fuselage, I first went over the tail feathers with 320 grit sandpaper. I vacuumed all the surfaces and finished by wiping everything down with a painter's tack cloth to remove any remaining sanding dust. I then brushed a coat of Coverite Balsarite on the outer contours of all tail feather parts. Once that had dried I applied Transparent Blue Ultracoat Covering Film with overlaps on the outer contours. With that finished I mounted the 3/32nd plywood pull-pull control horns using 15-minute epoxy.

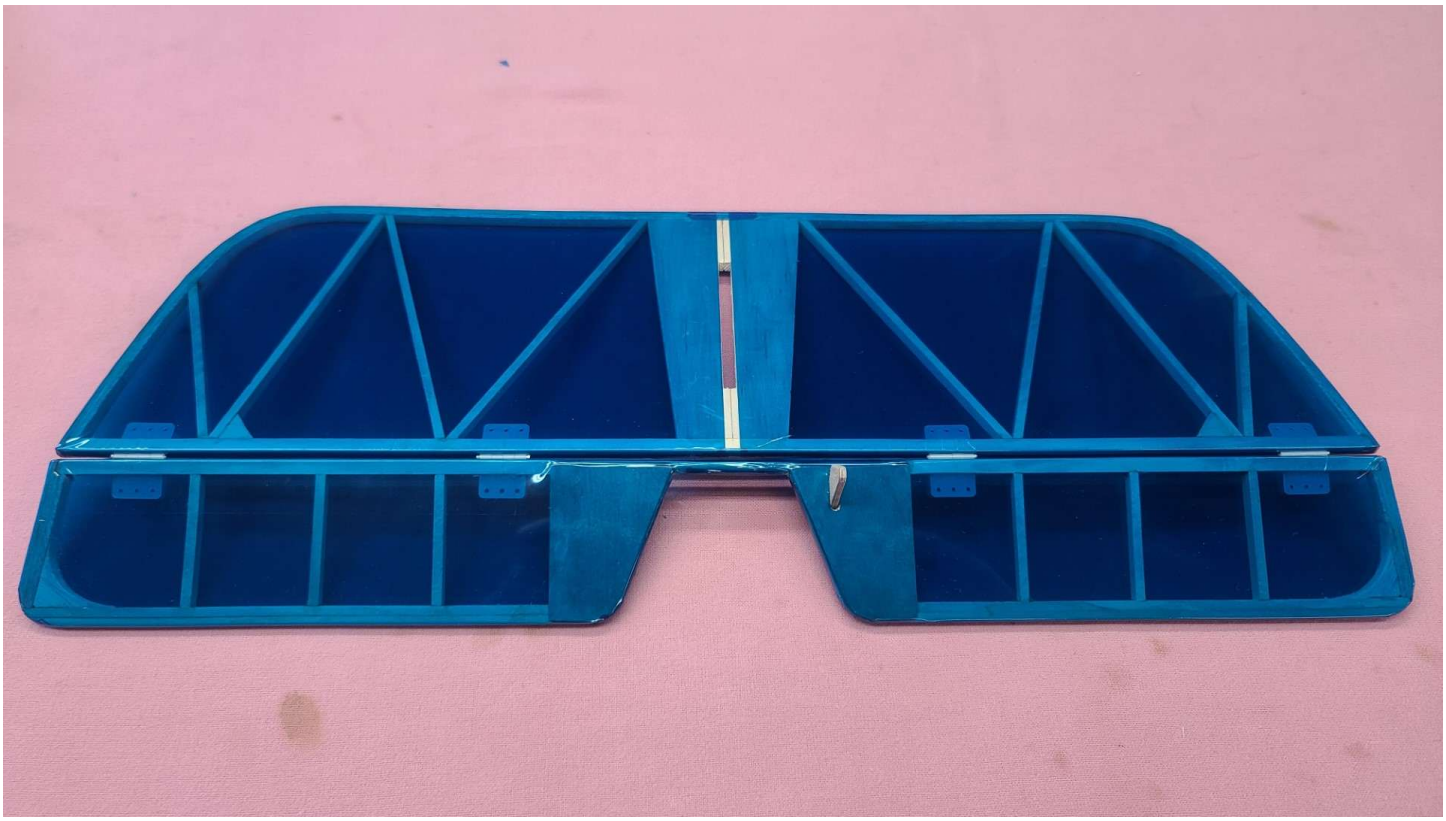

Figure 29 - Horizontal Stabilizer and Elevator Covering Completed

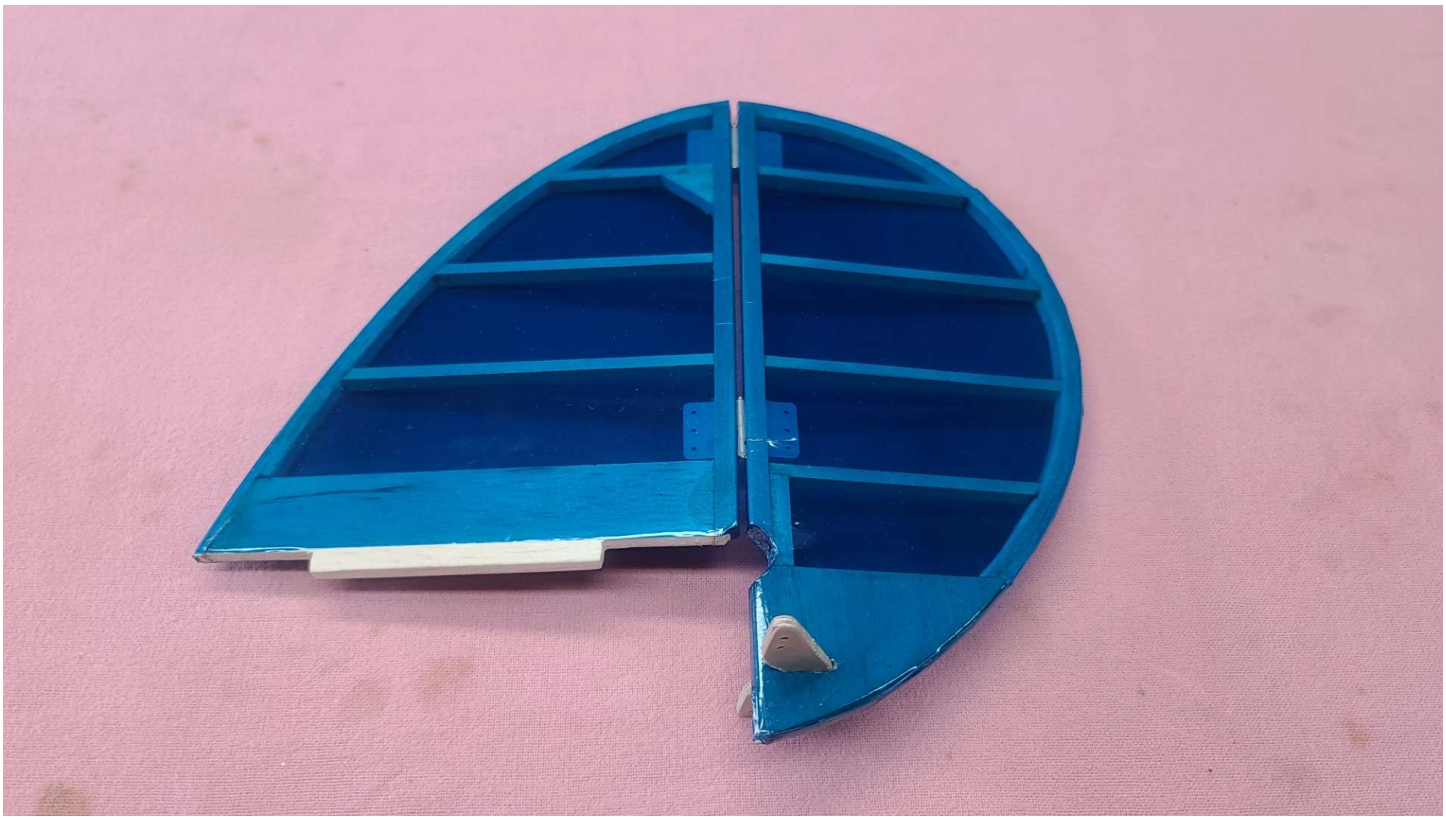

Figure 30 - Vertical Stabilizer and Rudder Covering Completed

Finally, we are covering the wing. After preparing the wing surfaces as I had done for the fuselage, I started the covering of the wing with the bottom surface. Again, I used applied Transparent Blue Ultracoat Covering Film. After covering the bottom, I cut out both aileron servo bay openings and covered the servo bay hatches. I then covered both strip ailerons and temporarily installed three Du-Bro #116 Standard Nylon Hinges in each. With the top and bottom surfaces covered, I then moved to the fuselage center section that is attached to the top of the wing. Here I used Flat Tan Top Flite MonoKote Covering Film.

With all that finished I installed the wing wire rigging center support structure on the top of the fuselage just in front of the cockpit. This was fabricated using 3/16th hardwood doweling which is epoxied into three holes on top of the fuselage. I finished off the cockpit with some black rubber edging material to cover the edge on the 3-inch cockpit hole. The pilot figure is still TBD. As you can see in Figure 31 below, all the wings' internal structure can easily be seen through the transparent film. Remember this scratch build is an RC Sport Old Timer, not a Scale build.

Figure 31 - Miss Vintage Wing Covering Completed

Alright, with the wing covering finished it is now time to permanently mount the ailerons and connect them to the aileron servo arms using Du-Bro #237 T-style Nylon Control Horns, Du-Bro #600 2-56 Spring Steel Kwik-Link Clevises, 2-56 rods, and Du-Bro #855 E/Z Links. The nylon hinges are installed using 15-minute epoxy.

Next, I need to fabricate and install the wing rigging wires or commonly referred to as flying wires. To do this I made up a set of mounting fixtures to attach the rigging wires to the wing and fuselage. These were cut from brass flat stock, shaped, and holes drilled for the mounting screw and flying wire couplings. These are shown in Figure 32 below along with the Aanraku Stained Glass (https://aanraku.com) black plastic covered hanging line and connectors, and some Du-Bro hardware (#600 Spring Steel Kwik-Link Clevises and #201 2-56 Rigging Couplers) which are used on the bottom wires where they attach to the fuselage. Nothing fancy, but all this works just fine. Figure 33 shows the flying wires and aileron control rod installed on the bottom of the wing.

Figure 32 - Wing Rigging Wires Hardware

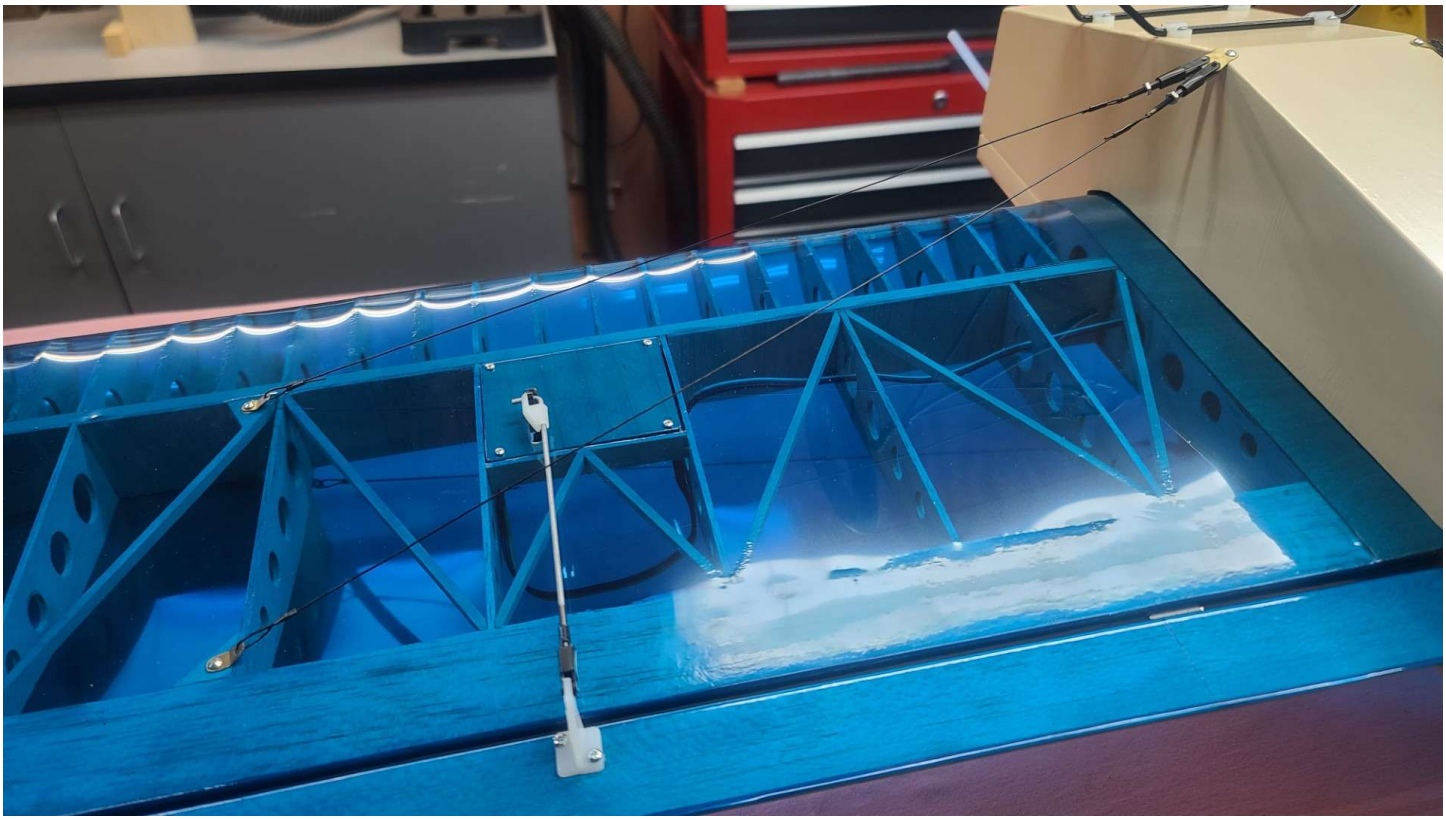

Figure 33 - Wing Bottom Rigging Wires and Right Aileron Control Rod

It is time to put some tail feathers on this beauty. Using my magnetic build board and fixtures, I first mounted the horizontal stabilizer to the aft fuselage structure using 15-minute epoxy, ensuring it was installed parallel to the

wing in the horizontal plane. You can see this in Figure 34 below with small bubble levels on the fuselage and on the horizontal stabilizer. I also ensured measurements between the building board and the bottom of the stabilizer tips were equal.

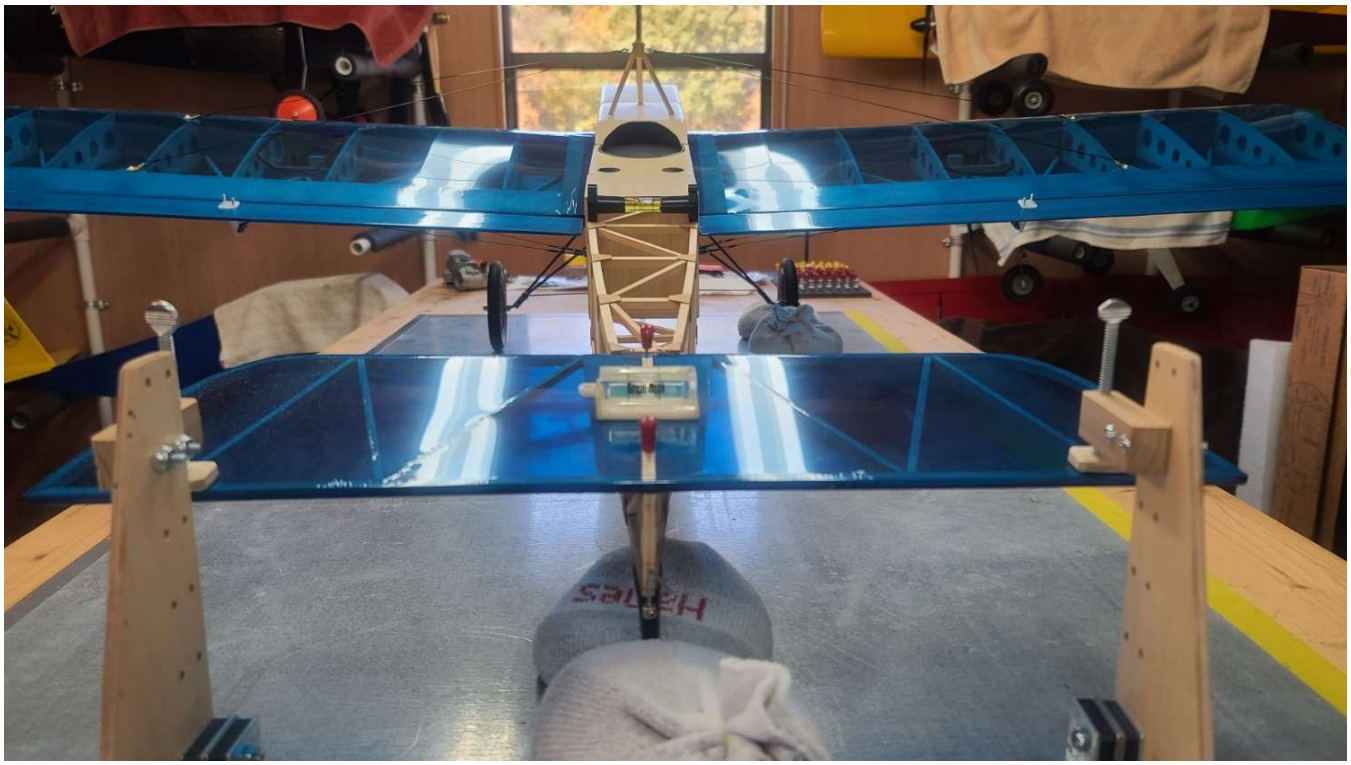

Figure 34 - Horizontal Stabilizer Installation

I then mounted the vertical stabilizer into the slot in the horizontal stabilizer using 15-minute epoxy. In Figure 35 below you can see the vertical stab held in place by a magnetic fixture and clamp, so it is 90-degrees to the horizontal stab. This was also verified using a plastic 30-60-90 triangle.

Figure 35 - Vertical Stabilizer Installation

Alright, it is time to put everything back together and recheck the resulting C.G. location. All six Du-Bro #116 Standard Nylon Hinges for the tail feathers were epoxied in placed and the elevator/rudder permanently installed. I re-installed the motor mount and my O.S. .35 SX 2-stroke engine on the firewall along with a 10x6 wooden prop. I then placed the 6-volt 5-cell 2,000mAh NiMH receiver battery on the floor of the fuselage and all the way back against former F3. The servo tray (with three servos) was again placed on the servo tray rails between F2 and F3 just forward of the battery pack, and the receiver in front of the servo tray. The wing was put back into the fuselage wing saddle with 4-20 nylon mounting screws just set into the holes but not screwed down. The only items not installed were the pull-pull wires/hardware for the rudder/elevator, but these would not change the C.G. location very much and if anything, they would help to correct the nose heavy condition we had earlier.

To again measure the resulting C.G. location, I positioned the assembled model on three digital kitchen scales in a normal flying attitude (Figure 36) and put resulting weight measurements into my C.G. calculation spreadsheet. The spreadsheet results shown in Figure 37 below were what I was hoping for this time. The C.G. was dead on at 0.0mm from the required location of no more than 78mm aft of the wings leading edge, and the total weight of the plane (without fuel) is now sitting at 4.37 lbs.

Figure 36 - Miss Vintage Final C.G. Measurements

Miss Vintage RC Model CG Calculation by Weight											
Model			Details			Weight:	4.37	lbs			
Miss Vintage			Tail dragger	Imperial							
D	740.0	mm	Distance between center point of main wheels and tail wheel	29.1							
CG(s)	78.0	mm	Distance of specified CG location from main wheels	3.1							
W(p)	908.0	g	Measured weight at left wheel	32.0							
W(s)	866.0	g	Measured weight at right wheel	30.5							
W(t)	209.0	g	Measured weight at tail wheel	7.4							
W(total)	1983.0	g	Total weight of plane: W(p) + W(s) + W(t)	69.9							
CG(a)	78.0	mm	W(total)	3.1							
W(t)	209.0	g	Weight required at tail wheel for balanced CG: W(total) x CG(a) / D	7.4							
W(delta t)	0.0	g	Delta from weight required at tail wheel	0.0							
CG(diff)	0.0	mm	Difference between actual and specified CG: CG(a) - CG(s)	0.0							
Legend:			Aircraft-specific; enter once and do not alter for this aircraft								
			Measured weights; change with every weight session								
			Calculated values; do not edit these fields								

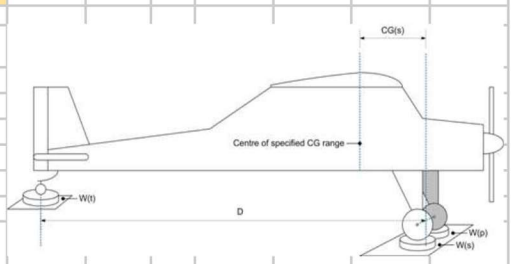

Figure 37 - Miss Vintage Final C.G. Location Calculations

We are ready to finish up this scratch build with just a couple more items. Using a Du-Bro #517 2-56 Pull-Pull System, I installed wire control cables and connectors for the rudder and elevator. I then ran a Sullivan Gold-N-Cable #508 Control Rod Set from the throttle servo to the engine throttle. With that finished it was time to power up the transmitter and receiver to run through all the controls to set-up and verify correct control throw directions, end points, exponentials, throttle idle, and the engine needle valve mixture setting. Figure 38 below shows the final arrangement of everything installed in the fuselage bay below the wing saddle.

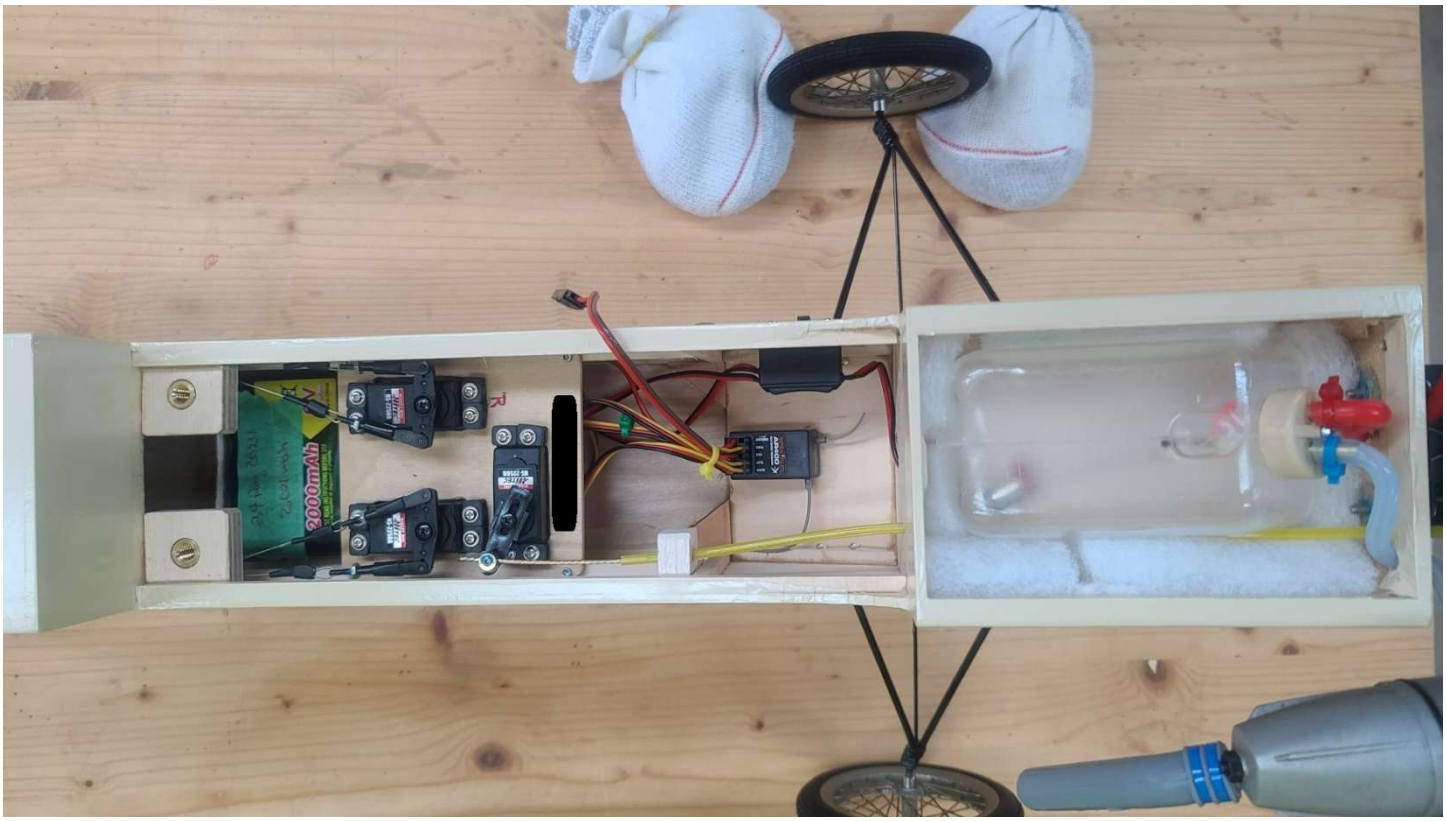

Figure 38 - Fuselage Bay Hardware Installation

I still need to decide on what to use for a pilot, but that can be done later. Figures 39 & 40 below are my finished Miss Vintage ready to head to the flying field for her maiden flight. I hope you enjoyed this build as much as I did. If you decide to build one for yourself and have any questions, please feel free to contact me @ niemanl@balsaandglass.com. Don't forget, all the images in this build description are available for you to view in greater detail on my website @: https://balsaandglass.com/Balsa_Photos.html.

Figure 39 - Miss Vintage Aft View

Figure 40 - Miss Vintage Frontal View

Figure 41 - Miss Vintage Successful Maiden Flight

Figure 42 - Miss Vintage 3D Printed Pilot Bust & Spandau-MG08 Machine Guns

Don't forget, all the images in this build description are available for you to view in greater detail and larger size on my website @: https://balsaandglass.com/Balsa_Photos.html#MissV.