ANGELWING DESIGNS

Alien Technologies

# MICRO Gentle Lady

A simple 2 channel micro glider designed for ParkZone brick radio systems.

**Specs:**
**2 channel (Rudder & Elevator)**
**30” wing Span**
**97 Sq. In.**
**1.5-2 oz. Flying Weight**
**2 oz./ Ft. wing loading**

Thank you for buying your **Micro Gentle Lady** kit **from Alien Technologies.** It is designed to be an easy building, fun to fly anywhere 2 channel micro glider. The 2M Gentle Lady designed by Carl Goldberg Models is the inspiration for this kit. It is perfect size to toss around the school yard, local slope or keep in the back seat of your car for a quick lunchtime thermal session. I hope you enjoy it as much as I do.

Although it is easy to build, it does require a nice flat surface that will accept pins to ensure the wing is built straight & warp free. A balsa building board is idea, but an acoustic ceiling tile or nice flat piece of cardboard will suffice.

Care should be taken in the covering that you choose. Lightweight film or tissue must be used. Traditional covering like Monokote and Ultracote will warp and crush the structure, do not use them! The prototype was covered in Parklite film. You must make sure not to over tighten the covering and induce warps in the lightweight structure.

All part markings should face inward and right side up unless otherwise noted. Parts should be left in their sheets until needed to prevent damage. When removing, cut the tab holding them in place carefully with an X-acto knife and sand any remnants of the tab away with 220G sandpaper for a nice tight fit.

This kit was designed in CAD and laser cut in my garage. If you have any questions, comments or concerns, please do not hesitate to contact me.

Thanks

Red

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**Equipment needed:**

- ParkZone brick radio system
- Covering (Coverite MicroLite, CoverLite, UltaCote Lite etc.)

**Tools needed to Complete:**

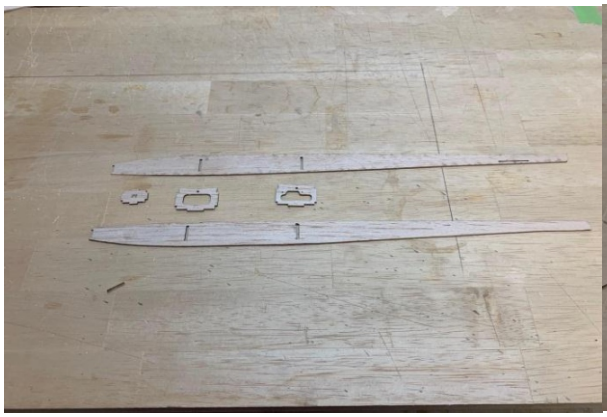
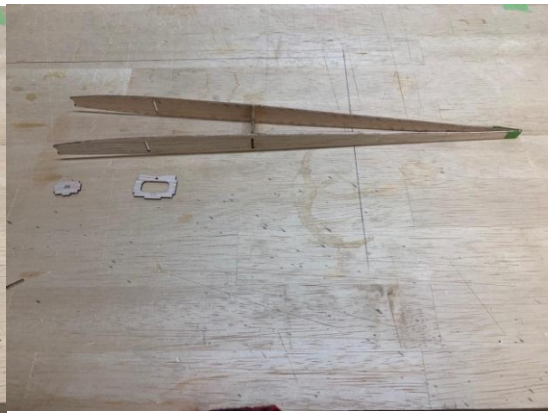
- Masking tape
- Waxed paper
- Straight or T pins
- Straightedge
- Sandpaper 150, 220 & 400 grit
- X-Acto knife
- 90 deg. triangle
- Covering iron
- Thin & Med CA, Hot glue, ShooGoo or silicone equivalent
- Small piece of Velcro

I like to use a pipette for precise CA joints, especially with the thin stuff. The parts are small and it can run everywhere right out of the bottle if you aren't careful. They are available from a few different sources, I get mine from CSTsales.com  Give them a try, I won't build without them now. Most of the construction uses thin CA, except in a few instances where med CA is called for. The fine one is shown, one with a larger tip for medium CA is also available.

**Fuselage Construction**

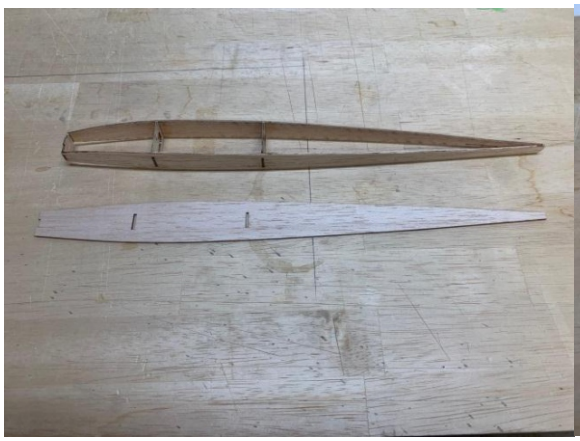
Use thin CA unless otherwise noted

1. It is not necessary to build the fuselage over the plans. Locate the left & right fuselage sides, as well as formers F-1, F-2 & F-3. Tape the aft end of the fuselage side together making sure that the right side has the pushrod exit. Dry fit F-3, do not glue.

2. Working forward, dry fit F-2 and F-1 in place. Using a rubber band around the nose helps hold everything together before you glue. Once you have everything lined up square and straight, glue the fuselage sides together at the tail, F-3, F-2 & F-1

3. Locate the bottom sheeting and fit into place. Once satisfied with the fit it can be bonded. Care must be taken so as to not introduce a warp at this point.



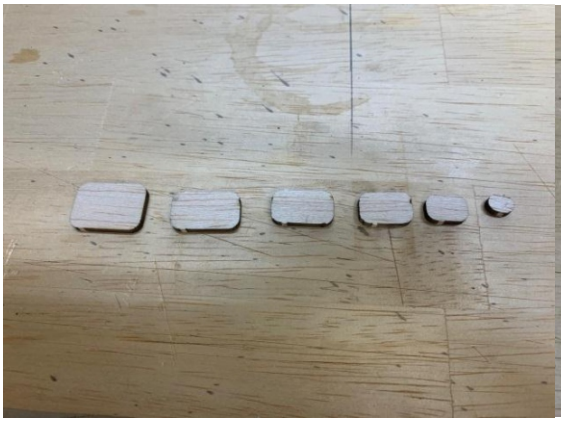

4. Find the wing dowel (it's in the hardware bag) along with the 2 dowel reinforcements (there are in the center of F-2). Cut 2 pieces of dowel approximately ½" long. Using your X-Acto knife, *carefully* open up the dowel reinforcement holes slightly so the dowels will slide in.

5. Glue the dowel with reinforcement through F-2 & F-3 as shown.

6. Locate the top sheeting and dry fit it into place. Note that the pushrod exit will be on the left side. Bond in place. **Note:** The sheeting does *not* extend all the way forward to F-3. Use the stabilizer to properly locate the sheeting. The aft edge of the stab should overhang the fuselage by about 1/32". **DO NOT GLUE STAB IN PLACE!**


7. Locate the front nose sheeting/hatch. Cuts the tabs and remove the hatch. Dry fit in place, glue when happy. Be careful not to squeeze in the sides, this can make the hatch not fit properly.

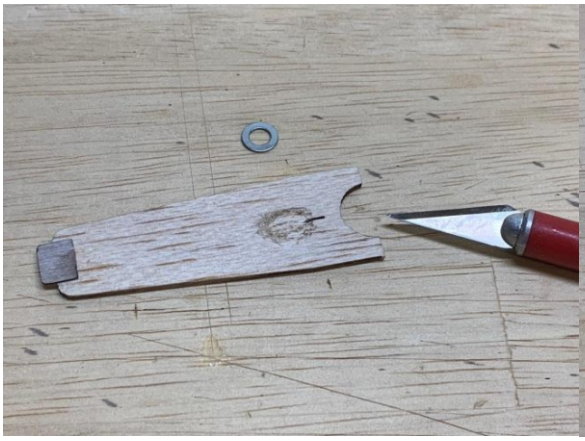
8. Locate the 6 1/8" balsa nose block pieces. Sand the front of F-1 flush and glue on the first (largest) nose block in place. Glue each successively smaller block in place until all 6 are bonded. ***Tip:*** Use only a drop or two of medium CA and try to keep it in the middle of the block. This will make it easier to sand later.



9. Locate the 1/64th plywood hatch ring (also in the hardware bag) and magnet. Lay the ring with the etched line facing *down* on a piece of waxed paper and glue the magnet in so it sits flush with the top surface.


10. Using the etched line on the hatch ring, align it in the fuselage and glue in place.

11. Locate the metal washer (in the hardware bag, probably stuck to the magnet ☺) and 1/64$^{th}$ ply hatch tongue. Glue the tongue on bottom of the hatch (the side with the etched ring) with the mid line even to the front of the hatch and rounded ends protruding. Using your knife again, remove balsa in the circle so that the washer sits flush with the surface. Glue the washer in place with medium CA. Do not glue in the hatch pull (also on 1/64$^{th}$ sheet) at this time.



12. Your hatch should now fit nicely in place with a click. Sand the hatch if necessary to get a nice fit. **Note:** aft end up the hatch will sit a bit proud. This due the curve of the top of the fuse and the hatch being stiff. Not to worry, this will easily sand flush. Sand the entire fuselage and prepare it for covering.

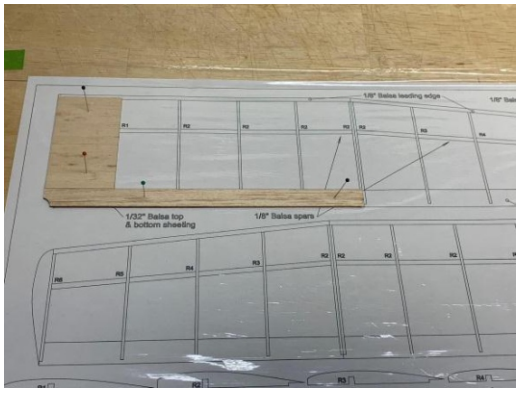
**<u>Wing Construction</u>**

Although the wings are built directly over the plans, humidity (*or lack thereof)* can cause the plans to shrink or stretch. This can make the parts appear not to fit exactly. Not to worry, the parts are self-jigging and will end up in the right place. Use the plans as a reference to keep the ribs straight etc., but don't fret if the parts don't match the plans exactly.

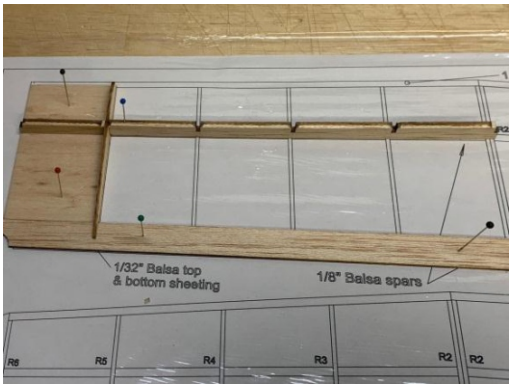
Each wing half is built with an inner and outer portion. There are joined together later to get the proper dihedral and polyhedral angles. The spars are cut with the dihedral & polyhedral angles precut, and a jig is included to check for accuracy.

<u>Begin with the right wing.</u>

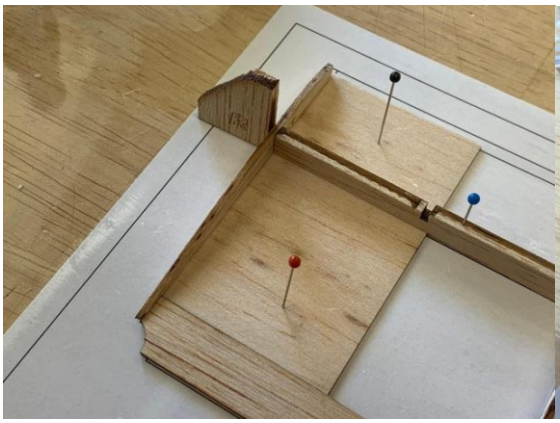
1. Locate the 1/16" trailing edge (with the round notch) & 1/32" center sheeting (shorter one without the etch mark) and pin in place over the plan, but do not glue.

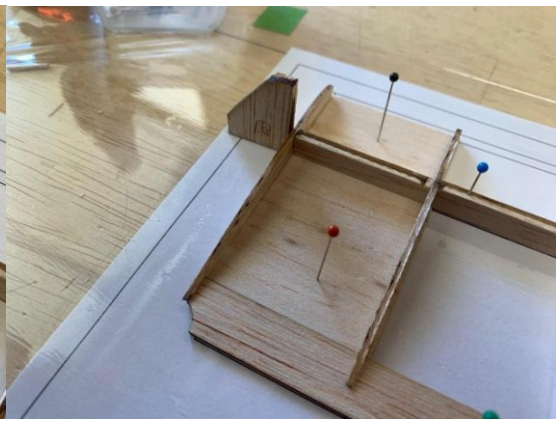



2. Locate the 1/8 spar and position it in place over the plan, but do not pin.



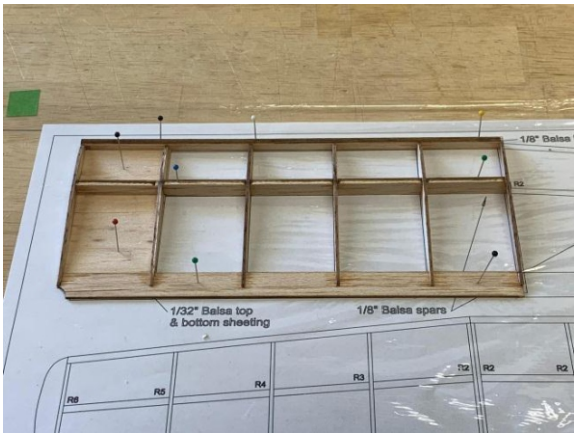

3. Locate the dihedral gauge & (2) R-1 ribs. Using the gauge, place R-1 at the proper angle on the spar with the notch tight at the trailing edge. Add the second R-1 the same way, but vertical.



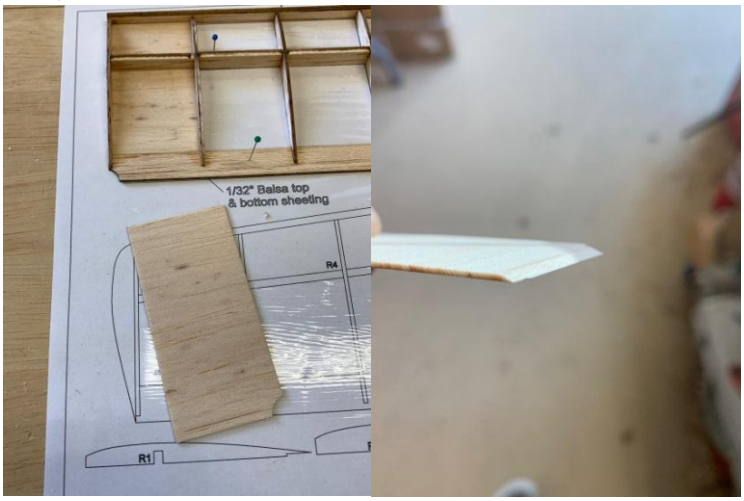


4. Add the rest of the R-2 ribs and glue in place. **Note:** Make sure to use the M gauge to set the correct angle. (not shown)

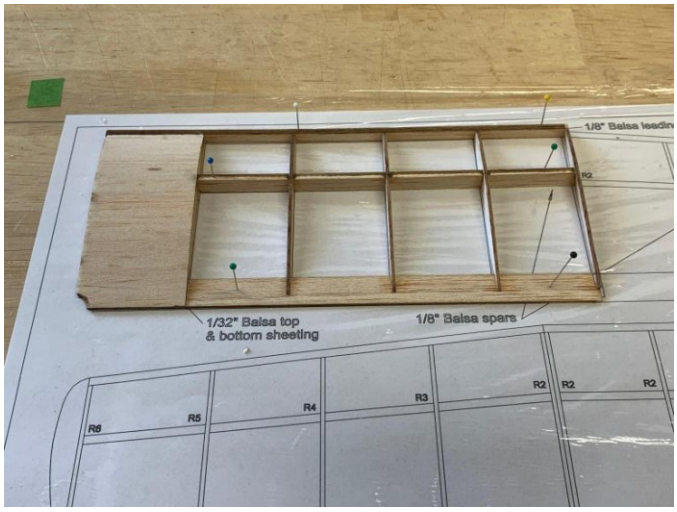

5. Place the 1/8" leading edge up against the ribs and bond in place.



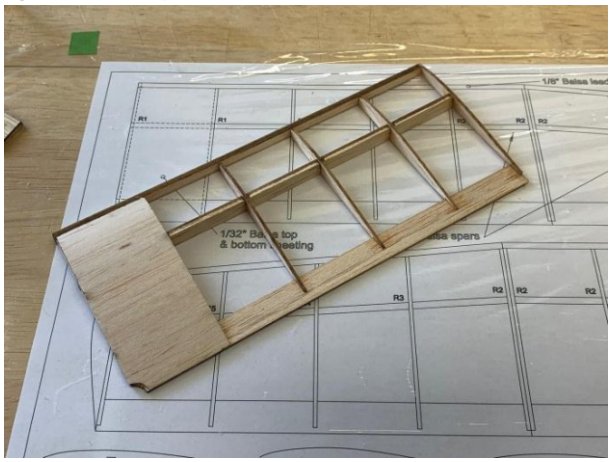

6. Find the 1/32" top sheeting with the etch mark. Taper the sheeting to a point from the etch mark to the edge.




7. Check the fit of the sheeting, when satisfied bond in place with medium CA.

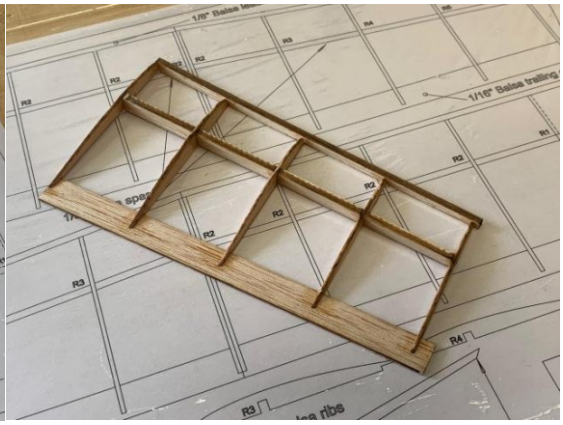



8. Remove the inner wing from the plan and set aside.



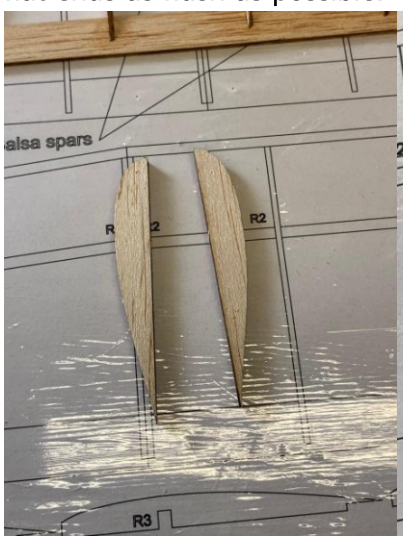

9. Locate the tip trailing edge, spar and ribs R-2, R-3, R-4 & R-5 and pin in place. Make sure to use the M gauge to check the angle of R-2. Once satisfied with the fit. Note, the tip spar will fall slightly short on the plan; this is a design change that the plan doesn't reflect. The trailing edge is intentionally long.

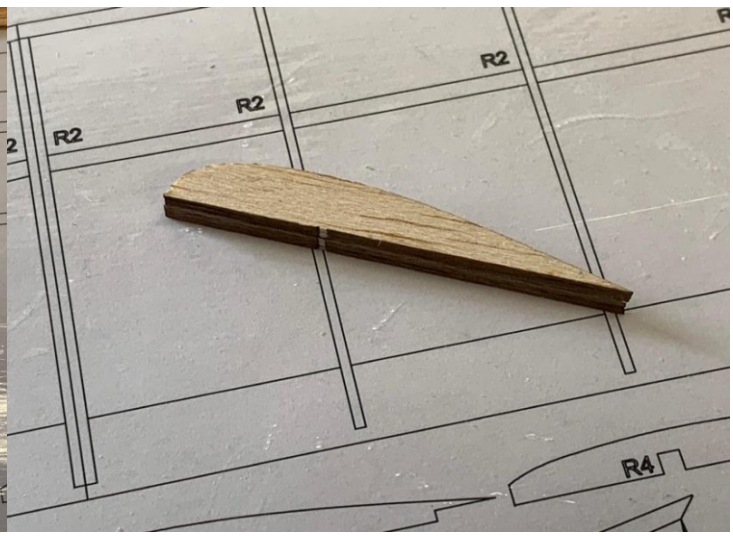

10. Pin the leading edge in place and bond to the ribs. Once dry remove the tip from the plan.



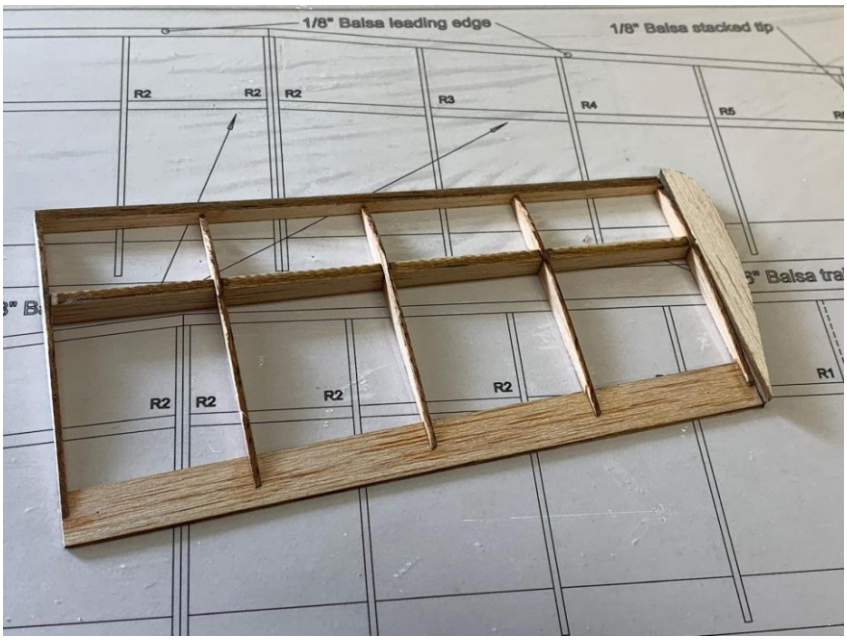

11. Sand the ribs flush at both ends of the wing.

12. Locate the two 1/8" balsa tips and laminate them with medium CA. Take care to get the flat ends as flush as possible.



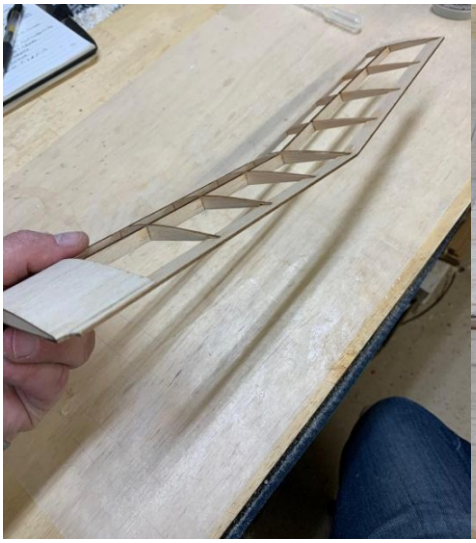


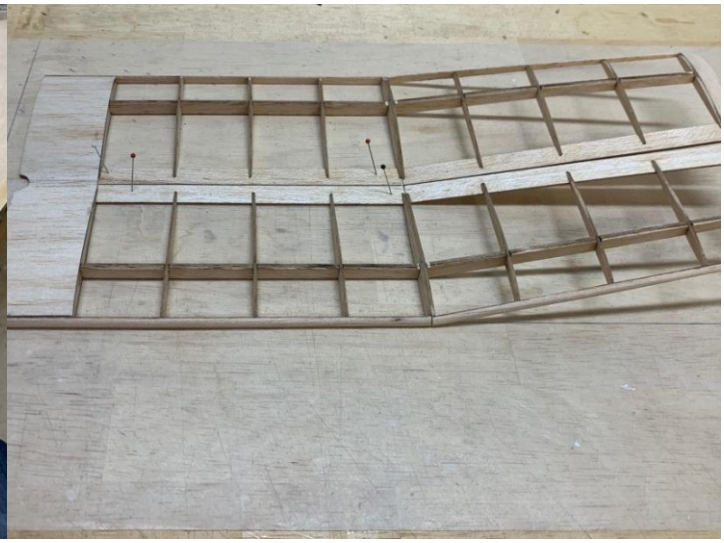
13. Glue the tip to R-5.




14. Repeat steps 1-13 for the *left* wing.
15. Once all 4 panels are built, now is a good time to shape the leading edges and tips prior to joining them together.

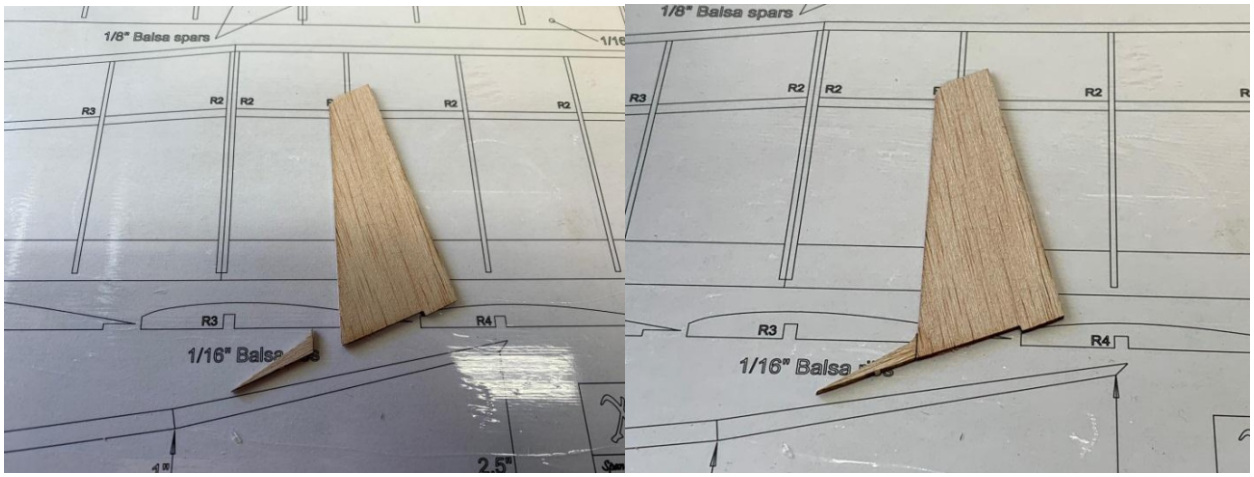
16. With the inner panel pinned flat, block the tip up to achieve 1.5" of polyhedral. Sand the inner/outer joints so they match for a good bond. Pin the second wing right behind it so you can match the angles precisely.





## Tail Construction

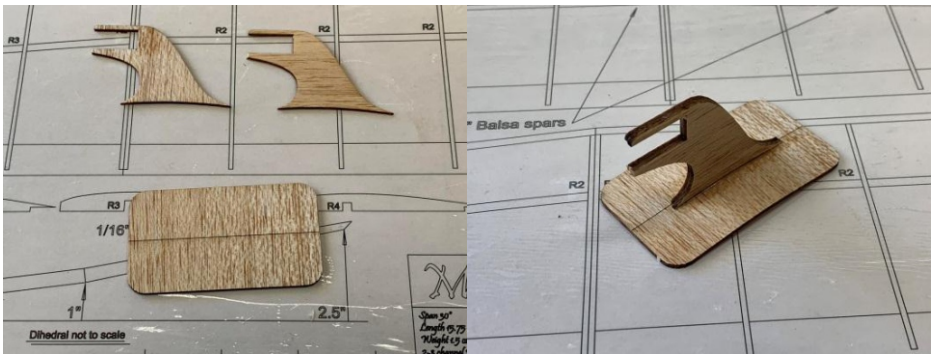
1. There only construction is bonding the dorsal to the fin. The rest of the work is sanding, covering and hinging.




Sand the entire airframe in preparation for covering. I start with 80g to rough shape the nose and tip blocks, and then switch to 220g finally finishing with 320-400g.

## Power Pod

1. Glue the two uprights together; once dry fit the saddle in place. Use the etched line as a reference to keep it straight and glue it securely.



2. The motor can be secured with hot glue. You will more than likely have to extend the wires to reach down the back of the pod, through the rear wing hold down hole and forward to the brick. Wire from an old servo works well for this. The pod is simply held in place with the wing rubber bands, two on either side of the upright. Position the pod forward far enough for the prop to clear.

I used an 8mm motor scavenged from a ParkZone Mustang and a Plantraco DD turbo prop. I suspect that there are many other power combos out there that would work equally well or better.

**Covering**

Once again go over the entire airframe, this is your last chance to check for blemishes. I'm going to assume that you know how to cover, so I will not go over it step by step. However I will offer a few tips.

- Cover the bottom of the wings first. This helps to hide the seams and makes for a nicer job. I was able to cover the bottom in of both wings in one piece. Move to the top next. This I had to do in 4 pieces, 1 each left and right inner and outer panel.
- Cover the fuselage starting with the bottom, each side and finally the top. Add the 1/64$^{th}$ ply pull tab to the hatch after its covered

The sequence below describes my method for using covering as a hinge. Although it takes a bit more time this makes for a very durable hinge and I think a nicer looking model. If you plan to use another hinging method, please read though below and deviate where appropriate to suit your needs.

1. Locate all of the tail pieces. Tape the rudder in place and sand to fit if necessary to achieve a tight, straight gap.
2. Round all of the leading edges and trailing edges, but *do not* sand the hinge lines.
3. Next sand a 45 degree angle into the bottom LE of the elevator. Pay attention the slot for the control horn will be on the ***right side***.
4. Sand a 45 degree angle into the LE of the Rudder. Notice the bevel is in the ***right side*** of the Rudder.
5. Sand all of the tail pieces in preparation for covering. Be sure to round all of the edges except for the TE of the Stabilizer and Fin, leave these squared off.
6. Cover the bottoms of the Stabilizer and Elevator first. Once done tape the Stabilizer and Elevator together (over the covering), flip it over and cover the top in one piece. This will yield a nice tight gap free hinge.

7. If the elevator hinge is too tight, you can head it it up with your iron and flex it further if necessary.
8. Use the same process for the rudder.

## Final Assembly

Locate the two .020 music wire pushrods (they are taped inside the shipping box). Both ends will use a modified "Z" bend for control hook up. While not difficult, care must be takes as once they are bent, there is no adjustment. It is best to use two small pair of needle nose pliers to make these bends. This type of bend allows removal by "rolling" the pushrod out of the servo arm or horn. You can fudge the length a little when you glue the control horn in place however.

1. Start the process by making a 90 degree bend 1/8" from one end.

2. Make the second bend 90 degrees from the first.

3. Repeat for other pushrod.
4. Install the pushrods into the fuselage. Starting from the back, feed them through the slots and forward through the holes in F-3. They will cross over each other. The rudder pushrod will end up on the right side of the fuse, and the elevator on the left.
   *Note:* The pushrod on the right side of the brick drives the rudder and will exit in the *left side* of the fuselage. The pushrod on the left side of the brick drives the elevator and will exit on the *right side* of the fuselage.
5. Using a couple dabs of hot glue, secure the brick in place up against F-2. Measure pushrod length at the servos and make another Z bend. Install both pushrods into the tabs on the brick servos.
6. Turn on your radio system and make sure the servos are centered. If you are using a 4 channel brick instead of the recommended 3 channel, your rudder control will be on the left stick (mode 2). If this is the case you can simply move it to the right stick by mixing aileron to rudder at 100%
7. Glue the stabilizer to the fuselage with thin CA making sure it is level square. There is no need to remove any covering, it will stick just fine.
8. Test fit the rudder, once satisfied with the fit, glue in place with thin CA, again making sure it is all square.
9. Starting with the Elevator, locate the 1/64$^{th}$ ply control horn. Uncover the horn slot in the elevator with an X-acto knife.
10. Place the horn in on the pushrod and install in the slot.
11. Tape the elevator straight. Making sure the servo is still centered, and then fit the horn in the slot in the Elevator. Adjust the horn till it is vertical and keeps the elevator centered. Glue in place with thin CA.
12. Repeat for Rudder.

13. Add a piece of Velcro in the fuselage to hold the battery in place.
14. Rubber band the wing in place. I use (4) bands.
15. The CG is located on the aft edge of the spar. Add nose weight to achieve proper balance. It should hang slightly nose low. BB's and epoxy as well as lead shot work well for this. I added shot inside the hatch cavity.

Congrats! Your Gentle Lady is now complete!

**Preflight**

- Double check CG. You can always move it to suit your taste later.
- Check for proper direction of Rudder & Elevator. ***Caution:*** *do not* set your servo travel beyond 100% as this can cause the servos to bind up at the end of the travel.
- I use about 20% expo but it's not necessary at all.

**Flying**

Start with a few gentle hand tosses to check CG, then wind up and let it rip. It will withstand the hardest javelin style launches you can muster. It is also very at home on the slope. There is no provision for a tow hook, however I have had good luck bending one out of pushrod wire and taping it in place near the CG. Experiment with placement for best position.

Of course it is most at home just tooling around at minimum sink looking for the next thermal bump, but simple 2 channel aerobatics including loops, wingovers, spins etc. are all in its bag of tricks.

**Options**

- A simple strip of 3M packing tape on the bottom of the fuselage will help protect the covering on rough flying fields.
- You can make a simple bungee from ¼" (or larger)free flight rubber and a length of lightweight monofilament line. The lengths are up to you and should suit your flying area. A general rule of thumb is about 1/4 rubber to 3/4ths line. Attach a brightly colored ribbon near the loop so you can easily find it after you land.
- An aerotow hook can also be made from the same .020 wire. I simply glued it to the right side of the nose block straight out to the side about ½". You can bend this slightly back to hold onto the towline, and when it's time to release you can simply turn sharply left and the towline will slide off.

Enjoy!

Red