J&H Aerospace GLH Build Guide

Welcome to the GLH build guide. This is a classic 1/2A or electric pylon racer with excellent handling characteristics, capable of using a wide range of inexpensive power systems. This model can be built in two or three days, due to the self-jigging construction, which takes out the tricky stuff typically required of a balsa airplane.

To build this model, you'll need the following:

Thin CA Medium/Thick CA Hot glue Xacto Knife/Razor Blade A sanding block. I use 80 grit on one side, and 240 on the other A razor plane (Optional) Covering iron Soldering iron/Lighter/Heatgun (To shrink heatshrink) Pliers Wire cutters/Dremel with cutoff wheel

To begin with, check the included materials list that came with the kit, and assure that everything listed is included.

This airplane builds into two pieces, the wing and the fuselage assembly. You won't need plans or anything, it all self jigs together. All wood-to-wood glue joints can be made with thin CA; however, we have assembled all of our GLHs entirely using medium CA.

Be sure to follow the construction order shown. The parts all interlock, and if you assemble them out of order, you can run into problems getting the other parts in place. The parts are all labeled, and we installed them for this manual with some of the labels facing out for clarity. You should consider placing them so the labels face inward so that they don't show through the covering (in a few cases this is unavoidable, so consider using windex or similar cleaners to remove the engrave scorching and then sand as needed. Be sure to build over a flat surface and pay close attention to warps. It is possible to remove warps by heating the covering, however it's better if they aren't there to start with.



Begin by assembling the fuselage center section cradle from 1/8" plywood.

The fuselage cradle is made from F2, F3, and the battery/servo tray.



F2 slots into the labeled end of the tray, and F3 slots into the servo end of the tray.



Locate the battery section fuselage sides, FS2.



Install the FS2 sides on the fuselage cradle assembly.



Attach FB1 and FB2 on the bottom of the cradle.



FB2 is the aft fuselage bottom. It slots into the fuselage cradle assembly and sides as shown.



FB1 attaches to the front of FB1 and protrudes forward.



The FS3 fuselage sides form the aft fuselage. Glue them to the back of the fuselage cradle.



Seal the FS3 sides into the bottom, FB3.



Attach the aft fuselage top deck, FT2. You may find that the aft fuselage closure below the horizontal tail slot tends to close together excessively, and this can interfere with the elevator pushrod. You can mitigate this effect by inserting a scrap piece of 1/8" balsa flush with the bottom of the stabilizer slot. Glue it in place.



Install the fuselage nose sides, FS1.



Attach the nose top deck, FT1.



There are three firewalls included. One for electric, one for a 1/2A engine mount, and one blank for custom installations. Select the one you intend to use.



Install the firewall. For electric installations, select the orientation you wish for the motor wire port. If you are using a glow engine, be sure to install blind nuts in the firewall before attaching the firewall. Also for glow engines, after the fuselage is fully assembled and sanded, cover the front of the fuselage with fiberglass to fuel-proof and reinforce it.



Remove the plywood FT3 and FT4 from the parts sheet. Install a blind nut in FT3, then install FT3 in the fuselage center section where it will serve as the aft wing hold down.



Glue FT4 atop FT3, being careful to avoid getting glue into the blind nut.



The wing is assembled in halves. Pay careful attention to build a left wing and a right wing. We will start with the left wing.

Locate a wing spar (W3) and 4 of the R1 ribs. The root of the wing spar is the end with rib slots closer to the end, out of the usual rib spacing for the rest of the spar.



The ribs do have a top and bottom. The lettering is oriented toward the top. The installation below shows the R1 ribs being installed atop a bottom spar (the top and bottom spars are identical). Note that the 5th R1 rib in the wing, the end rib, is installed after the top spar.



Each wing will receive two R2 ribs at the servo station, which is the 3rd and 4th stations from the wing root.





Install an R1 rib next to the root rib station.



Install the top spar.



Install the leading edge, W2, and the trailing edge, W4.



Install the root wing rib, R3.



Install the tip rib, R1.



The left wing is now complete except for sheeting.



Build the right wing as a mirror of the left wing following the same steps.





The wing panels are now complete. Do not attach them at this time. Instead, attach the leading edge top sheeting. You can achieve an easy match to the wing by beveling the underside of the leading edge of the sheeting, however it is also possible to glue the sheeting in place without pre-beveling.





Sand the wing roots and then carefully line them up and glue them together.





Install the W9 wing joiners top and bottom to strengthen the wing center section.



Glue the wing center section trailing edge, W6, to the back of the wing, flush with the main span trailing edge.



Glue the wing hold down reinforcement plate, W8, to the top of the wing center section trailing edge, flush with the back of it. Sand the bottom to match the curvature of the fuselage.



Prepare an aileron servo for installation. Center it using a servo tester before installation.





Glue an aileron servo to one of the servo mounting plates.



We recommend clipping the mounting tabs off the servo.



Glue the servo/sheet assembly to the wing spar, lined up with the R2 ribs.



Glue the rest of the sheeting down so that it attaches to the ribs and leading edge. Rotate the servo horn into the slot to prepare for covering the wing.



Thread the servo wires through the ribs into the center section. You may wish to add some sheeting to the bottom of the wing center section to make a hard point for the servo leads to pass through.



Attach the R4 plywood ribs to the wingtips.





Sand the wing, fairing the leading edge in. The GLH is intended to have a sharp leading edge. DO NOT sand the wing leading edge round in the wing center area between the R1 ribs. This is the mounting surface for the wing leading edge hold down.





Use a quality razor plane or sanding jig to shape the ailerons, W7. Bevel the leading edge of the aileron for the hinge. We recommend having the hinge on the top of the wing rather than the bottom.





Sand the wing and fuselage to a smooth finish.



Sand the horizontal tail leading edge.





Bevel the elevator leading edge for its hinge and then sand the rest of the edges to a smooth finish.



As you continue with the build, you will need to begin covering parts of the airframe.

I'm just going to give a basic overview of how to cover. Included will also be some links of more in depth explanations.

The included doculam covering is very forgiving and easy to use, and it can receive paint on the adhesive (dull) side. If you prefer a different brand/type of covering, feel free to use it, as this aircraft is fine across a broad range of covering options.

The most important part of covering is having time and sharp blades. I'll normally use 3-4 cheap single edged razorblades when covering a wing. If it doesn't cut by sliding through the plastic, it needs to be changed out for a sharper blade.

I cover each wing panel in two pieces. One on the top, one on the bottom. If you're feeling brave, you can cover the entire side of a wing one piece. However you do it, cover from the outside in.

I cover the bottom of the outer wing panel first, and the top second. Start at the bottom outer panel, tack the film down along the edges up the ribs, then trim the film a half inch outside of the wing. Start wrapping the film up around the edges. To do this for the tip, cut the film on the corners, and then just push the film up and around the tip. High heat is useful. Once everything is tacked, trim the film from the leading and trailing edges, and the tip.

Take a piece of film oversize from the wingtip. Lay the film on top, then tack the film on top of the ribs. Then tack the other 3 sides/edges, and wrap it around the edges. Then trim.

Covering the fin and control surfaces is even easier. Lay down a sheet of film on top of the surface, stick on, wrap around the edges trimming where necessary, and then do the same for the other side. Some overlap is required, but not a massive amount. I can normally get away with a 1/16" of overlap.

The main thing is to take your time! It takes me at least 1-2 hours to cover things nicely enough to be willing to show other people my work. Here are some useful links that show some other techniques. There are a million different ways to cover, and its up to you to find a method you like!

http://www.rc-airplane-advisor.com/heat-shrink-covering.html

http://amaflightschool.org/diy/covering-techniques

https://amaflightschool.org/getstarted/how-cover-model-airplane

Hinge tape can be used to mount the ailerons, however we recommend that you use doubled doculam hinges. If hinged top and bottom with doculam, the ailerons will have absolutely no slop and will be more flutter resistant, allowing higher top speeds for the airframe.



Once the horizontal tail and elevator are covered, hinge the elevator in place

Cover, at a minimum, the tail surfaces and aft fuselage before continuing.



Install the elevator control horn in its slot.



Bond a 13" length of carbon rod to one of the long pushrods and bind in place with glue and thread to serve as a stiffener as shown.



Install the pushrod into the elevator horn before sliding the horizontal tail/pushrod assembly into place.





If you plan to use a rudder, cut the rudder area loose and hinge it as you did the elevator. The rudder pushrod does not require a carbon stiffener since it uses a mid-length slot which stabilizes it. Install the vertical tail. We did not use a movable rudder on our example.



Prepare a servo for the elevator pushrod installation. Use whatever horn has the shortest radius from the servo. You need very little travel to achieve full elevator authority, and in most installations you will end up dialing back your elevator throw. Center up the servo before installation.



If using a fin, you will need to install the elevator servo with the horn toward the outside of the fuselage. If not, you can install the servo with the horn facing inward, which results in a straighter connection. Cut the pushrod to length after the installation is complete.





If there is any excess play in the elevator, squirt a small amount of glue into the control horn, both at the servo (accessible through the vent hole) and at the elevator. Use a servo tester to work the servo back and forth as the glue dries so as not to overload the servo when breaking the glue free. This will eliminate slop, reducing the tendency to initiate flutter at high speeds.

Install the wing leading edge hold-down, W1, on the wing leading edge (remove the covering on the mounting surface). Install the 1/8" carbon tube in the hole in W1, flush with the back so that it protrudes forward to engage the fuselage cradle front bulkhead. Sand the hold down to match the fuselage top and wing.



Install the aileron control horn linkage connectors, center the servos, and install the pushrods, cutting them to length.





Install the motor and speed control. Once the speed control/motor are configured for proper rotation, install a propeller. We recommend starting with a 6x4 APC prop for trimming, and then moving up to a 6x6 prop if you wish to pursue higher speeds. The recommended motor is capable of running on 6s power, but you will need to back down to a 5.25" or smaller propeller for such high voltages and monitor the motor temperature closely.



Congratulations! Your GLH is now completed. Adjust your initial throws for about 15 degrees deflection and balance the aircraft as recommended. Ensure proper direction on the control throws, and you should have a very uneventful maiden flight. You can shorten the landing approaches by configuring the ailerons for a spoileron mode. We recommend activating the motor brake so that you can get the prop level on landing.



We really hope you enjoy this crazy airplane as much as we do!

If you have any questions or comments, please contact us through our contact form: http://jhaerospace.com/contact/

Or contact Josh at joshuawfinn@gmail.com