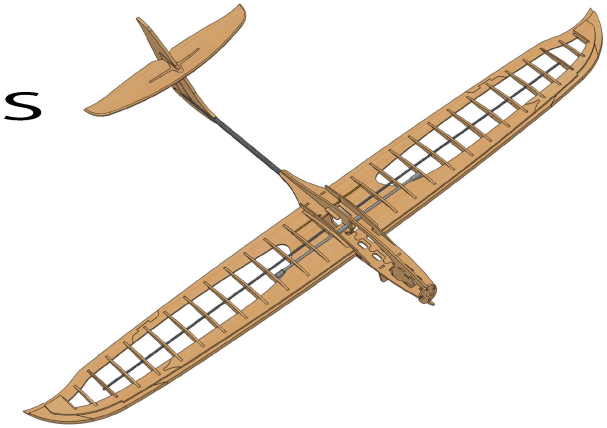
Z22ES



Electro-Shock Construction

Thank you for purchasing the Z22 by Zaerotech. The Electro-Shock is a fast airframe for mini pylon racing, or just fun at the field

I've put a special effort into making this kit technically satisfying for the intermediate to advanced builder. Tolerances are tight, considering the material and its thickness variations. So take your time, dry fit everything first, don't overdue the adhesive, but most of all, have fun

Always check the Z22 product page at www.zaerotech.com for the latest construction manual. It updates about once a month, and is a must, to ensure you have up-to-date information

Construction Guidelines

Removing Parts; The parts have been designed to break-out easily with your fingers. Carefully stress the separator tabs to remove. If in doubt, use a modelling knife to help

Adhesives: Although construction time is dramatically reduced using Cyano adhesives, Thirty-minute epoxy or Aliphatic resins like TiteBond, work equally well. The Aliphatic represent the easiest sanding option, but require more time. Epoxy is the best option, as it can be thinned and brushed onto the entire structure to strengthen the overall design, and seal the wood. If flying moderate slope conditions as a rule, the epoxy option will bring the loading up enough to increase penetration. Five-minute epoxies are not recommended

Covering: Use a medium covering, as heavy weight material will over-stress the structure, and could damage it. Use an iron with a sock to shrink the material, rather than a heat-gun

Electronics: The Electro-Shock is designed for 2-3S Lipo, and up to 60 watts of power. If you purchased the Stage 2 kit, the servo's operate at a maximum of 5 volts. Do not operate at 6V Rx voltage

Fastening components: Use small Velcro straps or plastic ties to secure the Battery, Rx and ESC. Fix the servo's in-place with silicone adhesive, a drop of Aliphatic resin at several points, or other nonpermanent means

Enjoy the build Kevin J. McDonald

Zaerotech.com

Wing Detail
(Left Wing Shown)

Step 1 - Lightly Sand all wood parts with 320 grit sandpaper. Make sure the separation tab material is removed, so that parts will mate properly. Do not overdue it, as the parts are designed to fit by simply sanding off the laser residue

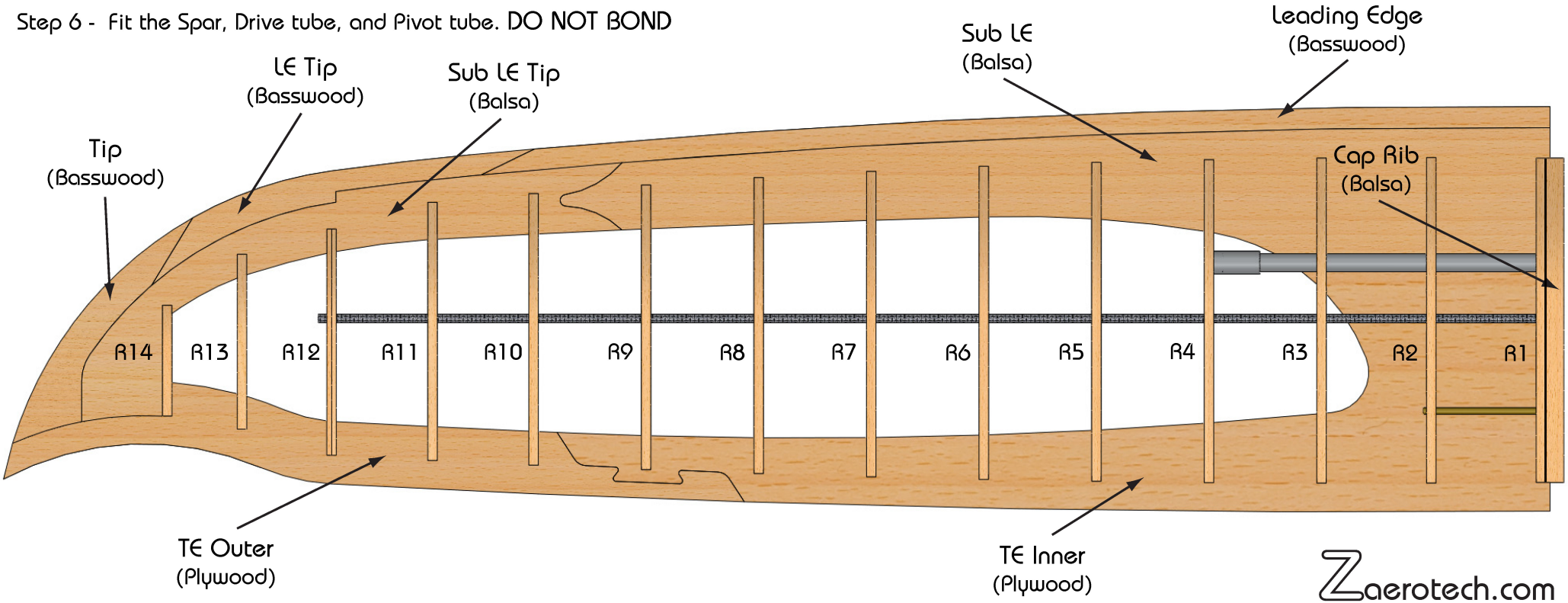
Step 2 - Deburr all metal parts, removing ridges and sharp edges. Test fit all metal parts before bonding, and make sure they are clean and dry. Sand the ends of the carbon parts to produce a small chamfer. This will help them slip through their respective capture points // Test fit the spar and tubes to thier respective holes in the Ribs. Be careful. Until the parts are integrated, they are prone to splitting and cracking. All fit should be snug, don't over sand

Step 3 - Arrange the plywood & balsa parts on this plan for the Left Wing. Use the other plan for the Right Wing // Pin only at the laser holes to avoid splitting the wood. Pin the outside edge near the joints to close any gaps that might appear // Dab & press adhesive into the joints, and let cure

Step 4 - Bond R1 in place using the Multi-Tool to insure it installs at 90 degrees to the work surface. MAKE SURE THE RIB IS FLUSH TO THE BUILDING BOARD AFT OF THE CARBON SPAR LOCATION. It is easy to rock the rib foreward on its lower entry

Step 5 - Fit and bond the remaining Ribs by sliding the aft end into the slot first, then rotating it down into the foreward slot. Do not force any fit. Sand if needed, but most importantly, take your time and align the ribs perfectly before pushing them home. Make sure the adhesive forms an adequate fillet at all points of contact

Step 6 - Fit the Spar, Drive tube, and Pivot tube. DO NOT BOND



Zaerotech.com

Wing Detail
(Right Wing Shown)

Step 7 - Slide the aluminum Pivot tube out far enough to fit the aluminum Coupler onto the end // Insert the Magnet into the Coupler, and fit it to the Pivot tube. Slide the Pivot tube back in toward the tip until it stops, making sure the Coupler is flush against Rib 4 // Apply GAP to all points of contact. Avoid thin CA, as it can wick into the Coupler and compromise the Magnets function

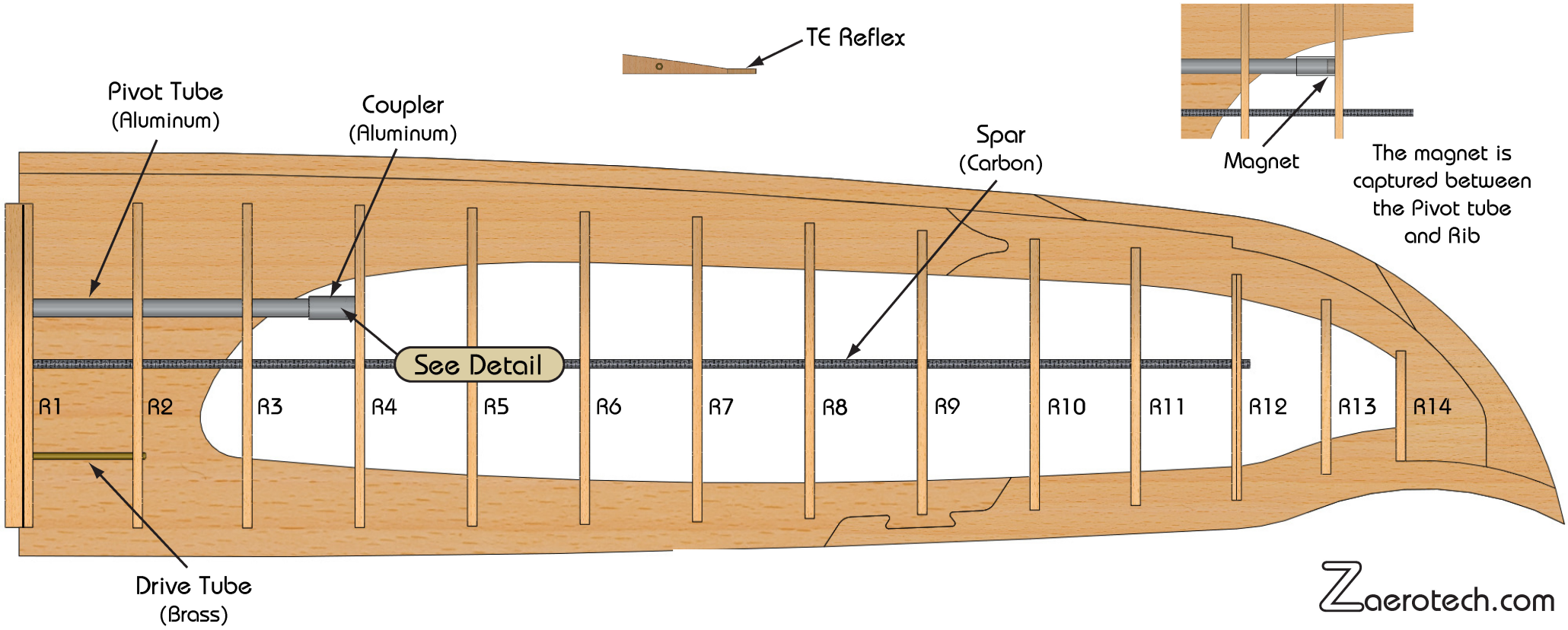
Step 8 - Slide the carbon Spar through the Ribs and flush with Rib 1. If the Spar is tight, lightly sand it // Apply CA to all points of contact

Step 9 - Fit and bond the basswood Tip. DO NOT USE PINS on any basswood parts // Fit and bond the basswood LE Tip, the the basswood LE

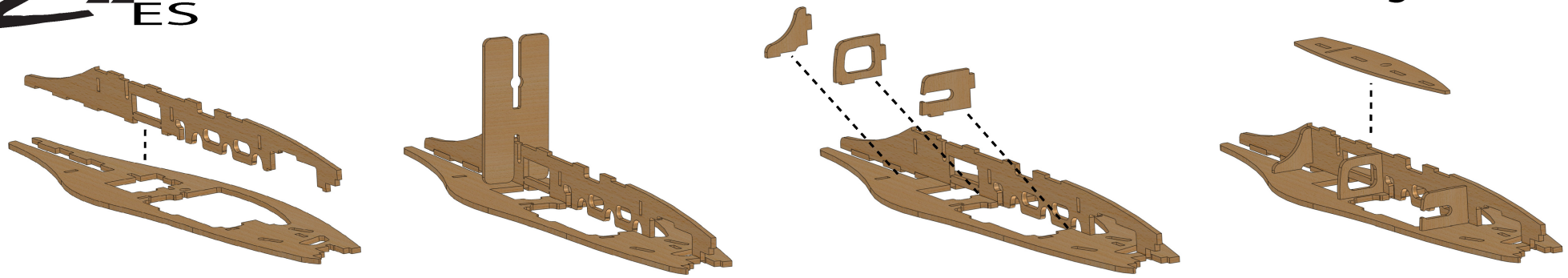
Step 10 - Bond the brass Drive tube, flushing it with the protruding Pivot tube // Fit and bond the balsa Rib Cap

Step 11 - Bond all points of contact between the parts, and form adhesive fillets where the basswood parts join the ply parts

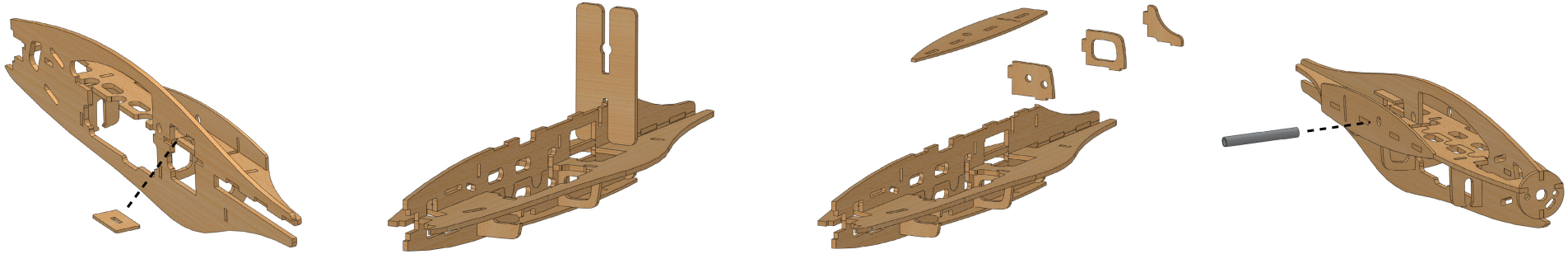
Step 12 - Sand the LE using the templates as final shape guides. It is best to sand the bottom entry first, then the top. Be careful not to sand into the rib, it is the primary guide to determine the foreward entry of the section. Use a fine grit sanding block to carefully sand the ribs until the laser residue is removed. Sand only until the ribs are dark brown, rather than showing fresh wood // Sand the TE to suit, but allow it to form the small reflex inherent in the section as shown.



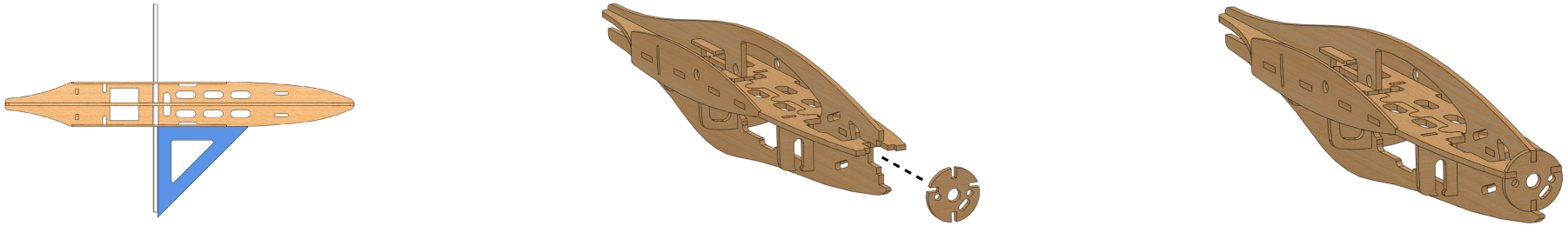
Fuselage Detail



Step 13 - With the Vertical Spine on a flat surface, fit the right Horizontal Spine. Use the alignment tool, and tack in place // Fit the Struts by angling them in, top (long) tabs first, then rotating them down to the holes in the Vertical Spine. Tack in place // Fit the Drive Plate, arrow facing up. Tack in place



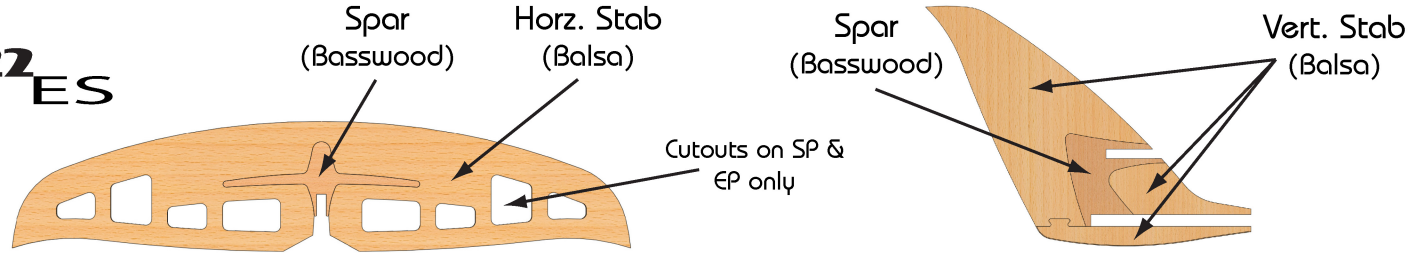
Step 14 - Fit the Servo Stop Plate. Square it up and tack in place // Fit the left Horz. Spine using the tool. Tack in place // Fit the remaining Struts and Drive Plate, squaring them up, and tacking in place // Insert the short aluminum Pivot tube into the assembly and center it up



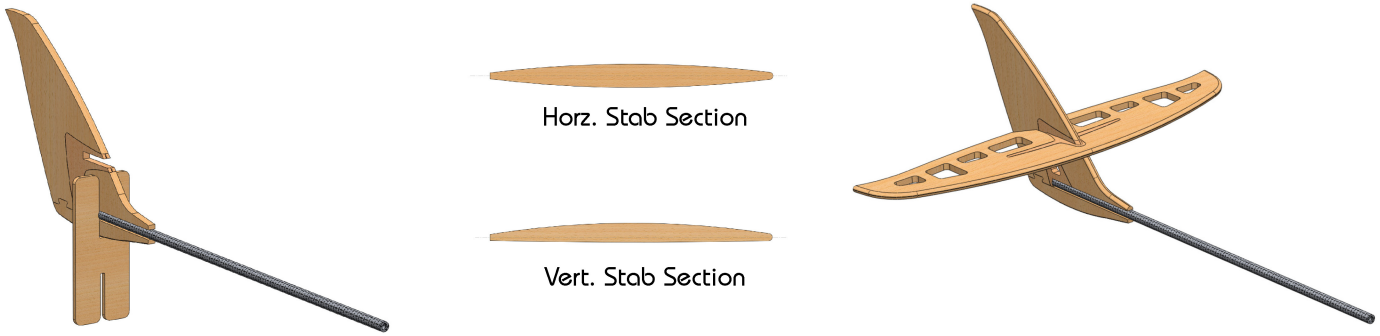
Step 15 - Use a square to check the angle between the steel Pivot Rod and Drive Plate. Tweak it if needed, remove the rod and tack in place // Determine which Motor Plate use best suited to your need, Fit and tack in place. Note the thrust angle; down, and to the right // Check the entire assembly for proper alignment. Once satisfied, finish bond all points of contact // Sand the entire assembly, and spray with a clear sealer coat or paint. A flat white primer coat with a top color coat, works best if painting is preferred

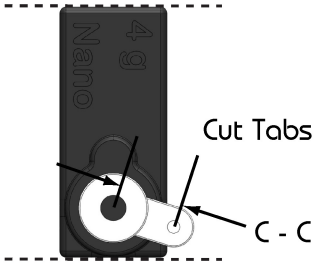
Z22ES

Final Assembly Detail

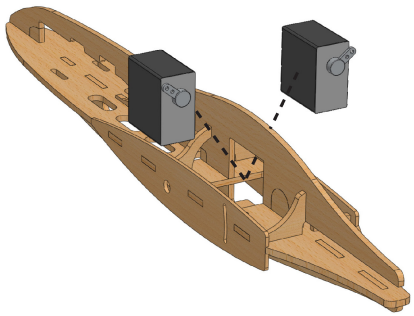


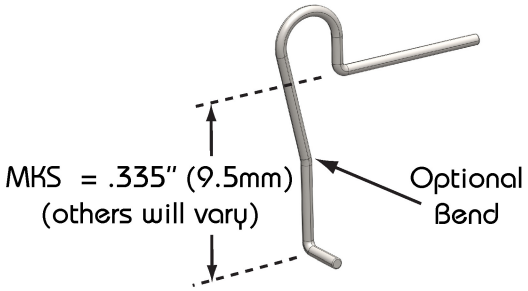
Step 16 - Fit the Spar into the Horizontal Stab, and press adhesive into the gap // Position the balsa Vertical Stab parts around the basswood Vertical Spar. Pin the perimeter, and press adhesive into the gaps // Sand the parts on a sheet of 320 grit on a flat surface to flush the basswood to balsa

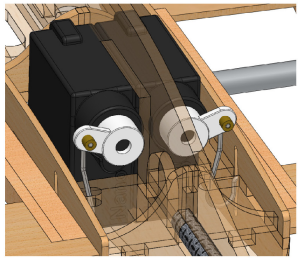




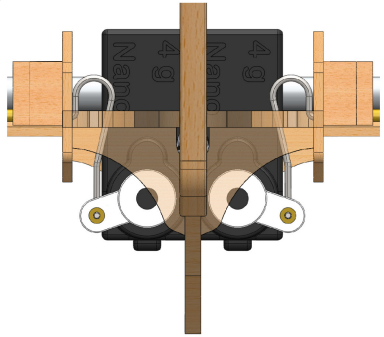
Step 17 - Use the Multi-tool to center the carbon Tail Boom. Slide the tool foreward and aft, while tacking the Tail Boom tube in place // Test fit the Horz. Stab to the Vert. Stab. The fit should be a little loose, with the covering material taking up the gap to produce a snug fit // Sand both the Horz. & Vert. Stab as illustrated. Note the asymmetric Vert. Stab. Flatter side on the right // Cover with light material, or seal with a clear-coat // Cut both tabs off of the servos // Connect and center the servos. Set a center-to-center distance of between .195" (5mm) & .235" (6mm), or at the outside hole on the stock MKS arm. Cut off the other side of the arm // Mount the servo arms as illustrated, You will remove the arms later, so don't torque the screws







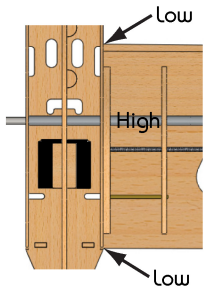
Some servos will need the brass
Stops facing aft (foreward for MKS)



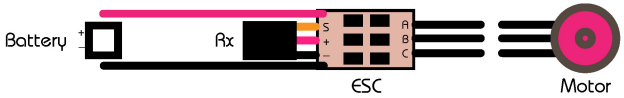
Step 18 - Fit the Servos by angling them into the open frames. Test fit them first, then use Silicone adhesive, epoxy, or GAP to bond them to the frames. Aliphatic resin or hot glue will also work. Don't use excessive adhesive // Make a 90 degree bend in the Control Wire as illustrated. Note that different servo types and their respective lengths will vary. Make both Left & Right versions // Fit the wires, cutting the excess length after the bend, to allow it to protrude past the servo arm only 1/16th (1.5mm). Note the bend faces foreward for the MKS, and aft for larger servos // Cut a short 1/16th (1.5mm) long piece of brass tubing, by carefully rolling a hobby knife over it to scribe a line around the circumference. It will separate after a few rolls back and forth // Fit the tube over the end of the wire to form a stop, and use a small drop of aliphatic resin or thick Cyano on the end to bond the two together. Alternately, solder and trim very close for the MKS // If your servo travel allows a collision to occur between the Control wire and servo arm at the extreme down TE range, you can make an optional bend as illustrated

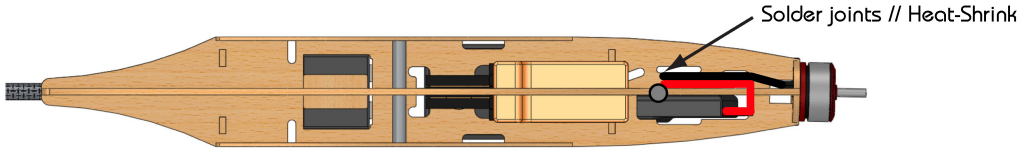
Z22ES

Setup Detail

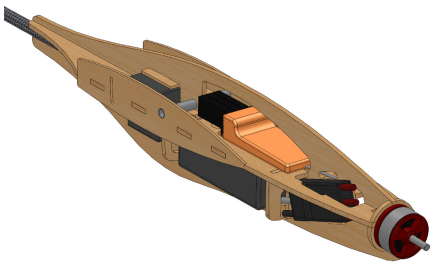


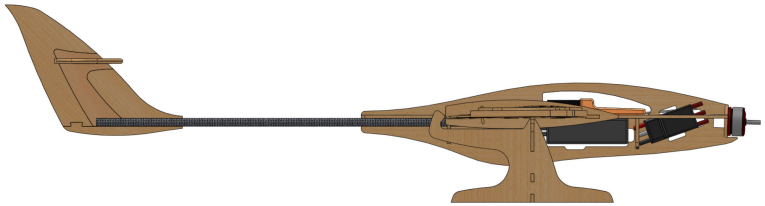
Step 19 - Remove the Control Wire and arm for this next operation // Fit the steel Pivot rod, making sure the ends are free of burrs, but not rounded off. Sand the wing Root down approx. 1/16th" (1.5mm) while alternately fitting the wing to make sure the Root is flush with the Drive plate. Repeat with the other wing. The Pivot rod should be close to contacting the magnets. Now alternately sand the Roots again until both wings make contact with the magnets. When finished, you should have a small bit of slop, approx. the width of two pieces of paper on both sides. This slop will be taken up by the covering material. Finally, sand the LE & TE of the Root to approximate a curve, where the Pivot tube is the high-spot, and the LE & TE are the low-spots. This will keep the LE & TE from scrubbing the Drive plate and resisting rotation. When satisfied with the function, cover both wings

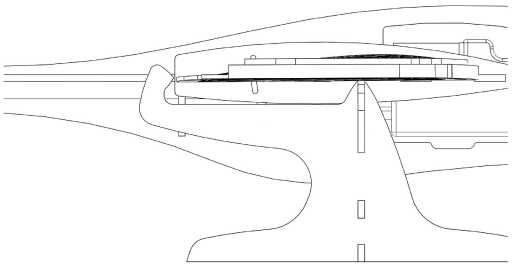




Step 20 - If you purchased the Stage 2 kit, the ESC came with instructions on use and wiring. Most systems will resemble the illustration above. The ES was designed (Stage 2) for 2S (7.4V) operation, with no more than 5V provided by the BEC section of the ESC. The MKS servos are not designed to operate above 5V // It is recommended to solder the motor and ESC wires at the stock length, apply heat-shrink, and stow as illustrated. Test the connection without the heat-shrink heated first. If the motor spins in reverse, simply reverse any two connections, and finish







Step 21 - Install all electronics, and fit the Tail assembly into the fuselage capture. DO NOT BOND at this time // Assemble the Balance jig, and fit the wings. Set the model on the jig, and nudge the TE toward the arrow on the jig. When the ES is balanced correctly, the TE should almost touch the arrow. It should be tail-heavy when you first try it. Cut the foreward end of the Tail Boom approx. 1/8" at a time to bet the balance right. You can cut up to 1/2" (12mm) from the boom total, If needed, apply lead foreward // Start out with a wing incidence that brings the top of the TE, even with the center of the arrow

Step 22 - Set your Tx for Elevon mixing, and adjust the differential to approx. 60%. Adjust the servo Travel to get as much throw as possible, without colliding the Control wire link with the Drive plate cutout. Check control movement. A left bank will need the left wing TE to travel up. Back-stick (up elevator) will need both TE's to travel down. Be careful to set travel to include full bank and full elevator at the same time, as the combination can over travel the mechanism and cause a collision // Experiment with CG balance and elevator trim to find the best performance. Elevator trim changes wing incidence and can have a profound effect on flight