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THANK YOU!

This guide would not have been possible without the cooperation and assistance of fellow fliers and builders, particularly Greg M. ('glidermang' on RC Groups). Greg is the author of the very informative *Samba EVO* Build Thread . His assistance and willingness to serve as a resource are greatly appreciated. If I've succeeded in confusing you, I'd recommend reviewing Greg's build guide. He'll set you straight.

Neil at Hyperflight in the UK facilitated this guide at all stages. Without him, it would not have happened. They sell the *Samba EVO* and all the required equipment to complete it and feature the best customer service and the fasted shipping to the US that I have encountered.

I would also like to thank my fellow pilots in the Pikes Peak Soaring Society in Colorado Springs, CO, USA, for their forbearance and understanding while this guide was being written. Yes, it's always nice to have friends.

The opinions expressed and the methods used herein are strictly mine. We all know that there are sometimes dozens of different ways to do the same thing in this hobby. If you have a better way of doing things that works for you, do it. This is a builder's guide, not a builder's bible.

Finally, any mistakes or errors are fully mine. I made them, and you can't have them! In something as detailed as this, there are inevitably going to be bumps in the road. My apologies in advance for the rocky ride.

Leonard (mac44mag)

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Samba RES EVO

Dear Builder,

Welcome to the *Samba RES EVO* family! The Samba EVO is an F3-RES (**R**udder/**E**levator/**S**poiler) competition RC glider with outstanding flight performance. The kit was designed using the latest techniques and precisely made from high quality materials using both laser cutting and CNC milling.

Thanks to the attention to detail and precise construction, the model is strong and easy to assemble quickly. The interlocking parts design make assembling the *Samba Evo* one of the simplest high-performance kits available.

Kit Specifications

Required to Build

1. One complete *Samba* kit
2. Minimum 4-channel RC system
3. 3 servos (see below for recommendations)
4. 2 rolls of Lite covering (Oracover/Oracote Lite recommended)
5. Adhesives (Builder's preference. Recommendations below)
6. Standard modeling tools (Xacto knife, sandpaper, pins, etc.)
7. Miscellaneous building supplies (glue, spare blades, etc.)

Recommended Servos

1. Rud/Ele: Any 9g class servo (i.e.: KST X08, HS-55, etc.) with 15Ncm of torque
2. Spoiler: Any 5-8g servo (HS-40, HS-45HB, D47, KS HD 47MG or similar)

Note: If using a 2S LiPo battery, be certain that both your servos and receiver can handle the higher voltage.

Recommended Throws

1. Elevator: +/- 15-20 mm
2. Rudder: +/- 25-30 mm
3. Spoiler: Up to 90 deg.

Adhesives

1. Thin and medium CA
2. Aliphatic (white) wood glue
3. Epoxy

Technical specifications

Wingspan: 1980 mm
Length: 1080 mm
Weight: From 420 grams
Airfoil: S3021 modified

Getting Started

Most components do not require building over the plans. You can simply cover your board with some type of release film (cling wrap, etc.) and build away! However, feel free to use the plans if you prefer.

Thin CA is recommended for most balsa-balsa joints. For the wing and attaching the horizontal and vertical stabs to the boom, epoxy works well. Use aliphatic glue (i.e.: *Tightbond* or equivalent) for the nose and tail blocks. When gluing, first tack the joint with a small drop of CA, inspect to ensure that all is correctly placed and aligned, then glue the component completely.

There are a couple of decisions you need to make early on. They concern: A) the servos you will use (this will determine the nose plate that you use and your battery and receiver placement), and B) the type of control system (pull-string or control rod). This guide uses the recommended pull-string setup without thread guides and places KST X08 servos in the nose plate with the receiver mounted to the fuselage and the battery mounted to the top of the nose plate. If you choose to use this system, there are parts included in the kit (SP1a, circular spacers, guide tubing) that will not be used. Do not be confused by this. They are included for your convenience, and you can choose to use them or not. It's your choice. They can be used with control rods. If using traditional or CF control rods, become familiar with the plans and include the needed parts in the assembly process.

Finally, if something doesn't fit, be very careful before cutting or trimming anything. This kit is truly precise, and other than the occasional light sanding to compensate for variances in balsa thickness, etc., the pieces fit together very well.

Let's get started!

Horizontal/Vertical Stabilizers

1. Pin a straight edge to your building board to serve as a reference line.
2. Locate the required parts as indicated on the plan and the photograph to the right. They are not bundled together, so you'll have to search through the plastic 'parts bag' and the wood bundles to locate what you need.
3. Lightly sand the char from the edges of the laser cut parts. Be careful! They are light and delicate.

Figure 1: Horizontal Stabilizer

4. Dry fit and pin the horizontal stab parts to your board using the ruler as a reference edge.
5. Join the parts with thin CA, or if you prefer, a thin aliphatic white glue such as Super Phatic.
6. Fit and glue the thin 'stiffener' into the leading edge of the horizontal stab using aliphatic glue. Trimming for length may be required.
7. Using the other side of the ruler as a guide, pin the elevator pieces to the board and glue in the pine elevator joiner using aliphatic glue or epoxy to create a single piece elevator.

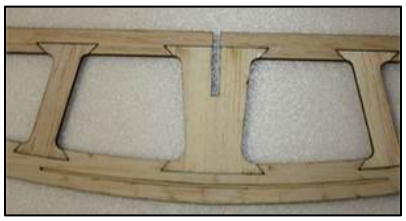

Figure 2: Horizontal Stab Detail

8. Remove the parts from the board and sand the leading edges round to reduce drag.
9. Bevel a 35°- 45° angle slanting from the top leading edge of the elevator to the rear to allow the elevator to move downward when hinged with a simple tape hinge.
10. Repeat the above steps for the vertical stabilizer and rudder.

The tail surfaces will be joined together then to the boom after final sanding and covering. They may be covered at this time should you wish.

Figure 3: Vertical Stab Parts

Figure 4: Vertical Stabilizer Assembled

NOTE
THE HINGING METHOD IS A BUILDER'S CHOICE. THESE INSTRUCTIONS USE A SIMPLE TAPED V-HINGE, BUT FEEL FREE TO USE A METHOD OF YOUR CHOOSING.

The Fuselage

Basic Construction

HINT
BEFORE GLUING, TAKE THE TIME TO SAND OFF AS MUCH OF THE CHAR AND BURNT WOOD AS POSSIBLE FROM THE CUT EDGES OF THE PIECES. DOING SO WILL ENSURE THAT YOU GET THE BEST POSSIBLE BOND BETWEEN PARTS WHEN GLUING.

The fuselage is a contemporary former-plywood-balsa design composed of interlocking laser cut pieces. As in any model, care should be taken to ensure that the assemblies go together square and without a built-in twist. Use the adhesive of your choice throughout construction, but many modelers use a combination of CA, aliphatic (i.e.: *Tightbond* or similar), and epoxy, depending upon the materials being joined.

To build the fuselage:

1. Locate and lay out all of the required pieces as shown in the illustration below.

Figure 5: Fuselage Parts - Courtesy of Glidermang on RC Groups

2. Orient the parts in their correct relationship to the rest of the model.
3. Dry fit everything together before gluing, including placing the assembly onto one of the two fuselage sides. This gives you experience in locating the parts in relation to each other and ensures that the pieces fit as they should.
4. Begin by gluing the plywood servo tray between formers SP2 & SP3. Epoxy works well for this assembly. Note that the kit ships with <u>two</u> trays with servo openings in them. One

is sized for HS-55 type servos and one for smaller KST X08 size servos. The tray between SP2 & SP3 is the piece cut for larger HS-55's. The KST X08 openings are in the forward nose plate. The formers are somewhat complicated with many notches and cut-outs; however, they are precisely located and the tray will fit on the formers correctly at only one position. The two holes for the control lines point to the top of the fuselage on SP3. Some light sanding may be needed. Using epoxy, glue the three pieces together either one end at a time or both ends at once using clamps to hold the pieces in contact and perpendicular to one another.

5. Next, glue SP1 to the forward plywood nose plate, again using either aliphatic or CA. Be sure to use the plate that fits your intended servos. Use clamps to guarantee a good bond while ensuring that the two pieces are at 90° to one another. Set aside to dry.
6. Glue SP4 to its plywood plate as shown on the plans, again using clamps to keep the two aligned and square.
7. Dry fit then glue the servo tray assembly (SP2/SP3) to one of fuselage sides. Aliphatic or CA will work well. **IMIPORTANT:** Do Not allow adhesive to enter the small notches between the fuselage sides and the formers. Precisely cut stringers will be inserted through those openings, and glue may prevent them from sliding through.
8. Check to see if the SP1/ply assembly is dry, and if it is, glue it to the fuse side from Step 7.
9. Glue SP4 and its plywood plate into place.
10. Glue the end formers, SP1 and SP5 into position. Keep them at 90° to the fuse side.
11. Glue the other fuselage side to the assembly, using clamps to hold the formers to the sides and at 90° to the body. Be careful that the fuselage does not twist during this operation and that the sides bend evenly to the nose and tail formers without one side bending more than the other. Use tape and/or rubber bands to hold the sides to the formers at the nose and rear of the fuselage if needed. At the end of this step, you should have all of your formers and plywood plates attached to the fuselage sides.
12. Locate the bundle of eight 3mm (~1/8") x 3mm pine and balsa stringers. There should be four pairs of stringers (two pairs of pine and two pairs of balsa).
13. The stringers can be tight where they pass through the notches in the formers. It may be beneficial to round the edges or plane the stringers slightly before attempting to install them.
14. Begin with one of the sanded shorter pine stringers. Insert it from the rear of the fuselage (SP5) into the notch just above the sheer webbing/decking. Push it completely into the fuselage until it is flush with SP5. The forward end will be at the surface or perhaps a millimeter or two beyond SP2. The stringers fit well against the fuselage sides, so thin or medium CA run down the stringer between it and the fuse works well.

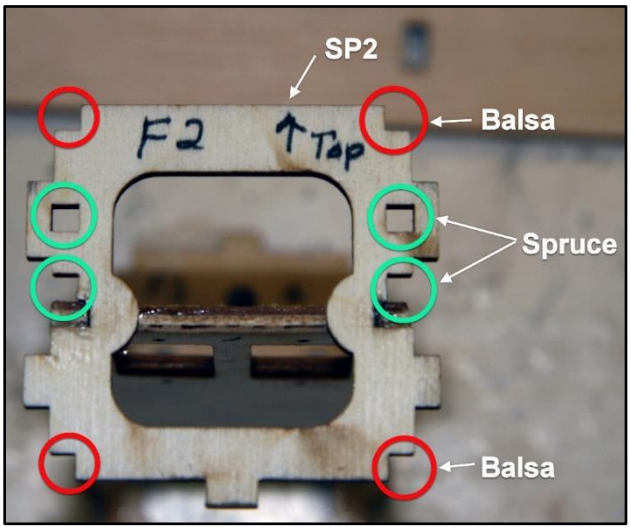

Figure 6: Stick Locations on SP2

Some modelers add a medium CA fillet at the points where the stringers pass through the plywood formers as reinforcement for the joint.

15. Repeat with the second short pine stick for the other side.
16. Install the T-nut in the wing hold down.
17. Set the wing hold down support piece between SP4 and SP5 with the T-nut surface facing downward. **DO NOT** glue it in place at this time! It should sit on top of the stringers you just installed. If the fit is too tight, sand it lightly to remove any excess.

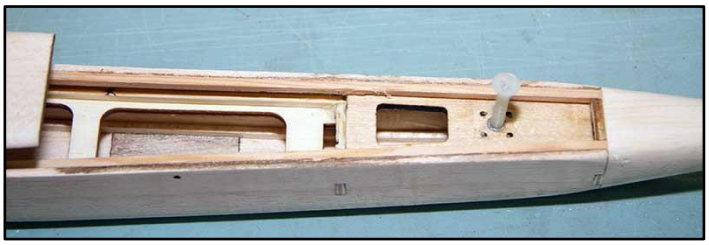

Figure 7: Wing Hold Down Support

18. Move on to the longer pair of pine stringers. They run from the top of SP5 through SP2 flush with the fuselage edge to form a reinforcement to the wing saddle and trapping the wing hold down loosely between it and the other pine stringer. Glue the stringers as before.
19. To fasten the wing hold down, press it up from the bottom of the fuse, gluing it tightly against the top pine stick with medium CA or epoxy.
20. The shorter balsa stringers fit into the notches on the top of the fuselage just forward of the wing. Insert them through SP1, adjust them until they are flush with the top of the fuselage and glue them using thin CA.
21. Using a flat sanding block, carefully sand the top of the wing saddle lightly to ensure that the fuselage sides and the support spars are even.

HINT
THE SHARP TRAILING POINTS OF THE FUSELAGE SIDES THAT WRAP OVER THE TOP OF THE WING LEADING EDGE ARE VERY FRAGILE. SOAKING THEM WITH THIN CA STRENGTHENS THEM WITH MINIMAL WEIGHT GAIN.

22. The longer balsa stringers fit into the notches at the bottom corner of the fuselage. Insert and glue them as you did the shorter balsa stringers. If necessary, sand lightly until they are flush with the fuselage sides and the end former, SP5.
23. Locate the three pieces of 3 mm balsa that make up the nose sheeting and the latch, and sort out the three needed plywood pieces from the parts bag There are two ply latch frames and a ply hold down tab for the front of the hatch cover. The hatch cover has a slot in it. (See Plan)
24. Using the outlines etched into the balsa, locate and glue the two latch frames and the hatch holding tongue into place. (See plan)
25. Retrieve one of the white plastic tubes from the parts bag, roughen it with sandpaper and cut it in half.
26. Locate the steel latch post in the small plastic bag with the pull-string supplies. Place it into one of the cut plastic pieces, then glue the plastic piece into the latch frame on the hatch cover with the top of the latch post protruding through the top of the hatch cover. Be

careful not to allow cement to get into the plastic tube. Trim the tube flush with the forward end of the latch former.

27. Glue the other cut plastic tube into the other latch former and trim it flush. This acts as the receptacle for the latch when it is engaged.
28. Dry fit then glue the forward top decking into place against the nose block.
29. Place the hatch cover into place.
30. Fit the (for lack of a better term) cockpit cover into place aft of the hatch cover. Pin it in place if necessary. Make sure that the latch itself can engage/disengage with the tubing in the cockpit cover. Adjust the length as necessary.

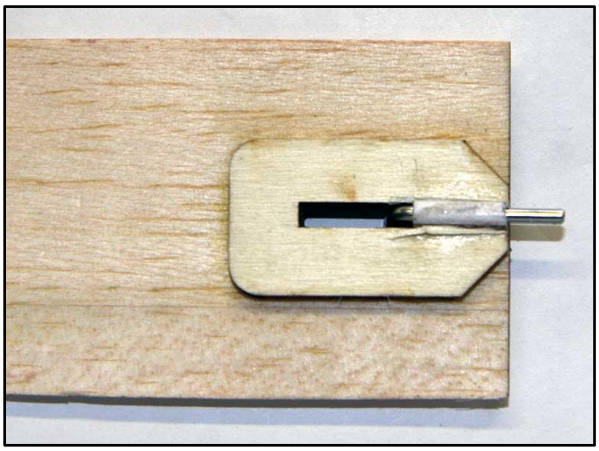

Figure 8: Completed Hatch Cover and Latch

31. When all is satisfactory, glue the cockpit cover in place.
32. Dry fit the bottom onto the fuselage and glue it into place. Use tape or rubber bands to hold the fuselage together at the nose and the tail if needed until the glue dries.
33. The final assembly operation for the fuse is to join the tail block to the rear of the fuselage. Locate the ~72 mm (~2-1/2") x ~30 mm (~1-3/16") square light balsa block and slide it onto the boom.
34. Check to see that the stringers are sanded flush with the SP5.
35. Dry fit the boom into the rear of the fuse and slide the tail block up to meet the rear former.
36. If all is in order, use aliphatic (recommended) or epoxy to glue the tail block to the fuse. Use masking tape to pull and hold the tail block snug against the rear former. Be sparing with the adhesive and don't let it contact the boom.
37. Remove the boom <u>immediately</u> after the tail block is glued and taped into place, and set the fuselage aside to dry. If there is glue on the boom, clean it immediately.

Shaping the Fuselage

1. Trace the side and top views of the tail block from the sheet plans onto thin paper. If you like, you can then glue the tracings to heavier card stock to make the templates.
2. Cut out your templates.
3. Tape the templates to the tail block and trace their outlines onto the top and sides.
4. Use the outlines to rough shape the tail block.
5. When the tail block is roughly formed, use a sanding block with coarse sandpaper (80

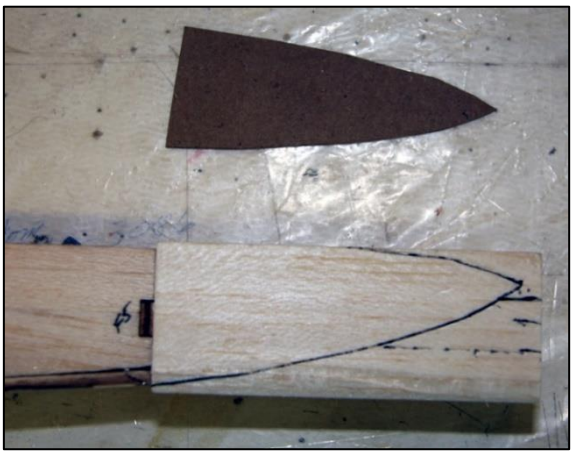

Figure 9: Side Template Traced to Tail Block

grit) or a small hand plane to flatten the corners. Do not attempt to round them at this time.

6. When the corners are flattened to your satisfaction, use a flat sanding block with 120-150 grit sandpaper to round and blend the corners from nose to tail. Remember, the corners are backed with the stringers, so you can be somewhat ruthless at this stage.
7. You can exercise some artistic license at this point, but the following pictures illustrate the basic shape you're attempting to create. Take your time, use a light hand and pay special attention to keeping the curves even as you move fore to aft. It is very easy to get the point of the tail block off center on the boom, giving the entire fuselage/boom assembly an unbalanced look.

When the fuselage is shaped to your satisfaction, it may be covered at this time.

HINT
WHERE THE BOOM EMERGES FROM THE TAIL BLOCK, THE WOOD MAY APPROACH A FEATHER EDGE AND WILL BE VERY FRAGILE. REINFORCE IT BY SOAKING IT WITH THIN CA.

Figure 10:Samba EVO Pod - Top View

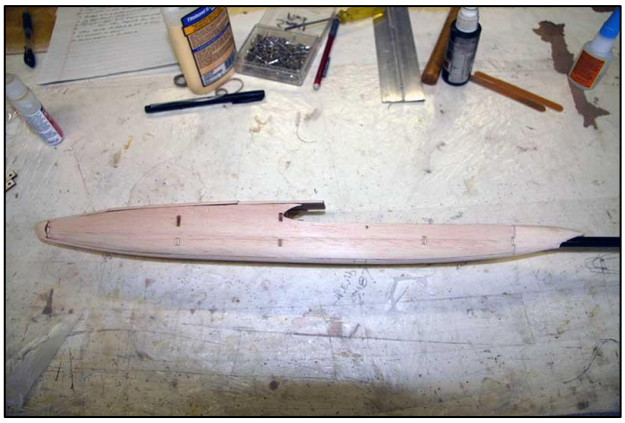

Figure 11: Samba EVO Pod - Side View

Wing Center Section

This part of the build goes quickly, particularly if you're using CA. It can be divided into three main phases:

1. Wing preparation where you sort out all the bits and pieces, glue the longer parts together (top sheeting, spar, trailing edge), and lay out the basic center section outline.
2. Building up the wing itself.
3. Applying top sheeting, building and installing the spoiler, sanding, etc.

HINT

BUSINESSES THAT SELL GRANITE COUNTER TOPS ARE EXCELLENT SOURCES OF SMALL STONE BLOCKS SUITABLE FOR WEIGHTS!

Wing Preparation

1. Pin down a straight edge to build against. Your wing build accuracy starts here!
2. If building over the plans, cover the center section with a non-stick covering: wax paper, cling wrap, etc.
3. Locate the following:
    a. Top sheeting (2 pcs.)
    b. Bottom sheeting (3 pcs)
    c. Spar sheer web (2 pcs)
    d. Trailing edge (2 pcs)

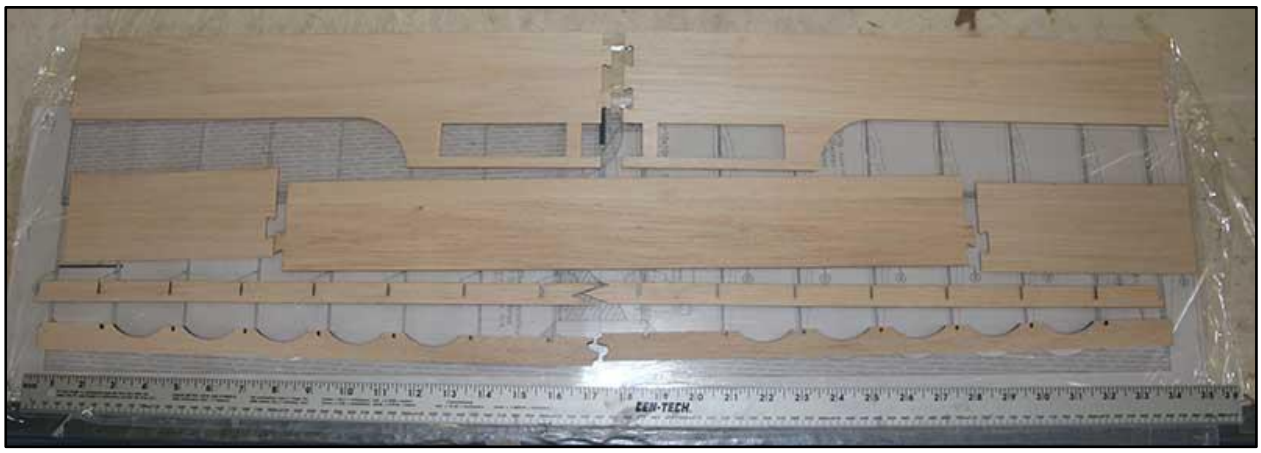

Figure 12: Wing Center Section Parts

4. Lay out the top sheeting pieces with the long leading edge against the straight edge. (See Fig. 13)
5. Pin securely, weigh it down, then glue.
6. When dry, carefully remove the sheet from the building board taking care to not stress the glue joint. The balsa is light and cannot take much pressure.

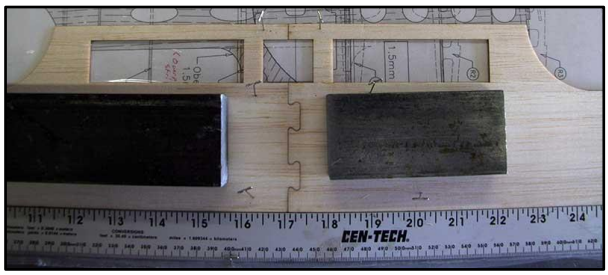

Figure 13: Wing Center Section Glued

7. Use a flat sanding block to sand the glue joints to remove any excess glue. It is much easier to do this now than after they are installed.

8. Join the bottom sheeting, spar, and trailing edge using the same technique as above.
9. When the longer parts are complete, pin the trailing edge as accurately as you can over the plans. **Note:** Building over the plans is not strictly necessary. If you are building over the plans, trust the components. The parts are correct!
10. Mark the middle of the center piece and use that line in conjunction with the plans to locate and pin the bottom sheet.
11. Draw a centerline across the bottom wing sheeting, then draw two more lines exactly 3 cm (1.181") to either side of center. These will exactly locate the inside edge of the R1 ribs and help align them when installing them. (Thanks, Glidermang!)
12. Pin the center piece and trailing edge to the board.
13. Slip one R9 and one R4 rib into the trailing edge on both sides of the wing and pin them on line at 90 degrees vertical to the board to serve as spacers for the bottom sheet. Do Not pin through the bottom sheet.

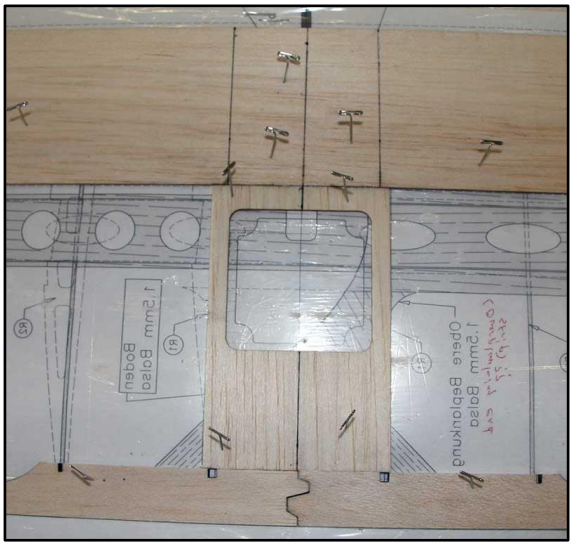

Figure 14: Wing Center Piece Marked at Center

14. Slip the bottom sheeting underneath the ribs, and use your straight edge to press the bottom sheeting against the notches in the bottom of the ribs and against the center piece. Pin the bottom sheeting into place with the pins located to the rear of the bottom sheet.
15. Once the three pieces (bottom sheet, centerpiece, and TE) are pinned and marked, check for square and flat then glue the bottom sheeting, center piece and trailing edge together at the center piece. Thin CA works well here.

Spar and Ribs

The internal main spar is built up inside the top and bottom sheeting. It's constructed of two 3 mm (~1/8") square carbon fiber rods spaced 3 mm (~1/8") forward of the trailing edge of the bottom sheeting joined by a balsa sheer web. Of primary concern is aligning the bottom carbon fiber spar with the bottom spar cap. If it is not aligned precisely, the pre-cut notches in the ribs will not fit correctly. (See Fig. 15, next page)

To build the center section spar:

1. Locate the spar parts: the two square carbon fiber spars and the spar sheer web that you glued up in the *Wing Preparation* section.
2. Rough up the sides of each square carbon fiber spar with sandpaper to remove any mold release and provide more surface area for the glue to reach. Carbon fiber dust is nasty stuff! Wear a mask and sand outdoors if possible.
3. Place a carbon fiber spar on the bottom sheet approximately 3 mm (~1/8") forward of the back of the bottom sheeting.

4. Fit ribs R1, R3, the middle R4, and R9 in place on both sides of the centerline, trapping the carbon fiber in the notches pre-cut into the ribs and aligning it with the bottom sheet.
5. Pin the spar and the ribs securely in place.
6. Lightly tack glue the carbon fiber spar in place and remove the ribs.
7. Finish gluing down the carbon fiber spar. Press down on the carbon fiber to ensure a good bond. Use thin CA for this. Medium CA will have difficulty working underneath the spar and might leave a fillet that would prevent the balsa sheer web from mating correctly with the carbon fiber.

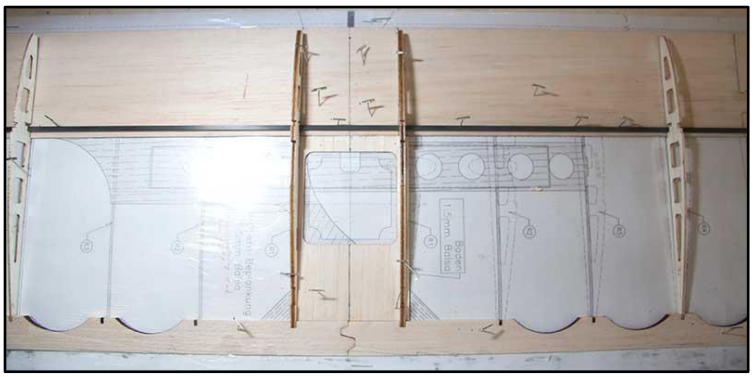

Figure 15: Ribs Used to Place Bottom Spar

8. Dry fit the balsa sheer web against the carbon fiber spar with the notches upward.
9. When satisfied with the fit, glue the sheer web to the <u>forward</u> side of the carbon spar using medium CA. Pin/brace the spar perpendicular to and firmly against the bottom sheeting.
10. Place the right R1 into place and pin it securely. NOTE: <u>Do Not</u> forget to very lightly sand the charring from the plywood ribs to give a better glue bond. Use medium CA or epoxy.

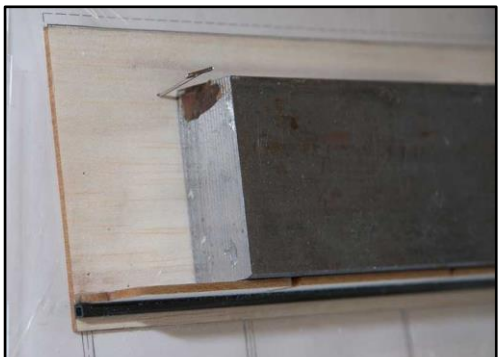

Figure 16: Spar Webbing and Bottom Spar Weighted

11. Insert the provided plywood sheeting supports under the leading edge of the bottom sheet to press the sheet into contact with the leading edge of R1.
12. Glue R1 into place using aliphatic or medium CA. NOTE: Remove any glue that squeezes out on the bottom inside of R1. The fillet will prevent the hatch frame from seating completely. A slight fillet on the outside is permissible.
13. Check to see that R1 is at a right angle to the bottom sheet then weigh it down.
14. Locate the 3 mm (~1/8") plywood hatch frame and dry fit it into the right hand R1. Be certain that it fits tightly against the rib.

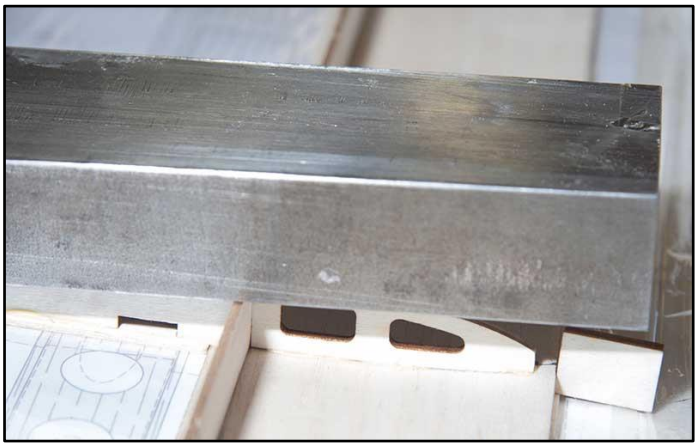

Figure 17: Plywood Bottom Sheeting Supports

15. Use aliphatic or medium CA to glue the hatch frame to the bottom sheeting and R1.
16. Repeat Steps #10 -- #12 for the left hand R1.
17. Locate the 4 mm (~3/16") ply half rib, its mounting plate (See plans), and the two 10 mm (~3/8") x 10 mm x ~38 mm (~1.5") balsa blocks that serve as reinforcements and spacers

for the carbon fiber wing hold down pin at the leading edge. NOTE: Remove any char from the plywood pieces.

Figure 18: Hatch Frame and Wing Hold Down

18. Dry fit the plywood spar rib reinforcement between the two R1 ribs *in front* of the spar. Sand if necessary.
19. Glue the spar mounting plate into place with aliphatic or medium CA.
20. Glue the half rib into place. (See plans) Ensure that it is in good contact against the spar web and bottom sheeting all along its bottom length.
21. Dry fit and glue the two balsa spacer blocks into place. When dry, sand to match rib contour.

WARNING!
THE MOST COMMON CAUSE OF A WARPED WING IS A FAILURE TO FULLY SEAT THE RIBS AT EVERY POINT OF CONTACT. **DOUBLE CHECK FOR THIS!**

22. Fit and pin all the ribs securely into the center section, ensuring that all but the R9 ribs are at 90° to the board. **IMPORTANT!** The R9 ribs are not at 90° to the board, but are slanted slightly inward as part of the first polyhedral break angle! (See Fig. 19)
23. Use thin CA to glue the ribs into the trailing edge and <u>lightly</u> tack glue the ribs at the rear of the bottom sheeting only. Use the sheeting supports to help pull the bottom sheeting against the rib bottoms.

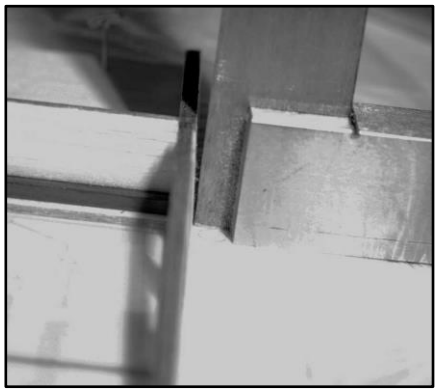

Figure 19: Tilted R9

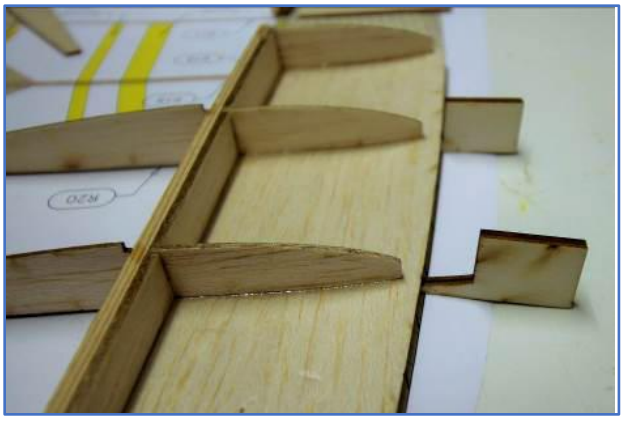

Figure 20: Using Bottom Sheeting Supports

24. Dry fit the other carbon fiber spar into the top notches of the ribs against the sheer web. Be sure to seat it completely along its length from R9L to R9R.
25. When all is as it should be, remove the CF spar, roughen it and glue it in place using medium CA. Check to ensure that it is flush with the top of the sheer web. Use clamps between the ribs to assure a good bond to the sheer web.

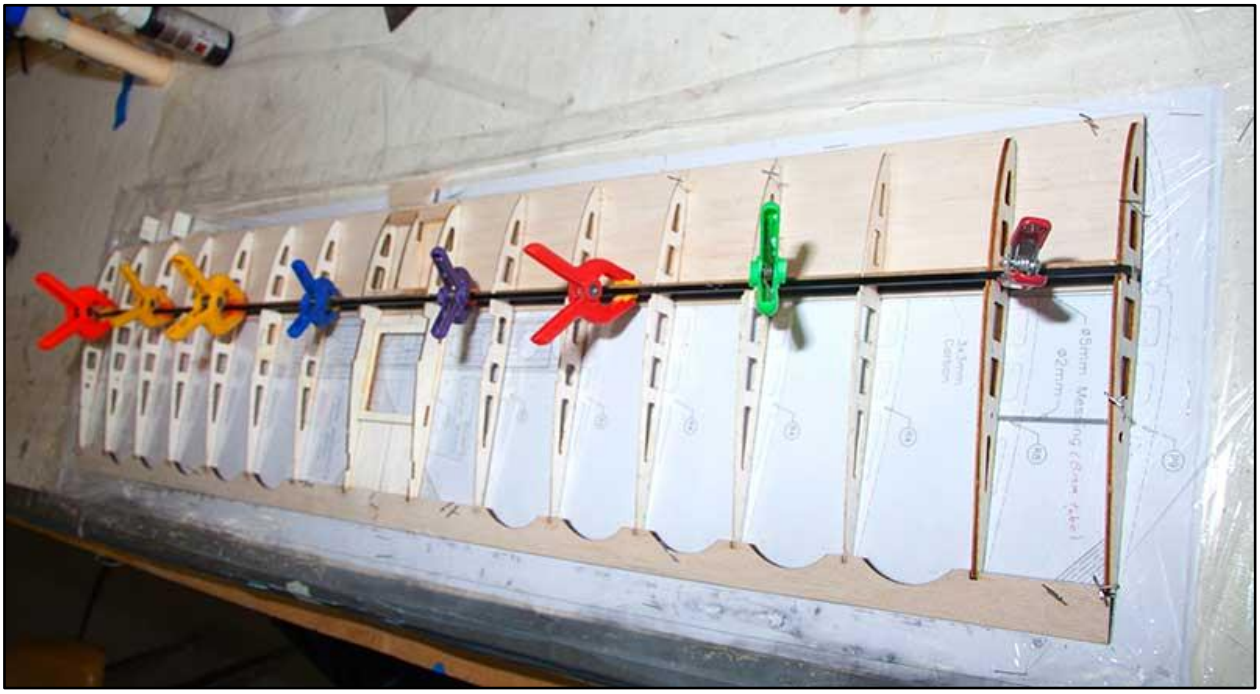

Figure 21: Center Section with Completed Spar Less Spoiler Box and Leading Edge

Leading Edge, Spoiler Box, and Wing Hold Down Support Plate

1. Locate the stick bundle with 10 rectangular balsa sticks and remove the two longest ones (~860 mm) (~33.75").
2. Securely pin the narrowest one (~8 mm) (~3/16") edge-wise against the front of the ribs as a sub-leading edge ensuring that the bottom sheet is flat against the building board. Do Not press down to hard or you will separate the bottom sheeting from the ribs. Check to see that the stick is tight against the front of the ribs. The bottom sheeting will extend beyond the sub-leading edge.
3. Use thin CA to attach the sub-leading edge to the ribs and bottom sheeting.
4. Before removing the wing from the board, double-check to see that all joins are securely glued. It's easy to miss one.
5. Remove the center section from the building board and plane/sand the sub-leading edge to match the contour of the ribs.
6. Fit the spoiler box floor between the two R3's. Be sure to set the "U" notch with the opening toward the leading edge. Bend the balsa floor slightly to get the tabs to insert into the ribs. **NOTE:** Carefully press the box floor down until it makes full contact with the ribs all along its length. Be patient and do not force it! It will fit. Trim the notches slightly if needed.
7. Check one more time to ensure that the floor is seated against the ribs, then secure it in place.

8. Roughen the outside of the two pieces of 5 mm aluminum tubing that serve as wing joiner bushings. Trial fit them through R9 and into R8 for each end of the center section, then use either epoxy or medium CA to secure them in place. Pay attention to not allow any adhesive into the tubes and make sure that you get the outside ends flush with R9.
9. Locate four of the thin triangular pieces (see Fig. 23). They are braces for the joiner tubes. Glue one on top of the tube and one on the bottom, against the tube.

Figure 22: Joiner Tube and CF Reinforcement

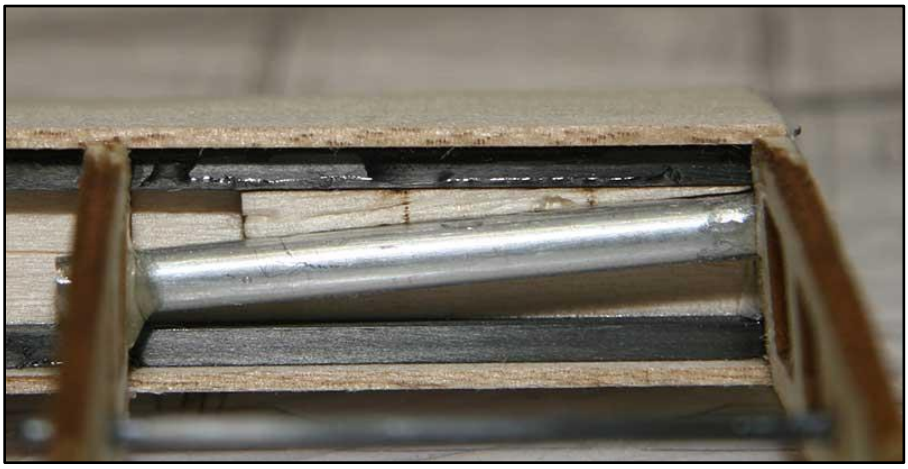

Figure 23: Joiner Tube Braces

Wing Hold Down Support & Top Sheeting

1. Now dig out two of the four pieces of 2 mm (~1/16") x ~57 mm (~2-1/4") pieces of carbon fiber rod and use medium CA to install them in the rear of R9 – R8. (See plans)
2. Locate the 60 mm (~2-3/8") piece of trailing edge stock and the matching piece of 3 mm (~1/8") ply with the hole in it. These will become your wing hold down block. Glue the triangle stock against the trailing edge making certain that it is pressed solidly against the bottom center piece.
3. Use medium CA or aliphatic glue to glue the plywood piece in place. Weigh it down as it dries.
4. Install the four triangular gussets outboard of the R1 ribs and inboard of the R9's, as shown on the plans.
5. Inspect one last time to see that all parts have been installed and are securely glued.

Figure 24: Wing Hold-Down Parts w/o Spoiler Box

6. The next step will be to install the top sheeting. Pin the trailing edge to the building board and pin the ribs aft of the spar. This helps to guarantee a warp free wing.
7. Dry fit the top sheeting to the center section. It is helpful to moisten the sheeting to allow it to bend.
8. Finally, glue the top sheeting. The choice of adhesive is up to you. Some prefer CA for the speed, others aliphatic, and still others use epoxy or a combination of all three.
   NOTE: When gluing the sheeting, pay attention that the sheeting contacts the sub-leading edge all along the join! Use clamps, pins and weights where needed.
9. Fit and install the top spoiler cover between the top sheeting and the trailing edge.
10. When dry, carefully remove the cross pieces from the spoiler opening to open it up, then plane/sand the forward edge of the sheeting and sub-leading edge completely flat.
11. Glue the leading edge to the sub-leading ledge. Use an adhesive that sands easily.
12. When dry, plane/sand the leading edge to the proper contour using the provided template as a guide.

HINT
IF USING ALIPHATIC (WHITE GLUE), DO YOURSELF A FAVOR AND REMOVE ANY SQUEEZE OUT BEFORE IT HARDENS!

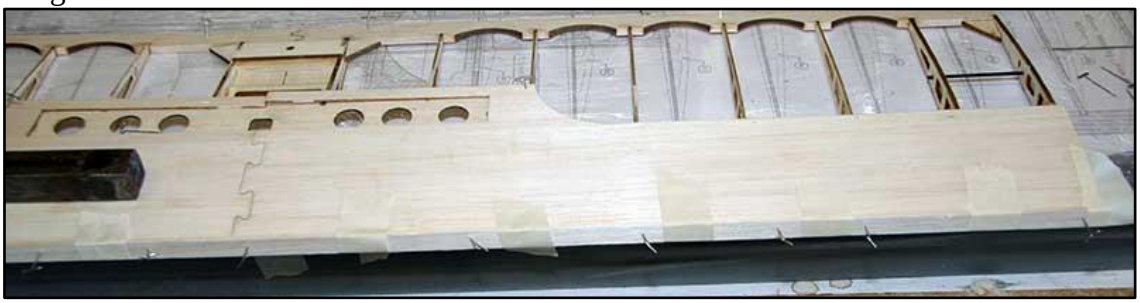

Figure 25: Leading Edge Pinned and Taped

13. Bore a 4-mm (~3/16”) hole in the center of the leading edge in which to mount the wing hold down pin. Install the short 4-mm (~3/16”) carbon fiber pin using CA, or even better, epoxy.
14. Trial fit the wing to the fuselage. When the boom is inserted, it will be necessary to shorten the nylon wing bolt to approximately 17 cm. (~11/16”) to clear the boom.

Installing the Spoiler

The spoiler disrupts the airflow over the wing, which results in less lift. The plane, naturally, descends more rapidly. When deployed, some elevator compensation may be required.

The spoiler on the *Samba EVO* is operated by a small servo (KST X08 (9 g.), HS-40, Dymond D47 or similar 4 g.) in the wing center section. The kit includes laser cut plywood mounting trays specifically designed for the KST X08 and Dymond D47.

Mounting the spoiler servo is a builder option, but many choose to glue the mounting frame into the servo bay then use thin double-side tape to mount the servo to the balsa. Hot glue or any other builder preferred method will work as well.

An excellent video showing the linkage and operation of the spoiler is available on YouTube at: Samba EVO Spoiler. Take time to view the video. Pay special attention to the orientation and placement of the servo, the length of the servo arm and the holes used in the servo arm and the control horn. Your experience may vary.

To install the spoiler:

1. Trial fit the spoiler into the spoiler box to check the fit, and if using one of the supplied servo mounts, check to see that your servo fits in the mount.
2. Invert the center section, and place the servo into the servo well. The end of the servo with the arm will be under the servo opening, or close to it. With the center section upside down, the servo will rotate toward the table when activated.
3. The servo does not operate from the standard center position. Instead, it rests against one travel limit. Use a servo tester to set the servo at one limit so that when activated the servo will rotate the arm upward through the opening in the spoiler box. Most computer radios will allow you to limit travel when configuring the model for operation if the servo raises the spoiler past 90°.

WARNING
SPOILER SERVO PLACEMENT IS CRITICAL TO THE PROPER OPERATION OF THE SPOILER. TAKE YOUR TIME. TRIAL FIT AND TEST EVERYTHING BEFORE MAKING THE INSTALLATION PERMANENT.

4. Return the servo to what will be the ‘closed’ position and attach a servo arm as close to horizontal as possible, with the end of the arm pointing forward under the spoiler. The actual location forward/aft will be determined by the length of your servo arm, your servo dimensions, etc.
5. If using a servo mounting tray, press the servo into the tray, position it in the desired location, and mark the location of the servo tray. Do Not place the servo so far forward that the arm contacts the leading edge of the spoiler box when it is raised.
6. Glue the servo tray into its place and refit the servo. Do Not fasten the servo into position at this time.
7. Using a servo tester, activate the servo to check its motion. **NOTE:** The servo must be free to rotate far enough to raise the spoiler to a desired angle of 90 degrees. For this to happen, you may have to cut a small notch in the servo box bottom so that the arm will not contact the box when fully raised.
8. Temporarily hinge the spoiler into the spoiler box, turn the center section over, and using the servo arm mark the location for the spoiler control horn just to one side of the spoiler arm. It should be near the spoiler centerline. The control horn has three holes and is in the sheet of 1.5 mm (~1/16”) ply that held the polyhedral braces.

9. Mount the spoiler control horn as shown in the image on the right. Note that the horn appears to be mounted flush with the forward edge of the spoiler with the extension facing aft. Also, the opening for the horn needs to be wider than a simple knife cut.
10. Mount the servo and construct a wire pushrod to connect it to the spoiler control horn.
11. Test and check the operation of the spoiler, then fasten the servo into place.
12. To finish off the spoiler control horn, strip a small piece of insulation from a piece of servo wire and carefully glue it onto the end of the wire sticking through the horn.
13. Locate the servo hatch, trial fit it, and set it aside. Cover it when you cover the wing. It can be either taped into place, hinged and taped, or set with small screws.

Figure 26: Spoiler Control Horn

Mid-Wing

The two mid/tip panels (Right and Left), are joined to the center section with 4 mm (~3/16") carbon fiber rods that embed in the aluminum tubes installed in the center section. Dihedral is built into the center/mid joint and the mid/tip joint, resulting in an easily transportable 3-piece polyhedral wing.

NOTE
BUILDING OVER THE PLANS IS NOT STRICTLY NECESSARY IF CARE IS TAKEN TO KEEP ALL PIECES TIGHT TO EACH OTHER. THE PARTS ARE PREC1ISE ENOUGH TO ALLOW THIS. SEE GLIDERMANG'S EXCELLENT Samba Build Thread ON RC GROUPS.

Build both the left and right panels at once; first completing one step on one panel then repeating it for the other. Pay attention to build a left and one right panel, not two lefts or rights. The construction order generally follows that which was used for the center section.

Except where specified, CA works well for the panels. Use medium and thin as is your preference. When joining plywood, some modelers prefer to use aliphatic (white) glue or epoxy. Remove any excess char.

NOTE: Steps will be listed for one side only. When the step is completed, unless otherwise stated, repeat the same step for the other side.

To build a mid/tip:

1. If you choose to build over the plans, layout the wing plans on a building board, covering them with a non-stick plastic such as cling wrap. Locate and lay out the needed parts where you can reach them, but leave room for you to work. Orient them as nearly as possible to the way that they to be are installed.

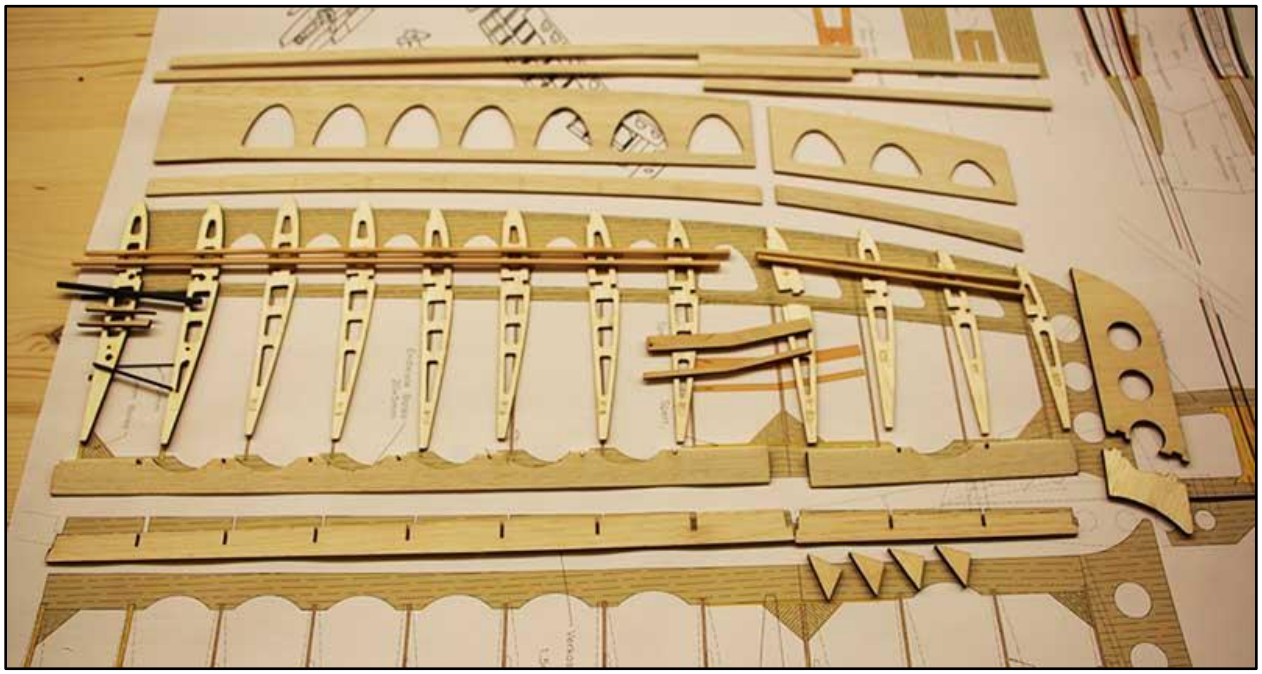

Figure 28: Right Side Mid/Tip Parts

2. Begin by gluing the mid bottom pine spar to the bottom edge of the mid sheer webbing. Pin it against a straight edge to ensure alignment.
3. Pin the scalloped mid trailing edge to the building board.
4. Insert R11 and R17 onto the trailing edge and the spar sheer web. <u>Be certain</u> to use the correct (left/right) sheer web. Use a block or square to ensure that the pieces are 90° to each other. R10 will be installed later.
5. Carefully pin R12 – 16 into place. The fit is snug, but <u>do not</u> force the ribs into place. Lightly sand where necessary.
6. Ensure that the spar/rib structure is pressing tightly against the trailing edge and that the ribs are pressed tightly against the building surface.
7. Glue the ribs into place. Be sparing with the glue, but not miserly.

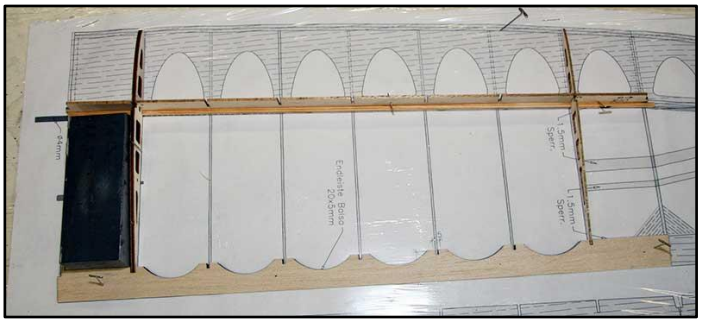

Figure 29: Mid-wing Ribs R11 & R17 Used to Space Spar and Sheer Web

8. Now attach the lower wing sheet/strip to the forward rib bottoms. These are the ~400 mm (~15-3/4") x ~15 mm (~9/16") pieces of slightly curved ~2 mm (~1/16") balsa. **NOTE:** Like the sheer webs, these are matched to Left and Right. When in place, the etching for the rib placement is visible and the side with the slightly greater curve is to the outboard end of the wing. Use the "lifter wedges" that you used to lift the center section bottom sheeting into place.

WARNING!
JUST LIKE R9 IN THE CENTER SECTION, R10 AND R18 HAVE POLYHEDRAL BUILT INTO THE SPAR. BE SURE TO PRESS THESE RIBS TIGHTLY AGAINST THE END OF THE SHEER WEBBING TO PRESERVE THE CORRECT POLYHEDRAL ANGLE.

9. With the wedges in place to pull the bottom sheeting against the ribs, press lightly down on the rib to ensure proper alignment and contact with the edge, and use thin CA to bond.
10. Rib 18 can be tricky. Place it on the bottom sheeting, aligning it with the etched marks on the sheet. It has a small tab that extends to the rear of the sheer webbing. **Leave it alone!** It plays a vital part later on when you install the polyhedral bracing. Press inward to force the rib into contact with the spar at the correct dihedral. Use thin CA to glue into place.

Figure 27: R18-R19 Installation Detail

11. Install the rear polyhedral brace onto the front side of the trailing edge. Some builders recommend using epoxy here. Ensure that the brace fits snugly against R17 is and aligned with the trailing edge. **NOTE:** It may be easier to unpin the wing section for this operation then reattach it to the board for the rest of the steps.
12. Double R18 and R 19. Study the plans carefully, then glue the ribs in place.
13. Install R18b to match the polyhedral angle of R18. (See detail, above) Line the forward edge of R18b carefully with the lower spar so that it is flat against the building board.
14. Glue in the two triangular corner gussets on either end of the mid-wing trailing edge.
15. Glue in the top spar. Take extra care to ensure that it is seated fully into the notches in the ribs and flush with the top of the sheer web.
16. Install R10. Make sure that it is pressed fully down and hard against the spar sheer web!
17. Fit and glue the main spar polyhedral brace between the spar caps between R17 and R18. The end with the hole in it fits toward R17. Some light sanding may be necessary at this point. It is highly recommended that you use epoxy here. **NOTE:** Do Not allow any glue on the outside of R18!
18. Again, as with the center section, you will install the narrower of the two leading edge strips as a sub-leading edge across the front of the ribs and on top of the bottom sheeting. Leave enough sub-leading edge on the inboard side to allow for sanding in the polyhedral angle.

19. Trim the sub-leading-edge close to length and plane/sand a bevel it to match the rib profile leaving the front flat.
20. Glue on the top sheeting. Align it to the end of R10. Pin it and weigh it down to ensure good contact. **NOTE:** The sheeting is cut to form! It fits the curve of the sub-leading edge. If the curves do not match closely, try the other piece of sheeting.
21. When dry, plane/sand the sub-leading edge flat and perpendicular.
22. Pin and glue the wider piece of leading edge to the sub-leading edge and sheeting.
23. When dry, use the edge profile guide to sand the leading-edge profile.
24. Bevel one end of one of the 4 mm carbon fiber rods to match the angle at which it meets the sheer web. Lightly sand the beveled half to roughen the surface. Chamfer/round the other end.
25. Insert the rod into the mid-wing section with the beveled side flat against the sheer webbing, then dry fit the mid-wing to the center section.
26. Remove the mid-wing, and use either medium CA or epoxy to glue the CF rod into the mid-wing with the flat bevel against the mid-section sheer web. **NOTE:** Ensure that no adhesive builds up beyond the top or bottom of the rod.

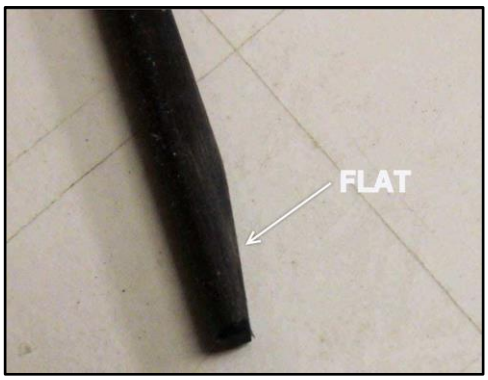

Figure 28: Beveled Carbon Fiber Rod

27. As with the center section, use two of the thin triangular wedges (Fig. 24) to support the carbon fiber rod. Glue one on top and one on the bottom of the rod.
28. Locate one of the 4 mm (~5/32") wooden locating pins, chamfer one end and glue the non-chamfered end into the aft 4 mm hole in the mid-wing using medium CA or epoxy.
29. Use medium CA to install the 2-mm carbon fiber rod brace just forward of the locating pin.
30. Trim and sand the spars and sheeting flush against the end ribs on both ends. Check to see that there is no squeeze-out around the CF rods.

If you were not building the left and right sections concurrently, return to Step #1, Page 21, and repeat.

Wing Tip

The wing tip and its associated winglet are the last major assembly modules for the *Samba*, yet they are among the most critical parts that you will build. The tips have been especially designed to reduce vortex drag at the end of the wing, and care needs to be exercised in their construction.

To build the wing tip section (R20 – R22):

1. Locate all the tip parts: Pine spar sticks (~163 mm (~6-7/16") long), sheer webbing, R20-22, 2 pcs. of leading edge, trailing edge piece, and 2 triangular gussets for each tip.
2. Glue the bottom pine spar even with the bottom of the sheer webbing.
3. As you did with the other wing sections, pin the tip trailing edge to the board and use R20, R21 and R22 to trap the bottom tip spar and the tip sheer web into place. **NOTE:** The slightly wider end of the sheer web fits to the inboard side (R19) of each tip.

4. Check to see that all is aligned properly, then use thin CA to glue the parts together.
5. Add the upper spar, check to see that it is fully seated into the rib notches and flush with the sheer webbing, then glue.
6. Place and pin the bottom sheeting into place using the wedges to pull it up against the ribs as before.
7. As with the center section and mid-wing, install the sub-leading edge.
8. Shape the sub-leading edge to the rib profile.
9. Install and trim top sheeting.
10. Install the leading-edge.
11. Shape the leading-edge profile.
12. Add the tip outboard triangular gusset at R22.
13. Sand spars, webbing, and sheeting on the ends of the tip flush with the existing ribs.

Repeat for the other wing tip if not building the two concurrently.

Attaching the Tip to the Mid-wing

1. Pin the mid-section securely to the building board.
2. Trial fit the mid-wing and the tip together. Sand the polyhedral braces as needed to fit between the pine spar caps.
3. Make any adjustments needed to fit R19 tightly against R18 and the two pieces of trailing edge together without gaps.
4. Set the CG jig under the outboard end of the tip section, bracing it on the notches (as shown).
5. Practice assembling the pieces several times. You will be rewarded! Check to see that the rear polyhedral brace fits correctly along the tip trailing edge.
6. Glue the tip and the mid-wing together. Some builders prefer using epoxy here to take advantage of the longer setting time. Clamp and pin as necessary to line up the two sections as perfectly as possible.

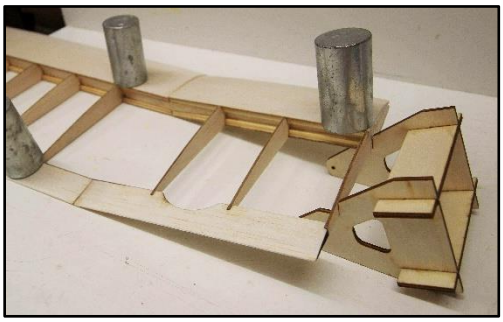

Figure 29: CG Jig Used to Set Polyhedral Angle

Repeat for the other side.

Building the Winglet

The "winglet" is the upward extension at the end of the wing tips, and is used to decrease wingtip vortices, thereby reducing drag. Many builders find it easier to build the wing tip as two separate pieces. The winglet is then attached to the tip and the entire assembly glued to the mid-wing to form a solid unit.

To build the winglet:

1. Locate and identify the three pieces that make up the winglet.
2. Glue the two pieces of the winglet together.
3. Trial fit and then glue the triangular stock to the outside of R22 with the long side (hypotenuse) facing outboard! That becomes the edge to which you will glue the winglet blade.
4. Form the triangular stock to match the airfoil of R22. Do Not sand on the down/hypotenuse side.
5. Surface sand the flat side of the winglet blade smooth and use medium CA to glue it against the hypotenuse of the triangle stock. Take care to ensure that the bottom edge of the inside of the winglet is used to position the blade against the tip. The outside edge will protrude slightly above the wing bottom.
6. Sand the winglet bottom flat with R22.
7. Sand the triangular stock profile to blend with the wing tip and winglet.

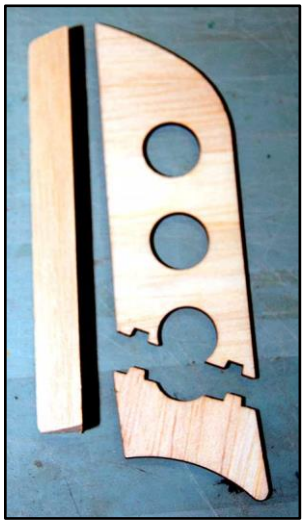

Figure 30: Winglet Parts

Repeat for the other winglet if not building the two concurrently.

Covering the Wing

If you followed the advice to cover the components as you completed them, all you have left to cover is the wing. Do so after you are satisfied with the fit of the sections.

Don't forget to cover the servo access hatch that fits into the bottom of the wing.

Assembling the Stabilizers and Pull-Spring Assembly

Assembling the Stabilizers Together Then to the Boom

The next step is to glue the vertical horizontal stabilizers to each other. The vertical and horizontal stabs are glued to each other at a 90° angle. Take care to ensure that they are precisely 90° to each other!

Once joined, the completed assembly is then glued into the CF boom. Some modelers prefer to use epoxy for this step, believing that it creates a better bond between balsa and carbon fiber.

To join the stabilizers to one another:

1. If not yet done, cover all four tail control surfaces with the covering of your choice.
2. Remove the covering from any surfaces that will be in wood-to-wood contact after gluing. Do Not forget the area under the bottom of the horizontal stabilizer.

3. Trial fit the two stab parts together. **NOTE:** It is vital that the two stabilizers are at 90° to each other in both the vertical and horizontal dimensions!
4. Alignment horizontally (fore/aft) is achieved by carefully aligning the bottom edge of the horizontal stab with the bottom edge of the cut for the boom in the vertical stab.
5. Dry fit the parts together and check to see that they are square in both the horizontal and vertical dimensions…then check it again!
6. Remove the parts from the jig and glue them together. Again, many modelers use epoxy here to take advantage of the increased setting time.
7. Place everything back in the jig and check for square. Use weights, tape, pins, string…whatever it takes…to ensure that they are aligned as perfectly as possible.

To attach the stabilizers to the boom:

Trial fit the assembly to the boom, and mark the contact points between the boom and the stab assembly with a felt tip marker. **NOTE:** Ensure that the vertical stab tracks a straight line down the center of the boom!

1. Use 150-220 grit sand paper to roughen the surface of the CF boom where the stab assembly will contact it.
2. Use epoxy to attach the stab assembly to the boom.

HINT
ONE OF THE MOST USEFUL TOOLS THAT YOU CAN HAVE ON YOUR BENCE IS A COMMON EMERY BOARD. THEY MAKE GREAT SANDING STICKS.

Attaching the Fuselage and Boom

The most critical part of this operation is to ensure that the flat across the wing saddle is perfectly parallel to the horizontal stabilizer. How you ensure that the fuse and horizontal stab are parallel is up to you. Methods range from using a digital inclinometer, a level, or even the Mk. I Calibrated Eyeball.

To attach the fuselage to the boom assembly:

1. If not done, cover the fuselage.
2. Trial fit the fuse and boom assembly.
3. Set the fuselage and horizontal stab parallel to each other, then trace the rear outline of the fuse where the boom emerges being careful not to move anything.
4. Separate the fuselage and boom, then roughen the boom following the outline you just traced back to where the boom emerges from the tail block.
5. Glue the fuselage to the boom using the tracing to ensure that the fuse and the horizontal stab are parallel. Epoxy is recommended for this operation.
6. Allow to cure undisturbed, and you'll have a completed pod-boom-tail component!

HINT
SEVERAL FREE OR INEXPENSIVE SMART PHONE INCLINOMETER APPS ARE AVAILABLE. ONE OF THE MOST RECOMMENDED IS *'CLINOMETER'*, AVAILABLE FOR BOTH ANDROID AND MAC.

Rigging the Pull-Spring Control Setup

The *Samba* is designed for a 'pull-spring' control arrangement, where control lines are run from the servo arm through the boom to a control horn on the elevator or rudder. The control surface is deflected by a piece of 0.04 mm (~0.00157") spring wire (supplied). The control surface is then held in tension by a single line stretched through the boom to the control arm of the appropriate servo. As the servo arm turns, it either increases or decreases tension on the spring causing the surface to deflect.

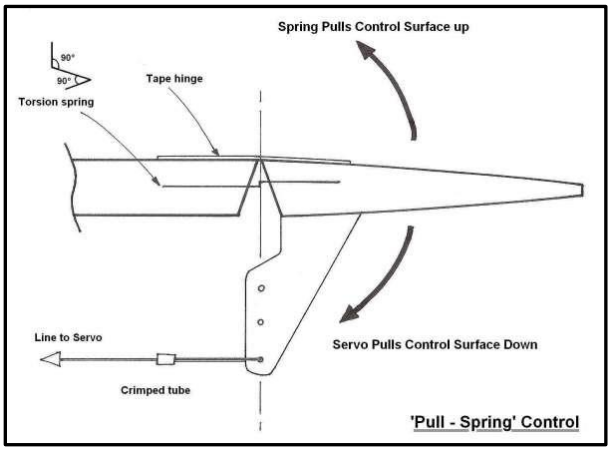

Figure 32: Pull-String Diagram – Courtesy of 'slowmatch' on RC Groups (Peterborough MFC, UK)

Pull-Spring Resources

Here's a link to a YouTube Video: https://www.youtube.com/watch?v=Y3_pSSRSPFw showing how to rig a Pull-Spring system. Also, here's a link to an article on Pull-Spring from the Peterborough Model Flying Club in the UK (Thanks, Guys!): http://www.peterboroughmfc.org/technical-articles2016/3-PullSpringControl%20.htm

If you're still undecided, a bit of online research may provide the information you need. Another solution would be to run carbon fiber rods through full length tubes, although the weight penalty would be significant over pull-spring. For control rods, the round balsa pieces with two holes in them may be glued inside the boom for support, and ply parts SP1a are guides which support the ends of the control rod tubes. Feel free use the method with which you're most comfortable.

To build the Pull-Spring Control:

1. Hinge the rudder and elevator using the method of your choice. This manual uses taped V-hinges.
2. Locate the required parts. The control horns are in the 1.5 mm (~1/16") ply sheet that contained the polyhedral braces. The rest of the parts are in the separate small bag.
3. Take a moment to wind the thread onto a small piece of card stock, a pencil, whatever.
4. Study the plans. Note that in all four of the tail surfaces there is a short length of 2 mm plastic tubing (included) installed perpendicular to the hinge line. These act as bushings for the spring wire. The bushings are ~40 mm (~1.5") apart. **NOTE:** Check the plans for the tube locations!

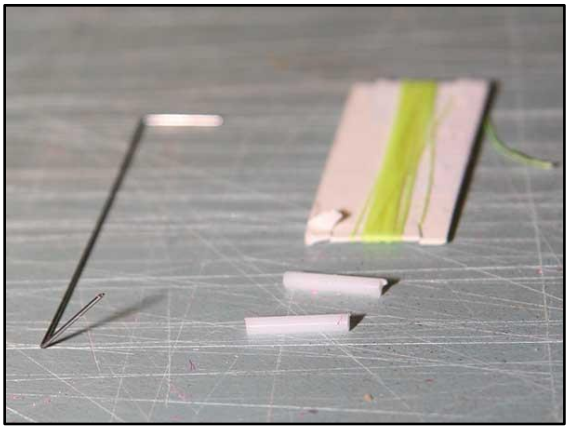

Figure 31: Pull-String Parts/Bent Spring

5. Cut the white 2 mm tubing into four pieces. Put the pieces back into the bag!!
6. Carefully measure, mark, and drill holes in all four tail surfaces for the tubes.
7. Insert the tubes into the holes. Do Not get glue inside the tubes. One method is to carefully plug the ends of the tubes with petroleum jelly, slightly insert the tubes into the holes, carefully apply medium CA to the outside of the tubes, and slide the tubes into place.
8. Bend a 90° bend in one of the 0.4 mm spring wires with the short leg ~10 mm (~3/8") long.
9. Insert the spring into one of the tubes and mark the location of the next bend on the spring with a felt tip pen.
10. Lay the spring wire on the bench with the bend flat against the table and facing away from you. The second bend will be 90° to the bench (upward to vertical) on one axis, but rotated 15° - 30° backwards toward the other short leg on the same axis as the first bend. This will give you an angle of between 60° - 75° between the bent legs.
11. Make the bend as outlined above. (See Fig. 33)

NOTE
THE ANGLE BETWEEN THE TWO BENDS DETERMINES THE STRENGTH OF THE SPRING. IN THIS CASE, IT IS RECOMMENDED THAT THIS ANGLE BE BETWEEN 60° AND 75°, NOT THE 90° SHOWN IN OTHER RESOURCES.

12. Insert the springs into the bushings. The elevator should deflect upward and the rudder away from the side with the control horn. If not, study the direction in which you've bent the spring. It sometimes helps to remember that the servo must pull against the spring.
13. Cut the provided thread in half.
14. Tie one thread to the elevator control horn.
15. Use a small drop of thin CA to secure the knot.

16. Use a piece of spring wire inserted through the fuselage to fish the threads into the servo compartment.
17. Feed the thread from the top of the servo arm down through the hole in the servo arm then up through the adjacent hole.
18. Clamp the control surface to the neutral position.
19. Partially loosen the servo arm screw, and check to see that the servo is still centered.
20. Lightly tension the thread for zero deflection on the control surface,
21. Wind the thread around the raised screw and tighten the screw to set your zero point. Do Not rotate the servo while tightening the screw!
22. Trim the thread leaving it ~30 mm (~1") long. This will allow you to easily adjust the neutral point if needed.
23. Adjust the servo arm position and thread to achieve equal deflection in both directions. (See *Control Setup*, p. 30)
24. Repeat for the other servo.

Figure 32: Receiver and Servos @ Max Deflection
NOTE: The RX is actually sitting below the servo tray.

Installing the Electronics

Because of the variations in radio equipment, the instructions that follow are generalizations only. They reflect a system based on an 800mAh 2S LiPo battery from Common Sense RC, a Hitec Optima 6 receiver, and KST X08 servos mounted in the front section of the fuselage, between SP1 and SP2. Things such as different servos, servos mounted in the second compartment, a smaller receiver or a different battery are all things that might dictate a slightly different arrangement.

As you install your gear, keep in mind: A) Balance and how the distribution of the gear will affect your CG, B) Additional weight may be required in the nose, and C) How you're going to secure the receiver and battery to prevent damage in the event of a crash.

The above gear worked well with the receiver slipped into the bottom of the forward compartment and secured with hook-and-loop strips (Velcro). As you can see, the servos are mounted in the forward compartment. The battery fits snuggly on the nose plate above the receiver and just forward of the servos. A flat balancing weight sits on top of the aft end of the LiPo. Yes, it is tight, but it works!

Again, your experience may vary.

Balancing

The balance of an airplane can determine whether or not you enjoy many hours of reward for your effort or whether or not you bring home the pieces in a plastic bag. Most pilots are aware of the importance of establishing a proper Center of Gravity (CG), but lateral balance (side-to-side through the roll axis) is also important.

NOTE
TO SOME EXTENT, THE EXACT LOCATION OF THE CENTER OF GRAVITY IS A PILOT PREFERENCE. IT IS HIGHLY RECOMMENDED THAT THE DESIGNER'S LOCATION BE USED FOR THE FIRST FEW FLIGHTS. THE CG MAY THEN BE ADJUSTED TO THE PILOTS LIKING FOR LATER FLIGHTS.

Before balancing, you need to install the adjustable tow hook in the provided slot in the fuselage.

To install the hook:

1. Make a small slit in the covering over the fuselage slot in the bottom of the fuselage and carefully seal the cut edges inside the edges of the slot.
2. Locate the tow hook parts.
3. Screw the 3-mm nut to the bottom of the tow hook and place one of the washers above it.
4. Insert the tow hook through the slot in the fuselage, then add the second washer and the nylon insert lock nut on the inside of the fuselage.
5. For your maiden flight, position the tow hook ~7-mm (~1/4") forward of the holes in the fuselage covering that represent the CG point and tighten the nut. This may be adjusted later for a more aggressive launch angle if desired.

To check the lateral balance:

1. Invert the plane and suspend it from the tow hook.
2. The model should remain level through the roll axis (left/right). If not, the easiest solution is usually to add weight to the higher side. Do not be terribly concerned about the nose or the tail dropping at this point.

Included in the kit is a Center of Gravity jig. This works in conjunction with two holes bored through the fuselage to balance the model at the designer's recommended CG starting point.

It works on the principle that if the wire transects the fuselage where the CG should be, then when the fuselage is placed into the jig, the model will pivot forward or backward on the wire depending upon whether the nose or the tail is lighter.

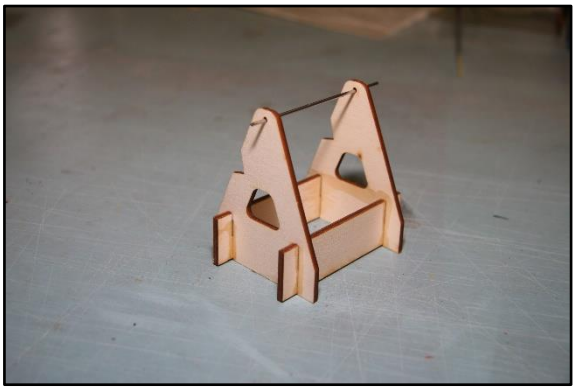

Figure 33: Center of Gravity Jig

To use the CG jig:

1. Locate the two small thru holes in the fuselage ~72-mm (~2.75") from the wing leading edge and just below the top stringer. Open them with a wire or pin.
2. With the wing attached and all the equipment installed, insert the jig wire through the holes in the jig and the fuselage thereby suspending the fuse inside the jig.
3. Set the jig on a flat, steady surface and release the fuselage. Observe if the nose drops, rises, or stays balanced. A slight nose down attitude is permissible for the first few flights.
4. Attempt to reposition the equipment forward or backward to counteract any imbalance. With the equipment listed in the previous section, *Installing Electronics*, options for repositioning were limited. This necessitated adding additional weight. Adding weight is normally the least desirable action, but at times it cannot be avoided. If tail heavy, add the weight as far forward as you can, and add absolutely no more than the minimum needed to bring the plane into balance at the recommended CG. **NOTE:** Ensure that any weight you add is securely fixed into place!
5. If you wish to move the CG, drill additional holes in the fuselage at the desired point.

Figure 34: Balancing Using the CG Jig

Control Setup

The recommended throws for the *Samba* are as follows:

Elevator:	+/- 15 – 20 mm (~9/16" – ~3/4")
Rudder:	+/- 25 – 30 mm (~15/16" – ~1-3/16")
Spoiler:	Up to 90°

It is recommended that these throws not be exceeded for the first few flights.

Many pilots also find it helpful to set exponential on their controls to make them less sensitive around the center position. This is an aid to prevent overcontrolling the airplane, a common difficulty with less experienced pilots. The exact procedure for setting Expo will vary from radio to radio. See your transmitter manual. Similarly, the amount of Expo used will depend upon pilot preferences.

Final Inspection & Test Toss

You're almost there! Just a quick couple of checks and the test glide, and you're ready to maiden. It is assumed that you have already bound your transmitter and receiver and configured your model to operate as you wish.

Here are a few final check points:

1. Check the stab and fuse alignment one last time.
2. Check the CG.
3. Inspect for any loose covering.
4. Operate the elevator, rudder, and spoiler to ensure that their movement is correct.
5. Check the CG…again.
6. Using the procedures outlined for your transmitter and receiver, perform a range check.
7. Have you checked your CG?

When satisfied with your setup, turn on your transmitter and receiver, confirm operation of the controls, and then gently toss the airplane straight ahead into the wind. **NOTE:** It is somewhat easier if you have someone else actually toss the plane while you stand ready to make any needed corrections. Repeat the toss as many times as necessary while adjusting rudder and elevator trim to achieve a straight gently descending glide.

CONGRATULATIONS! Your *Samba EVO* is now ready for its first flight. May it be the first of many!

We hope that you have enjoyed building the *Samba EVO* as much as we've enjoyed bringing it to you. Please check out our website at: **cad2cnc** (http://www.cad2cnc.ch/) for additional kits and building opportunities.

Appendix 1: List of Terms Used on the Plan

NOTE
THIS IS **NOT** A LITTERAL TRANSLATION IN THE STRICT SENSE OF THE WORD, BUT RATHER A 'WORKING' GLOSSARY OF THE LABLES AND TERMS USED ON THE PLAN.

Term or Phrase	Working Translation
0.04 mm Stahldraht	Steel Wire (Springs)
0.4 mm Sperr als Verstarkund des Hackens	0. 4mm Ply Tow Hook Slot Reinforcement
1.5 mm Sperr.	1.5 mm Plywood
2 mm ø Rohrchen	2mm Plastic Spring Tube Bushing
3x1 mm Verstarkung	3x1 mm Horizontal Stab Reinforcement
3x3 mm Kiefer	3x3 Elevator Joiner
3x3 mm Kieferleiste	3x3 mm Pine Stringer
ø10 mm Carbonrohr Pappel	10 mm dia. Carbon Fiber Boom
Ausschnitt fur Hochstart Haken	Tow Hook Opening
Boden 1.5 mm Balsa	Fuselage Bottom
Endleiste Balsa 20 x 5 mm	Trailing Edge – Wing and Wing Hold Down
Heckklotz	Balsa Tail Block
Heck-Montagebrette 3 mm Birke	3 mm Wing Hold Down Plate
Hohenrudder 3mm Balsa	3 mm Elevator
M4 Mutter von unten varsichtig vor Montage einschlagen und verleimen	Insert the 4 mm Wing T-nut and position carefully before gluing.
Nase Hartholz	Nose Block
Nasenbrett	Nose Plate
Nasenbrett Variante fur KST X08 HV Servo	Nose Plate for KST X08 Servos
Obere Beplankung 1.5 mm Balsa	Top Center Section Middle Sheeting
Pappel	Poplar
Rumpfboden	Fuselage Bottom
Rumpfdeckel	Rear Fuselage (aka: canopy) Cover
Rumpfnase oben	Forward Nose Sheeting
Rumpfseite 3mm Balsa	Fuselage Side
Schleifkannte	Canopy Sheeting Brace (Balsa)
Sehne	Control Thread
Seitenruder	Rudder
Servicedeckel	Hatch Cover
Servobrett	Servo Plate for 9 gr. Servos
Sp1a nur bei Verwendung	Use only for control rod setup
Verkastung	Reinforcement
Verkastung zum Stecken	Sheer Web