

Fokker D8 Master Instructions

Rev 1

Congratulations on your new project. The Fokker D8 is a marvellous subject that highlights the success of a monoplane design. The construction of the plane is similar and in some cases exactly like the original. Take your time and understand the how and whys certain parts go together. Always measure twice and cut once. The instructions are broken down into the main components which gives you the detail you need to successfully build this kit. The photographs will help give an idea how the parts will look like when glued together. There really aren't any special skills to build this plane besides keeping the parts straight as well as drilling straight. The main components are the fuselage, wings, tail area. The suggested building sequence should be the top wing, sub-wing, fuselage, bottom and mid wings, rudder, stabilizer and elevator. Naturally, you can build the kit in any sequence that works well for you, just realize that certain components might have to be put to the side until another component is finished. The photos will help you understand how the parts go together and how the plane is built. The text below has some helpful suggestions and instructions. You should have some building experience and be familiar with some aircraft terms such as, *CG* and incidence. If you have questions, contact us.

Contents

Cabane and interplane struts

Hinges

Landing gear

Wing

Subwing and struts

Rudder

Elevator

Fuselage

Stabilizer

Aileron

Hinges

The hinges are true scale and quite ingenious. With that said, you will find the hinge installation will provide smooth movement and no slop. Note that there are two different hinges used on this plane. They are basically the same except the aileron hinges are longer than the rudder and elevator hinges. You need to take your time and understand what you are trying to accomplish so you can successfully create the hinges. First, you need to assembly a hinge bender using parts #6 plywood and some scrap dowel #75. The top part of the plywood #6 has a slot in it. Cut and glue two pieces of dowel #75 so it goes covers the top of plywood #6 except for the slot. Place the plywood #6 in a vice so you can now bend a hinge #302 around the dowels #75. Center one hinge #302 over the dowels and bend down both sides. Remember that a screw will go thru the hinge hole so try to bend the hinge evenly. You now have the hinge in a " U " shape pattern. Ensure the holes line up, make any adjustments as needed. Now place the hinge over the dowels again. Notice the strap in the center of the hinge. This center part needs to bend down into the slot in the plywood #6 part. You might consider using a thin screw driver rounding the screw driver head so as you push this strap down you will get a curved scrap. Keep the screw driver centered. You will see where the center strap bends over itself. Use a pair of needle nose pliers to bend that part back over the hinge. Sort of looks like a crushed center strap protruding above the hinge. You can remove the hinge and test fit the steel rod #4 into the hinge. So, you should have the center strap on one side and the rest of the hinge on the other. The hinge will wrap around the brass bushing #319; where the bushing will be inserted into this new curved strap you just made. This center curved strap is a reverse bend. You need to keep this reverse bend round so the bushing is held in place without the bushing being bent or altered. A nice snug fit is desired. Reference the photos. It might take you a little bit to form up a nice hinge. The good news is that the metal hinge is easy to form. Once you have a hinge formed go ahead and form the other hinges using parts #302 and #303. The hinge needs to be secured to the bushing #319. You should carefully do this by soldering the reverse center strap to the brass hinge. Test fit the hinge/bushing on carbon tube #229. It should fit just fine and rotate freely. Go ahead and secure the other hinges to brass bushing #319; keep the hinge centered on the brass bushing. To mount the hinge in place on a dowel or carbon tube, the hinge will be surrounded on both sides with brass collar #320, then you will secure those collars in place with the brass pin #109. When you are ready to mount a hinge in place, put two collars #320 one on each side of the bushing #319. You want a slight gap between the bushing and collar so you won't have metal to metal rubbing. You can put masking tape on the

collars keeping everything in place. Using drill bit #153 carefully center drill the collars and insert a pin #109. **CAREFULLY**, glue the outside of the collar (away from the bushing) or add some glue to the brass pin #109 which will secure the brass collar to the carbon tube or dowel. Trim the brass nail and file the end. Repeat for the other collar ensuring that the hinge can move freely. If desire, you could add a little oil after you have completed the plane. This completes the hinge assembly.

Rudder

The rudder is fun to build and there is a sequence in building the rudder. You will laminate the rudder outline; create the control horn and hinges and then assembly these parts as well as the rudder ribs. Place the two cardboard outlines #93 together using some masking tape; be careful as the cardboard edges are sharp. The rudder outline is a mix of plywood and balsa parts. These parts #42 and 43 laminated in an order. The balsa #42 stringers are on the outside / inside and the center of the lamination. The plywood #43 will be sandwiched in-between the balsa. Soak these wood parts in warm water for 5 minutes, if desired. This will help the wood bend around the cardboard outline. You can join these wood parts on top of some wax paper so when the wood is held in place against the cardboard outline it won't glue to the cardboard outline. Using wood glue; laminate all the pieces together. Place one of the balsa parts #42 on a flat surface; brush some wood glue on the top of that. Now add two of the plywood #43 parts (12 and 24 inch long) on top of the balsa #42. Add another balsa #42 layer, add another plywood #43 layer and finally add the last balsa #42 layer. Make sure the lamination is straight and aligned wrapping the lamination around the cardboard outline. Use masking tape to secure the lamination against the cardboard. Ensure the lamination is flat, aligned and smooth against the cardboard. Set aside to dry. Locate two FR4 parts #296 and #297. These parts are a little messy since they have been laser cut. One thing to notice here, the center hole is offset a wee-bit, creating a thinner wall on one side. So, when you place the control horn on the rudder post (carbon tube) ensure that the thinner wall points forward toward the pilot. This will keep the control horn n-sync with the hinges. Now join these parts having the two inner #296 part in the center and the two outer parts #297 on the outside. Use slow CA glue which will give you some time to align the center hole and ear tabs. Once you have these parts joined and glued you, use a 1 inch belt sander or something similar and twirl / twist the control horn against the sanding belt to get the airfoil shape desired. Use a file or carefully sand under the tabs creating a straight line. This is where the original was welded, so, you are trying to recreate that feature. The rudder ribs #19,41,44 and 45 are laminated together like the rudder outline. The balsa parts on the outside and the plywood part

on the center. Align and glue the rudder ribs together. Slightly sand the ribs giving them an airfoil outline. The two hinges #302 need to be created before you final assemble the rudder. Bend two hinges to shape. The rudder post is a combination of the brass tube #230 and the carbon tube #229. Cut a 3 inch long piece from the brass tube #230. Insert this in one end of the carbon tube DO NOT glue yet. Lay the balsa outline and ribs on the plans. Notice where the ribs attach to the rudder outline; make a notch in the laminated outline for the rudder ribs. This will help secure the ribs to the outline. Just notch the first layer of balsa. Place the ribs on the rudder post (carbon tube) and glue them in position. Glue the outline to the ribs but DO NOT glue the rudder outline to the bottom of the rudder post (carbon tube) as you still need to add the hinges and control horn. Cut two half inch pieces of bamboo #401. These parts will go from the front of the bottom rib to the bottom of the outside of the rudder outline going over the rudder post. You are trying to simulate the metal tubing used for the rudder rib and outline. Sand and glue the reed in place. Looking at the rudder drawing you will notice that one hinge is above the control horn. Locate the related hinge parts #109, 319 and 320 placing them in position. The hinges are exact scale. You need to add the top two hinges first and the bottom hinge will be added when you mount the rudder to the fuselage. The hinge is on a bushing #319 and is secured in place by two collars #320. This keeps the hinge from sliding up or down the rudder post. The collars #320 are pinned in place. It is CRITICAL that you do NOT get any glue under the bushing as it will just about weld it to the rudder post (carbon tube). You will have to scrap your work. You could just add glue to the pins which will secure the collars in place. The hinge should move very freely add a little oil (WD-40) under the bushing if desired. Ensure you have the control horn oriented properly, perpendicular to the rudder and the thinner side of the center hole pointing forward, glue the control horn in place with some CA glue. Slightly crush the top of the brass tube #230 where it connects to the rudder outline making it the same thickness of the rudder outline. Now glue the brass tube to the carbon tube and rudder outline. This completes the rudder for now as you will add the bottom hinge when you locate the rudder on the fuselage. At which time you will permanently add the bottom hinge and glue the bottom of the rudder outline to the rudder post. Plus you can sand the rudder outline to shape giving it a little airfoil shape. If by chance you have a slight warp in the rudder; you might be able to undo that when you add the fabric.

Stabilizer

The stabilizer should be built on a flat surface and over the plans. No real magic to building the stabilizer but ensure you have good glue joints. Follow the plans and assemble the stabilizer. The ribs go together like the rudder ribs, in that; plywood is laminated between two balsa pieces. Glue the stabilizer ribs together. Slightly sand a curve on each side of the ribs removing the square edges. Place and cut the trailing edge dowel #75 to length. Position the ribs on the trailing edge and glue in place. Keep the ribs vertically straight, level and flat. Add the inner and forward dowel support #75 through the ribs securing it to those ribs and the trailing edge. You might consider waiting until the fuselage is framed up before you add forward ribs #25 and outer dowel #77. The reason is you can adjust the distance between these ribs and the fuselage longerons; ensuring that the gap between these parts is satisfactory before adding the fabric. If desired, add the ribs #25 and the outer dowel #77 to the stabiliser gluing them into position. This completes the stabilizer for now. The stabilizer will need to be fitted to the fuselage and at that time you will finish the stabilizer by locating the drill holes securing the stabilizer in position.

Elevator

The elevator should be built on a flat surface and over the plans. The stabilizer should be built before the elevator so you can "fit" the elevator to the stabilizer. Like the rudder the elevator outlines are laminated; same concept using balsa and plywood parts. Soak the balsa and plywood parts #59 and 79 in some warm water, if desired. Using a wood glue laminate these parts (like the rudder) having balsa on the outside. The lamination goes balsa-plywood-balsa-plywood-balsa. Once you have the parts glued, wrap the lamination with wax paper and then around the cardboard outline #94 using masking tape to hold the lamination in place. Create both elevator outlines. Once they are dry, remove the laminations from the cardboard and carefully sand a curve in the laminated outline. The ribs are just like the stabilizer and rudder, in that, plywood is laminated between two balsa parts. Keeping the ribs aligned, glue the elevator ribs together. Slightly, sand the rib edges giving the ribs a little curve getting rid of the square edges. The control horns are the same as the rudder #296 and 297. Create two control horns as you did in the rudder. Sand the control horns. Remember that the thinner wall side of the center hole will face forward towards the pilot. Three hinges are used on the elevator. Bend three hinges #302 to shape. Place the carbon tube #205 on the plans. Remember you are using scale hinges, which means there is now a sequence to assembly. In that, the hinges and

control horn need to be secured and located prior to adding the elevator ribs. Position the hinge #302, related hinge parts #319 and 320 and control horns on the carbon tube #205. Make sure you have the control horns oriented correctly in regards to the thin center hole wall. Test fit this assembly to the stabilizer. Once you are happy with the hinge locations; use #153 drill bit and secure the hinge collars to the carbon tube using brass pin #109. Make sure the hinges move freely. Refer to the hinge instructions for more detail. The control horns will be glued in position after the ribs are positioned and glued. Cut two 4-1/2 inch pieces of brass tube #230 and insert one in each end of the carbon tube. DO NOT glue in place yet. Test fit the laminated outline and ribs onto the carbon tube. Notch the balsa in the laminated outline like you did on the rudder for the elevator ribs. Position and glue the elevator ribs to the carbon tube and outline. Before you glue the forward rib #71, test fit that rib in place while the elevator is temporarily positioned to the stabilizer. This way you can ensure you have the correct gap and rib angle. Once you're satisfied glue rib #71 in place. Go ahead and notch the outline where the brass tube #230 will be positioned. Crush the ends of the brass tube to the same height of the elevator outline. Glue the brass tube to the carbon tube and the laminated outline. The control horns can now be glued into position. Ensure the control horns are perpendicular to the elevator test fitting the elevator to the stabilizer, helping the alignment. Once you're happy with the control horn position and angle use some CA glue and secure them in place. Place the elevator onto the stabilizer. Cut two small notches in the stabilizer trailing edge dowel for the control horns. Mark the three hinge hole locations on the stabilizer trailing edge. Drill three 1/8 inch holes for the hinge screws at these mark locations. Test the elevator onto the stabilizer. Ensure the elevator moves freely. Make any needed adjustments. This completes the elevator.

Subwing and landing gear struts

You should have the fuselage framed up prior to adding the landing gear struts to the subwing. In that, you will need to mount the landing gear to the fuselage groove blocks to ensure alignment. The subwing is straight forward and the incidence (zero) is taken care of for you. Glue two plywood ribs #32 together making two sets, keep all holes aligned. The struts will mount to the inside of these as well as the cross bracing cable fitting #309. The box spar parts #34, #35 snaps together. Glue the box spar #34, #35 together. Cut the axle to length for the wheels you plan on using. If you are using the 1/3 scale Dubro wheels with Dubro wheel collars the axle will be 27-5/8 to 27-3/4 inches long. Cut the axle to length for the wheels you plan on using. Dry assembly the ribs #23, #32 onto the spar box; then add the dowel #46 thru the ribs. Once satisfied with the location of the ribs and dowel glue them in place. You

might have to trim nails #33 to length. Once they are at the correct length, epoxy them into position on the rib #32, these nails support the bungee cords. The nails do not go past the inside of the rib #32; they should be flush with that edge. Also, you want to ensure that they do not interfere with the outer most rib #106 when that is added in place. Remember the landing struts will be against the inside of rib #32. The bungee cord #702 system is functional and is required for landings. Once the subwing is built access to the bungee cord will be limited; although, you can create two access doors on the bottom if desired. Or make the outer most rib #106 removable. You need two nine inch pieces of the bungee cord. The brass tubes #711 is used to crimp the bungee cord into place. Using the tubes and bungee cord, wrap the bungee cords around the nails, axle crimping the tubes #711. The bungee cords should be tight enough for some shock effect with the axle, don't over tighten them. Test fit the struts #307, 308 in position. You might have to adjust the struts to get them to fit. Use screws #116 to hold them in place. You need to cut slots in the upper plywood covering #36 and 39. The trick I found was to use a pencil and mark the inside of the rib #32 where the struts exit the rib. So, when the plywood covering #39 is in place before the struts are added you will know where to cut the slots for the struts. Mark the locations of the struts on the inside of rib #32. The struts should be test fitted to the belly of the fuselage. You might need to bend the struts a little to get them properly positioned. Once satisfied with the angle of the struts, it's time to install the music wire #310 into the struts. Insert some cotton into each landing gear strut. This will prevent the JB Weld from running down the strut. Follow the instructions on the JB Weld and mix up a batch and add it into the strut ends. Add the music wire #310 where the shorter end goes into the end of the strut. Wrap the ends of the strut and music wire with some masking tape. While the JB Weld is setting test fit the struts to the fuselage. This should align the music wire to the right angle. Let the JB Weld set over night. Remove the struts; you might want to paint them now before they are permanently set into the subwing. You need to cover the subwing now. Join the covering pieces #36 and #39 together first. You should slightly sand the edges (scarf) of the plywood #36 and then the mating edge of plywood #39. These edges when joined should overlap each other by 1/8 inch. Start on the subwing top and in the rear working your way forward stopping a little past the forward strut #307. Remember to keep the plywood centered on the subwing. The outside rib #106 will be added later. Cut the slots in the plywood for the struts, don't make them too large. Add the landing struts now before you wrap the plywood covering around the bottom. You should have the music wire in the struts which has been test fitted to the fuselage mounting blocks. The struts are intended to be mounted to the double ribs #32 semi-permanently, in that, you should not need to remove them unless you have a mishap. Use a little Loc-tite to secure the screw/nuts holding the struts in place. Position the fitting #309 on the inside of the front

struts #307, reference the plans. Using screws #116 and nuts #103 secure the struts in place. Add the outside rib #106 in place. Now continue gluing the plywood cover by wrapping the plywood around the nose of the ribs and onto the bottom of the ribs. The landing gear struts will be mounted with j-bolts; then the bottom belly shroud will be put in place. Add the turnbuckles #709 to fitting #309 using screw #40 and hex nut #108. You should use loctite to keep the nut #108 from coming loose. You should twist the turnbuckle ends out so they extend to their maximum length. This way when you twist the turnbuckle tight it pulls these ends in as well as tightens the cable. The cable #708 is functional and it is very important to keep guitar tight. You should check the tension before each flight. The cable goes around the music wire #310 / strut #307, so, when the cable gets tight it will pull that strut inward. Cut the cable to length and add the swage #720. Crimp the swage tight. Thread the other end of the cable thru another swage running the cable thru the turnbuckle and back thru the swage. Pull the cable tight and crimp. Adjust the turnbuckle #709 and secure the adjusted turnbuckle with the safety wire #38. The subwing is complete and ready for painting. The subwing and struts should end up with a gloss paint job.

Wing

You can build the wing as one piece or multiple panels, joining them at the end. Also, if desired, you could make the wing into two pieces if travelling space is limited. The overall wing length is 110 inches. The prototype was build in several panels, two outer and one center, then they were all joined. The wing will end up being quite strong as it is built with spars, stringers and sheeted with wood. The spar webbing is pre-cut allowing for easy assembly of the wing. The trailing edge of the wing and aileron is a combination of carbon fibre and balsa wood. This will add some strength as well as keep things straight. One thing to note is that the wing tip rib #134 will go on **after** the aileron is built and covered. The ailerons are permanently mounted into the wing. You should review how you want to add servos, pulleys or a receiver in the wing. The plans show the typical servo per aileron using a pull / pull system. There are four access doors on the bottom of the wing which will grant you some access to these areas as well as cable exits. These are the same ones found on the original. The subject of sheeting the wing is discussed in another section. These instructions will discuss framing up the wing. Take your time and keep the wing flat and warped-free. As you put the pieces together ensure that you have the proper parts positioned correctly.

Some things to remember -

1. The plywood spar webbing is exactly cut to the proper size.
2. The wood spars, stringers might need sanding to fit into ribs.
3. The rib capping will go over the spars.
4. Work from the center of the wing towards the wing tip.
5. The rib capping goes on the left and right side of the rib.
6. Wing tip follows the centerline of the outer rib.
7. Keep the wing flat and straight.
8. Keep ribs vertically straight
9. Glue with no gaps
10. Dry fit before you glue.

One thing to note before you get started. With laser cutting technology you can cut precisely which is good news. The bad news (sort-of) is the thickness of wood. The ribs are made out of either 1/8 balsa or plywood depending on where they are going. The plans are printed using 1/8 balsa or plywood wing ribs cut to exact 1/8 inch thickness. Some vendors supply 1/8 balsa a little more than 1/8 or maybe a wee-bit less in thickness. So, you are building along and notice that the ribs are slightly off from the plans. This is because the tolerance in the wood is creating that issue. I want to bring this to your attention as it is not a critical issue but you should understand why some parts might be off a wee-bit. Remember the spar webbing is absolute and the rib thickness tolerance could be off a wee-bit. Nothing to be alarmed about but just be aware. This was one of the main reasons I did not pre-cut the wing sheeting. As each wing might be a little different and cutting the sheeting precisely might create more issues than having you cut and fit the sheeting to your wing. Again the sheeting will be discussed in a later section.

Review the wing plan and get an understanding on how the wing will be assembled. If you decide you want to stain your wing like the prototype, then you need to stain all the wood parts before gluing anything together. This includes ribs, stringers, webbing, dowels, etc.. It will really make the wing look awesome but you will eventually cover it so it is up to you. You need to decide if you want to build the wing in panels or as one or even as a plug-in halves type. Once you decided that, we can begin. With the wing plan on a flat clean surface lay all the wood parts in position on top of the plans. This will ensure you have all the parts as well as get an idea what goes where. You should have some tools available such as a small triangle, masking tape and clamps. We will use these later. The goal is to build a straight flat warp free wing, which is quite possible and really isn't all that hard if you pay attention to your build. As far as glues to use. The prototyped used Duco cement, Titebond wood glue (original) and CA glue. There is real no right or wrong but these worked well for me. Duco cement is easily found at Wal-Mart or a store similar to that. Once you

have the parts laying in position you will notice where the plywood ribs go as well as you will see some ribs are doubled. The plywood ribs will support the aileron and the double ribs are supporting the start of the wing taper, just like the original. At this time glue together making two sets of double balsa ribs #125. Keep the ribs aligned and flat while the glue dries. Depending on your process of one or multi-panel wing build, decide where you want to start. The instructions will follow that concept. One thing to note is that you don't have stacks of wood to waste, meaning, cut wisely and leave little scrap when splicing the wood stringers and such together. Spruce wood is expensive so measure twice and cut once. You have enough wood in the kit to do the job prudently. The wing will go together like a puzzle. It is your job to keep the wing over the plans, flat and straight. The spar webbing should be flush with the top and bottom of each rib it joins. The rib capping will go on the side of the ribs over the spars and stringers. It will take a little bit of time to do all of this. One area to pay attention to is to ensure all stringers and spars are properly seated into their notched rib position. All the wing pieces work together and when something is out of position it will be noticed by other pieces. The wing design is a little complicated as it is a double tapering wing. The center section is straight then as you go out to the wing tips the spars taper as well as the bottom. First locate all the ribs in-between ribs #130 thru #124. This includes ribs #130. You will notice that the ribs are numbered the same for the right and left halves of the wing. So, you should have ribs #124-130 located for the right or left side of the wing. Find and position the spar webbing that goes with these ribs for the front and rear spars onto the plans. Each spar webbing has an arrow. Which means that edge should point to the ceiling. It doesn't matter if the arrow is visible after gluing into position, it does matter it points toward the ceiling. As the spar webbing goes toward the wing tip it gets smaller. So, each spar webbing starts tapering after the double ribs #125 which means the smaller edge of the spar webbing should always be going towards the wing tip. Don't worry if the arrow is visible after gluing or not. Again getting the spar webbing oriented correctly is more important. You will notice that the spar webbing associated with the wing fitting #204 is double the thickness than the other webbing. This is by design. Go ahead and locate the four #28 plywood supports and get one wing fitting #204 and a screw #107. You will use these metal parts to ensure the spar webbing is aligned correctly with the support block #28. You can reference view B-B on the plans to get an idea of what needs to be done. Go ahead and get several stringers #30 and several spar #38 pieces. The spar pieces #38 will be glued in place as you glue the ribs and webbing together. You can do the same with the stringers #30 if you want but I glued mine after the spars and ribs were all glued together. I just used the stringers for alignment. The spar is made up of a combination of spruce and balsa. You will notice two spars on the plan. They are built identical but the balsa part of the spar will face outwards. Reference the "typical rib layout" shown on the plan.

Notice that the spar webbing goes from the top to the bottom of the rib. Aligning the spar webbing in place like shown will help ensure the ribs are truly vertical if you can glue these in place without any gaps. Almost all ribs have "feet" these will stay on until the wing is one piece. Once everything is aligned and glued properly then they can be removed. Which is really after the aileron is mounted as the wing tip rib needs to be fitted to the wing. So, don't be in a big hurry to cut the feet off. What is really nice is that each webbing is cut exactly which ensures the ribs are spaced correctly. (yes, I know about the rib thickness tolerance) Starting in the center with rib #124 in position on the plans start building the wing towards rib #130. You should cut the splice angle in the spar #38 and stringers before gluing these parts in place. Center this splice in the center of the two ribs #124. The spars will go slightly past the rib #130 we are stopping at but that is fine. So, you should have the spar #38 pass the rib #124 and pass the rib #130. Ensure the spars seat all the way down, then glue in place. Keeping the ribs flat on the table and vertically straight, web #W12 in place. Once you have the top edge of #W12 level with the top of rib #124 and #125 glue that spar web #W12 to the spar #38 to the two ribs #124, #125. Repeat this process for the rear spar and spar webbing #X12. You can use clamps to hold the webbing in place if desired. Ensure spar #38 is seated correctly in the notch and that the ribs are vertically straight. The plans show there are a couple of splices in the spars. These locations are not absolute and generally it is indicating that you will need to splice the spars a couple of times during the build. You can add the remaining front (#W11-5) spar webbing out to the ribs #130. Repeat this for the rear (#X11-5) spar webbing too. So, you will end up with all the ribs positioned, the front spar webbing on the front and rear spars. Once this is dry, go ahead and position and glue strut support #28 into position. Keep all holes align with the front spar webbing. Now you can add all the rear spar webbing #W17-24 and #X17-24. You can use masking tape to hold them in place when drying or use clamps. When you come to the spar webbing with the two holes in it for the strut fitting. Use the fitting #204 and screw #107 to ensure everything lines up prior to permanently gluing these parts in position. With the spar webbing in place, go ahead and add the stringers #21, #30 and dowel #46 the same way you did the spar #38. Ensure the stringers seat all the way down into the notch. Keep the wing flat and straight. You will notice how strong the wing is getting by adding all these support pieces. You will make the outer panel separate and then join them at the end. Repeat this same process for the other side. You will join the center of the wing later. Now you should have to almost complete wing halves. Let's do the wing tip area of the one of the panels. Locate the remaining ribs for the left panel, which would be ribs #127-#134. Remember rib #134 will not be glued into position until the aileron is completed and ready to be installed. Although, we will use rib #134 as a guide to help align the wing. Repeating the process you did on the center section. You will start with rib 127 to rib 128. You will

work your way out to the wing tip. We will join rib 126 to rib 127 later when this done.

Aileron

The ailerons require some attention, as they are initially built in the wing. The assembly process will be to dry fit the parts in position in the wing. Position and glue the ribs, dowel and control horn into place. Then remove aileron from wing, add trailing edge, then cover aileron with plywood. Add bushings and re-install aileron permanently into the wing.

The control horns should be assembled by now and painted if desired. At this time locate the ribs, dowel and carbon tube. You need to build the aileron in the wing as the aileron follows the wing taper which means if you build the aileron flat on the table it will not be at the right angles. The bushings will be added later as well as the trailing edge. The goal right now will be to locate the ribs and set the correct angle. This is not real hard, but you need to slow down and pay attention to the rib angles. Dry fit all aileron ribs, control horn onto the carbon tube with the dowel. The aileron ribs and control horn are at angles to the carbon tube. Sanding on side of the aileron ribs and control horn hole (for carbon tube) will help you get these parts at the right angle. Don't over sand but a slight sanding with a file will work just fine. Set the wing on the plans aligning the wing ribs around the aileron to the plans. Slide wing rib #134 out away from the aileron and now position the carbon tube with the dry fit parts into the wing. Slide wing rib #134 back into position. The carbon tube should stick out equally past wing rib #129 and #134. Notice that the angle of the aileron rises as it goes out to the wing tip. Which means the aileron ribs need to follow this same slope. Starting with aileron rib #135, align that rib over the plans and to wing rib #129. The dowel #46 should slightly go past aileron rib #135 as you will sand it flush when the aileron is done. Once satisfied with this rib location. Glue aileron rib #135 to dowel #46 and carbon tube #200. The prototype used ZAP CA glue, green bottle, to join these parts. Keeping aileron rib #135 aligned and in position, move onto the next aileron rib #136. Once satisfied with aileron rib #136 position go ahead and glue into position. Repeat this same process for the remaining aileron ribs #137-140. Note by placing a straight edge on top and near the trailing edge on wing rib #129 to #134 this will ensure that the aileron ribs are at the correct angle or slope. So, when you are setting the aileron rib angles just ensure they are pressed against the straight edge as you glue the aileron ribs into position. Once you have all the aileron ribs glued go ahead and locate and glue the control horn into position. Keep the control horn perpendicular to the wing and aileron. Again, Zap CA was used to secure the control horn to the carbon tube. The control horn should be at an angle as shown on the plans. Locate the trailing edge parts #15 and #16.

The carbon fiber #16 should be glued to the top of the balsa strip #15 then glued to the bottom of the aileron ribs. Note that the carbon fiber #16 will be used for the wing trailing edge, so, save any remaining pieces. Cut the carbon fiber #16 and balsa strip #15 to length and glue into position. Remove the aileron from the wing.

Fuselage

Several different glues were used on the fuselage. One was a wood glue, Titebond and the other ZAP CA (green bottle) with ZAP kicker. Also, the fuselage was pinned with carbon fiber rods. This was the first time for this and it has good results. It is not necessary to pin the vertical and horizontal members to the longerons but cautioned on the conservative side. Note that the prototype had a dowel fuselage. These instructions are fine for stick fuselages as well, although some dowel procedures will be mentioned that do not apply to stick builds. Building the fuselage process consists of building a right and left half (fuselage sides) and then joining them together from the front (engine area) and working toward the tail. A couple of goals need to be set. You want a straight even fuselage. If you get a small twist or warp you might be able to clean that up with the fuselage rigging and/or struts. First lay sheet 1 on a clean flat building table. A hollow door on saw horses was used for the prototype. You will build the fuselage sides first. All fuselage side pieces are positioned without gluing first, once satisfied then secure with glue. The longerons are longer than 36 inches so you will need to splice the longerons together first. Notice on the plans where the recommended splice areas are. That location is not absolute but just a recommendation that worked. Use blocks or T-pins to secure the longerons in place. The prototype used blocks which worked quite well. You can see that concept in the fuselage photos. The block process is recommended. The longerons should slightly ($1/2$ inch) go past the front cowl supports #48 locations as well as the tail area. These extensions will help locate the cowl supports #48 as well as getting the tail to fit. You will trim the longerons to length later. Using a wood glue, join the fuselage side supports 97, 97A together. Starting at the front (engine area) place the joined side supports 97/97A. That should piece should fit snugly between the two longerons. For dowels, you should "cup" the ends of the vertical members and place them in position. For sticks, you might consider notching the longerons about $1/8$ inch where the vertical members meet the longerons. For either process you might consider drilling a $1/16$ diameter hole in the unglued vertical member now so, when you add the fuselage rigging wire the holes will be drilled already. If you decide to drill the holes now, do locate the holes slightly above the ends of the vertical member. See the plans on the locations of the rigging wire. The vertical members should fit in-between the longerons snugly

without moving the longerons out of position and not having any gaps. To create "cups" on the end of the dowel use a 5/16 diameter drill bit creating a arc at the end. Continue dry fitting all the vertical members between the longerons. You should omit the last vertical member at the tail as that will be added once the top and bottom longerons are joined. That tail area will be 5/16 inch wide when completed. Once your satisfied with the vertical members then use wood glue and secure them in place. Glue the front cowl support #48 in position. Using a square, ensure cowl support #48 is straight. Let dry. Note that you just built the port side (left) of the fuselage. Remove this fuselage side and repeat the same process but omit cowl support #48 this time. You will glue that part in position once this new side is dry. Once the second fuselage side is dry remove from plan and flip over and now position and glue cowl support #48 as this will become the starboard (right) side. The fuselage sides are not at their strongest just yet so place them in a secure area for now.

The groove landing gear blocks #99 need to have the J-bolt holes located and drilled now. As it is easier and more accurate to do that now versus trying to do that when the landing gear blocks are in the fuselage. Notice on the plans where the J-bolts are located on the landing gear blocks. The J-bolts will make a very nice snug fit which requires you to drill right on the edge of the groove. Recall the music wire #310 will sit slightly in the groove and above the groove, so, the J-bolt will clamp the music wire into place. Using a 4-40 drill bit, drill one J-bolt hole set. You should drill all the way thru these blocks. You now have two holes in the block so test fit a J-bolt now. It should fit fine. You might have to use some force if your two holes are slightly off. That is fine too as a hammer can help get them into position when needed. Continue with the remaining holes and drill those into these blocks.

The upper tripod strut supports #50 will be positioned with the landing gear blocks. You can wait on drilling the J-bolt holes on the tripod strut supports until you mount the wing. Drilling these holes will be easier than the landing gear blocks as you have easy access to them.

At this time you will join the two left and right fuselage halves together. You need to find the related parts #49, #61, #159, #99, #724 now. Note that the firewall #724 does not need to be mounted at this time although it can be used to help square up the front of the fuselage but does not have to be glued in place now unless you want to do that. Some parts such as front cowl support #49 and the strut blocks #159 with the landing gear blocks will dictate the spacing between the fuselage sides. One note is the front dowel #61 is larger than the longerons and/or vertical members. This is by design. On the original, that larger dowel supports the rear machine gun mounts which requires a bigger tube. Also note that the fuselage is straight until the longerons pass the cockpit seat area. You will work from the front (engine area) towards the tail

doing one bay at a time gluing as you go. Using triangles and squares to help you ensure everything is straight is highly recommended. Start by placing the two fuselage sides over the bottom view. Position the landing gear blocks and front cowl support #49 and the two tripod strut blocks #159. Once satisfied glue in place using wood glue. Let dry. Move onto the next horizontal members and glue the top and bottom members in place. Again, pay attention to the straightness of all parts. Doing one or two bays at a time and drying works well. See the fuselage photos on the tools used to keep parts in position as well as straight. There is no hurry to get this done. Do it right once. Work your way to the tail and stop, let dry. At this point you can "pin" the sticks or dowels to the longerons if desired. The prototype used 1 inch long carbon fiber rod 1/16 diameter. Using a 1/16 diameter drill carefully drill thru the longeron into the vertical members. Test fit the carbon rod. To do the horizontal "pinning" drill on an angle so you will miss the vertical carbon rod. Using ZAP CA or a similar product, glue the carbon rods into place. Let dry and then sand any extending rods flush with the longerons. Position and glue plywood arch #82 to the rear of the cockpit. Using ZAP CA with ZAP kicker made this rather easy. Remember to keep this arch straight and square to the fuselage. Behind cowl supports #48 you will notice dowel #75. This dowel #75 supports the belly pan and helps the side fabric contour. Using wood glue position and glue dowel #75 into place. Refer to the photos to see the dowel in place. At this time go around and carefully sand and file all fuselage joints. Fill any gaps with glue or wood putty. Ensure the fuselage is straight with no twist and all joints are good.

The cockpit area has four arch supports which can be added now. This material is bamboo which needs to be sanded smooth. Once sanded cut, position and glue these in place. Using a ZAP CA glue with ZAP kicker would work well. (Note that you can boil the bamboo in hot water to help form the shape you need.)