

WING INSTALLATION SECTION V

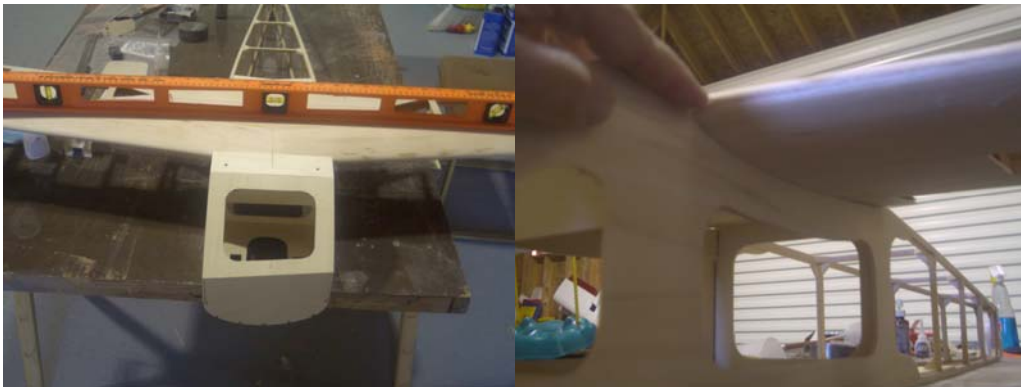
- You will need the following tools:
 - Spirit level
 - Ruler
 - Non-stretch string
 - Drill with bit assortment
 - 1/4-20 screw tap
 - Flat blade screw driver
 - 1/4" box wrench
 - 5/32" allen wrench
 - 5 to 10 minute epoxy
 - Medium and thin CA
 - Sanding block with 80 grit paper
 - 2 small clamps
 - Dremel with sanding drum
 - Builder's square
 - Glass cleaner

- Parts list:
 - 2 1/4" Wheels Not supplied
 - Wheel axles Not supplied
 - Wheel collars Not supplied
 - Tail wheel assembly Not supplied
 - Servo arms (3) Not supplied
 - Kevlar thread (optional) Not supplied
 - Carbon rods (6) (optional) Not supplied
 - Triangle stock balsa
 - Misc wood pack:
 - Wing saddle protectors (2) 1/64" plywood
 - Outer wing struts (4) 1/8" lite ply
 - 1/4" X 1/4" X 10" up strngr doublers(2) basswood

 - Ail Fus misc wood pack:
 - 3/16" X 3/16" X 36" fuse stringers(9) balsa
 - 1/16"X3"X24" fuselage sheeting (2) balsa
 - 1/16"X4"X36" fuselage sheeting (3) balsa

- 5/16"X5/16"/12" fuel tank mounts(2) balsa
- 4-40 X 9" threaded rod (1)
- Hardware bag #5:
 - Forward center struts (2) .062" aluminum
 - Aft center struts (2) .062" aluminum
 - Center strut diagonal braces (2) .062" aluminum
 - Outer strut fittings (8) aluminum
 - 1/4-20 X 1" slot head bolts (2) nylon
 - #2 sheet metal screw (1)
 - #2 washer (1)
 - 4-40 X 3/4" bolts, ctr strut to fus black (4)
 - #4 washers (8)
 - 4-40 locknuts (4)
 - backing washers (4) .062" aluminum
 - 4-40X3/8" bolts, ctr strut assembly black (4)
 - #4 washers (8)
 - 4-40 locknuts (4)
 - Steel flying wire straps (2)
 - 4-40X3/4" bolts, ctr strut to wing silver (2)
 - #4 washers (4)
 - 4-40 locknuts (2)
 - 4-40X1/2" bolts, outer struts black (8)
 - #4 washers (8)
 - 4-40 blind nuts (8)
- Wood bag #6
 - Forward fuselage formers (3) 1/8" lite ply
 - Aft fuselage formers (4) 1/8" lite ply
 - Precut stabilizer mounting rails (2) 1/4" balsa
 - Back rest angles 1/8" lite ply
- Parts bag #7:
 - Wheel pants
 - 4-40 X 1/2" bolts, pants mounting (6)
 - 4-40 blind nuts (6)
 - #4 washers (6)
 - 8-32 X 1" bolts, gear mounting (2)

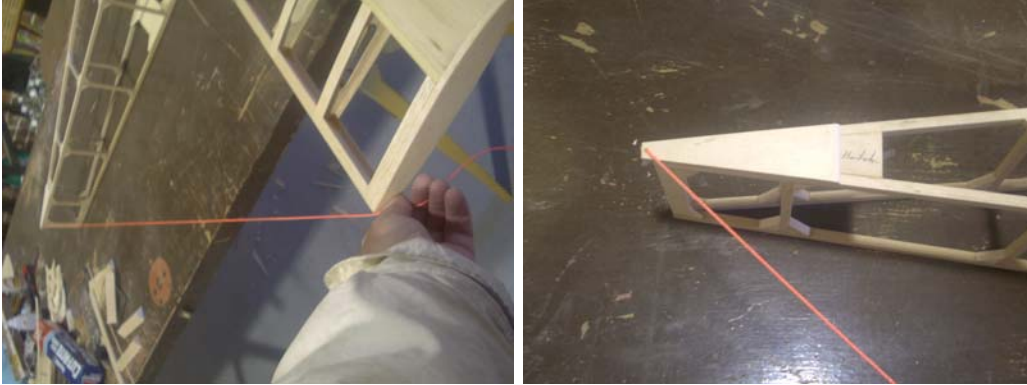
- 8-32 blind nuts (2)
 - #8 washers (2)
- Parts bag #8:
 - 4-40 locknuts (2)
 - #4 washers (4)
- Parts bag #9:
 - 4-40 locknuts (2)
 - #4 washers (4)
- Once again lay your fuselage inverted on you work table, with the firewall over the edge. Leave ample room to either side. The top of the table is your “zero” incidence reference from which you will be taking alignment measurements.



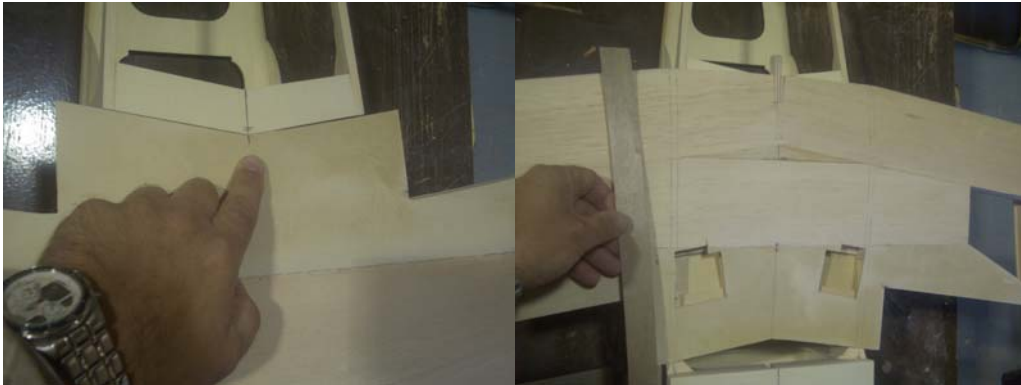


- Attempt to install the lower wing onto the fuselage. If it fits the first time you are ahead of the game. In all likelihood, it will not. Follow the following steps:
 - Using a level on the wing, determine which side is high. Look under the wing to see where it contacts the fuselage side, and then remove the wing and gently sand the saddle to free the interference. Use 80 grit paper.
 - It may help to run a pencil along the fuselage while holding it against the wing. This will transfer the wing contour onto the saddle to help in sanding.
 - Reinstall the wing and repeat until the wing sits in the seat.

- Using a ruler or string, measure from each wing tip to the fuselage centerline. Measure to the centerline pencil mark you made when joining the tail. The measurement should be equal or very close. If not equal, sand the long tip plate to make them equal. Yes, you are actually shortening a wing to make them equal lengths.



- Drill a small hole in the center of the tail as shown, and align the wing tips using a string. Use caution not to stretch the string when measuring. Adjust the wing position until the string is equal to both tips.



- Without altering the perfect positioning of the wing:
 - Mark the position as shown in the left photo.
 - Trace onto the wing where the saddle rests. The right photo above shows how these tracings should look when the wing is flipped over.



- Remove the wing and glue the 1/64" ply protectors directly over the saddle trace marks you just made with medium CA. Trim the protectors as necessary.



- Reseat the wing and recheck the string alignment. When perfect, lock the position on the fuselage by gluing two scraps of hard wood to the wing as shown in the photo. They must touch the inside of the fuselage on each side, but are NOT glued to the fuselage. These blocks will quickly align the wing for the following steps that require many wing removals and installations.
- Check for alignment using the following references:

- Measure from the tabletop to the center of the leading edge of the wing on one side of the fuselage.
 - Measure from the tabletop to the center of the trailing edge of the wing on the same side of the fuselage.
 - When alignment is perfect, the two measurements will be equal.
 - Take the same measurements on the other side of the fuselage. Average this with the previous measurement to zero the incidence of the wing.
 - Measure from the bottom of each wing tip from the front spar location to the tabletop. These measurements should also be equal.
- From the above measurements, determine where the saddle needs to be sanded to obtain equal measurements. Adjustments are made by slightly lowering the wing saddle where appropriate. Work slowly – you cannot add wood back!
 - DO NOT take any more wood off the front of the saddle than is absolutely necessary, as this will loosen the fit of the mounting peg. If your goof – you will have to shim the top of the landing gear plate with hard wood to restore a tight fit.
 - If you reach a point where the trailing edge is closer to the table than the leading edge, STOP SANDING. You will use the next step to align the wing.
 - Before proceeding with this step, you must have reached the following situation:
 - The wing tip measurements are equal – no exceptions!
 - The incidence measurements are equal, or the trailing edge is slightly closer to the table than the leading edge.



- Mount the 1/4" ply rear wing mount block using **epoxy**.
 - If you obtained perfect alignment in the previous steps, simply **epoxy** the block flush with the surface of the wing saddle. **Epoxy large** size balsa triangle stock to the backside.
 - If your trailing edge was low in the previous steps, then read on!
 - Seat the wing and prop it as necessary to obtain perfect alignment. Use a sheet of wax paper under the area or the wing where the mounting block will contact.
 - From under the wing and through the fuselage, **epoxy** the mounting block in place against the underside of the wing. Be very careful not to alter your alignment while the epoxy sets.
 - The block is now holding your alignments, you will have a gap between the wing and saddle, but that is OK.
 - Epoxy large size balsa triangle stock to the back of the mounting block.





- Drill and tap the wing and mount for $\frac{1}{4}$ X 20 nylon bolts. The holes should be approximately $\frac{5}{8}$ " in from the outside of the fuselage, and about 1" forward of the trailing edge of the wing. The goal is to hit the center of the wing mounting block tabs.

- Locate the main landing gear. It will be mounted with the rake to the rear of the airplane (the gear will tilt to the rear).
 - Mark $\frac{1}{2}$ " from the forward edge of the gear and 1" in from the start of the bends. Drill these two spots to accept 8-32 bolts.
 - Hold the gear in proper position against the fuselage. Ensure it is centered between the sides of the fuselage and that the rear edge is flush with the aft edge of the front wing former. Use the string on the tail to check the angle of the gear.
 - When satisfied, use the holes in the gear to drill the matching holes through the fuselage mounting plates.
 - Remove the gear and redrill the holes in the fuselage to accept the 8-32 blind nuts from the inside of the fuselage. Install the blind nuts and secure with a small amount of epoxy.
 - Mount the gear to the fuselage using the 8-32 bolts and washers.
 - Install your axles (not supplied) into the gear. Cut the shaft to 1 $\frac{1}{2}$ ". Use a dremel with a cutoff blade and file the end rounded.
 - Drill three pant mounting holes in each leg of the gear.
 - The holes will be forward, aft, and above the axles. "Above" is when the plane is upright. Remember that

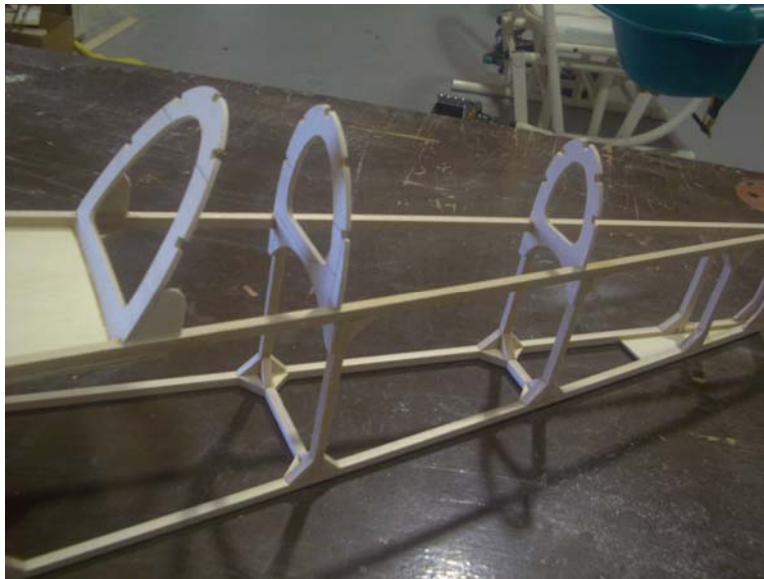
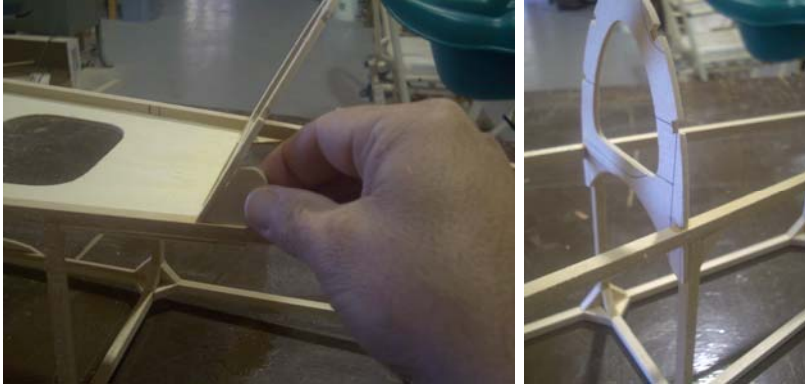
the plane is sitting inverted, so the third hole will be below the axle as you are looking at it.

- The holes should be just large enough to accept a 4-40 bolt. They should be as far from the axles as possible, while staying on the flat part of the gear leg and not getting too close to an edge.
- Install the wheel pants with the fuselage inverted and flat on your building table.
 - Locate on your wheel pants where the axle center will be and mark this point.
 - Using a bit the same diameter as your axle shaft, drill through one side of each pant and into the wood plate on the opposite side. **Use caution not to drill all the way through the outside of the pant!** If you have a drill press, use it with the stop feature to prevent accidentally drilling through. **Also, be sure to make a left and right pant.**
 - Determine the largest size of the hex portion of your axle. Using a bit slightly larger than this, open up the inside hole of the wheel pant.
 - The pant should now fit onto the axle and rest completely against the gear strut without interference from the axle.
 - Place the pants on the gear leg and level them to the table.
 - When satisfied with the alignment, carefully drill through one of your previous holes in the gear and into the wheel pants.
 - Remove the pant and redrill the hole to accept a 4-40 blind nut.
 - Install a blind nut in the pant and install the pant back on the gear using a 4-40 X ½” bolt and washer. Adjust the alignment as necessary as you tighten the bolt.
 - When satisfied, drill the remaining holes.
 - Remove the pant and redrill the new holes for 4-40 blind nuts.
 - Install the blind nuts and lock them in place with a small amount of epoxy.
 - Check your wheels on the axles. They should center on the shaft portion of the axles.
 - Mark the location for wheel collars.

- Remove the wheels and, using your dremel with a cutoff disc, grind small flats into the axle for the wheel collars. The flats must be on the bottom of the axles; which will be the top as you are currently looking at them.
 - Install the pants, collars, and wheels together. Snug all screws and bolts.
 - Check that the wheels rotate freely without binding on the pants or collars. Trim or adjust as necessary.
 - Remove the main gear assembly and set aside for painting.
- Install your tail wheel assembly as recommended by the manufacturer. Now is the time to check the fit and make any tail modifications that may be necessary. When satisfied with the fit, remove the assembly and set it aside for now.
 - Note, plan to use the gear mounting screws to also support the tail flying wires.



- Remove the wing and reinforce all exposed glue joints in the fuselage with **medium CA**.
- Glue the precut **1/4" X 1/4" X 10" basswood** doubler to the upper fuselage stringer. The doubler **DOES NOT GO FLUSH WITH THE STRINGER!** It is inset 1/16", so the turtle deck balsa sheeting can go on top of it. Center the doubler over the cockpit opening, or the area between "instrument panel former" and the "backrest former".



- Install the forward three turtle deck formers as shown using **medium CA**.
 - The aft cockpit backrest angle is set using the two precut **lite ply** supports. The arrows on these supports go towards the former and the stringer doubler.
 - The outer edge of the formers must remain 1/16" inside the outer edge of the fuselage stringer. This is to allow for sheeting thickness. The backrest former goes flush with the stringer doubler (not shown in this photo).
 - The other formers attach to the forward side of the cross braces.



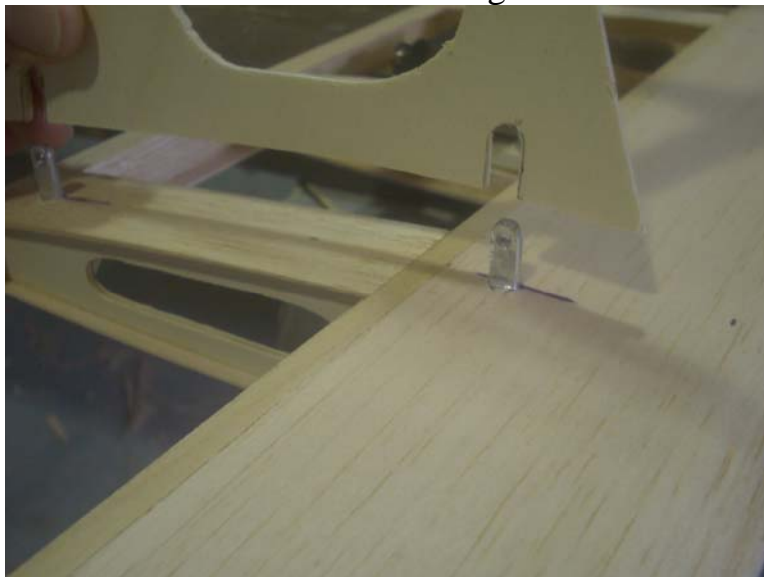
- Using a square to ensure they are vertical, glue the three forward fuselage top formers to the fuselage using **medium CA**.
 - Once again, the outer edges of the formers must remain 1/16" inside the outer edge of the fuselage stringer to allow for sheeting.
 - Cut and glue the five **3/16" X 3/16" balsa** stringers in place using **thick CA**. Fill the joints at the firewall as necessary for a complete glue joint.



- Assemble and install the center strut assembly as shown.
- Assemble the diagonal cross braces using 4-40 3/8" bolts, 2 washers and a lock nut at each joint.
- When mounting the struts to the fuselage top, use a 4-40 X 3/4" bolt, an aluminum backing washer, 2 flat washers, and a lock nut at each joint. The provided aluminum square washers go against the bottom of the fuselage top to distribute the loads against the lite ply. It is easiest to install the bolt from the bottom upwards.

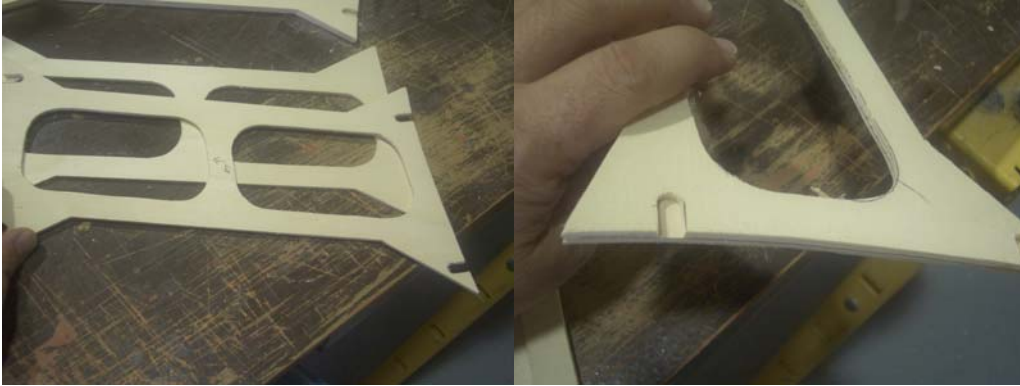


- Install the 8 strut mount fittings in each wing as shown.
 - Using your template, scribe a line down the center of the mounting blocks, in alignment with the rib and airflow.
 - Locate the position of the mounts using the marks on the wing struts. The aft edge of the struts should be even with the aft edge of the wing.
 - Drill and tap the $\frac{1}{4}$ -20 holes for the mounts so they are perpendicular to the centerline of the wing, NOT THE SURFACE of the wing.
 - Install the aluminum strut mount fittings until the top thread is flush with the surface of the wing.

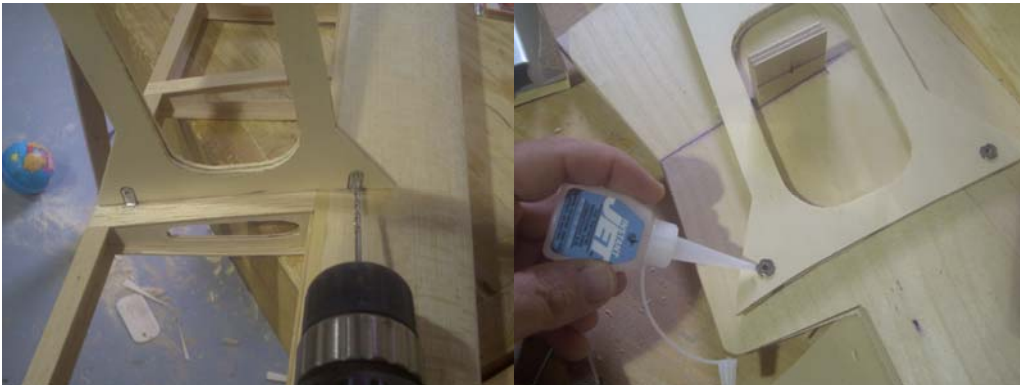


- Choose one left and one right strut panel. Hold in position and trace the shape of the strut mount fittings onto the panel. The aft edge of

the panel must align with the aft edge of the wing. Cut out the shape of the fitting as shown.



- Glue the two panels for each strut together for a left and right strut with **medium CA**. The panel with the cutouts must go toward the inside of the aircraft. BE CAREFUL to get it right! Press together on a flat surface and weight until the glue sets.



- Holding the struts in position on the wings, carefully drill with a 1/8" bit. Remove the strut and open the holes to accept blind nuts. Install 4-40 blind nuts on the outside of the struts. Lock the nuts in place with CA or epoxy.



- Mount the lower wing to the fuselage and set the assembly right side up on the worktable. Install the strut assemblies to the lower wing with 4-40 X $\frac{3}{4}$ " bolts with washers.



- Mount the top wing to the bottom wing using 4-40 X $\frac{3}{4}$ " bolts through the outer wing struts only. Slide the wing between the center struts as shown, but do not attach at this time.



- Check the incidence at the outer strut locations (not at the tips as shown in the photo) by measuring from centerline of the lower wing to the centerline of the top wing – at the leading and trailing edges.
 - The measurements should be equal, or up to 1/8” greater at the trailing edge.

Note: The 1/8” represents about 1 degree of negative incidence for the upper wing. Many people believe bipes fly better with the slight negative incidence to the upper wing. Full size bipes use the negative incidence. I have flown this plane with and without negative incidence, and cannot recommend one over the other.

- The measurements **must be the same** between the left and right sides.
- Make adjustments by turning the strut mount studs as necessary.
- Take your time, this is another critical step!



- Carefully lock the center struts in position using clamps.



- Set the plane up on the firewall, as shown in the photo, and stand back to check the alignment of the upper and lower wings to each other.
 - A slight misalignment can be fixed by re-positioning the clamps on the center struts.
- Measure the leading and trailing edge distance on both sides of the fuselage.
 - The Difference between measurements at the leading and trailing edges must be the same as the difference at the struts. For example, if the trailing edge measurement was 1/8" greater than the leading edge at the strut, then the trailing edge

measurement must be 1/8" greater at the fuselage. The overall distance is not as critical as the difference.



- When satisfied, drill through one strut mounting tab and install a 4-40 X 3/4" bolt, 2 washers and a lock nut.
- Recheck the alignment and drill the second strut. Install another 4-40 X 3/4" bolt, 2 washers and a lock nut.



- Remove the upper wing from the fuselage. Using a dremel with a sanding drum, remove the excess wood from the mounting tabs as shown in the photos. You may want to cover the wing surface to prevent damaging it should the dremel "jump" while grinding.



- Temporarily set the rudder servo you will be using into the servo assembly you built earlier. The servo post will go towards the rear of the assembly. If there is any fore and aft play, center the servo in the hole. Mark **PRECISELY** where the **CENTER** of the post is located on the sides of the assembly. Remove the servo.
- Using a square, ensure the aft edge of the fuselage is absolutely square to the upper fuselage stringers. Sand square if needed
- Glue the servo assembly to the tail of the fuselage as shown using **Medium CA**. The marks you made must be **EXACTLY** 1/32" behind the line formed by the aft edge of the fuselage. This is where the hinge line will pass when the rudder is mounted. The rudder servo post must be directly in line with the hinge line. Make certain the servo assembly is centered from side to side of the fuselage and not angled.
- Glue the two horizontal stabilizer rails to the top of the upper fuselage stringer. The thickest end goes forward to give the stabilizer a 3 degree incidence. The notches overlap the servo assembly.
- Place your two elevator servos in their mounts with the posts forward.
 - Lay the horizontal stabilizer (without elevators) into place on the mounting rails.

- Thread both elevator hinge pins through the hinges (without the elevators) in the stabilizer so the ends of the wires enter the screw holes on the servo posts.
 - Adjust the stabilizer so it is centered and the hinge line is perpendicular to the fuselage centerline. Stand back and eyeball the stabilizer with the wing, to make sure it is level. Even a slight misalignment to the wing is cosmetically very noticeable.
 - Check and recheck that the stabilizer hinge line is perpendicular to the fuselage centerline. This can be checked by running a string from the lower wingtips to the hinge lines of the stabilizer. They should be equal on both sides.
 - Make adjustments by lightly sanding the rails until the stabilizer is level. Do not take very much wood off.
- When completely satisfied, mark the position and lift the stab just enough to apply glue. Glue the horizontal stabilizer in place on the rails with **thick CA or epoxy**. This is to give you time to recheck alignments as the glue cures.
 - Glue the third turtle deck former in place against the servo mounting assembly. Make sure it is vertical to the upper fuselage stringer. The photo above shows the formers in the proper position, although the stab is not shown.
 - Glue the aft turtle deck former in place on top of the servo mount assembly. It should be forward of the rudder servo mount just far enough to clear the rudder servo mounting tab.



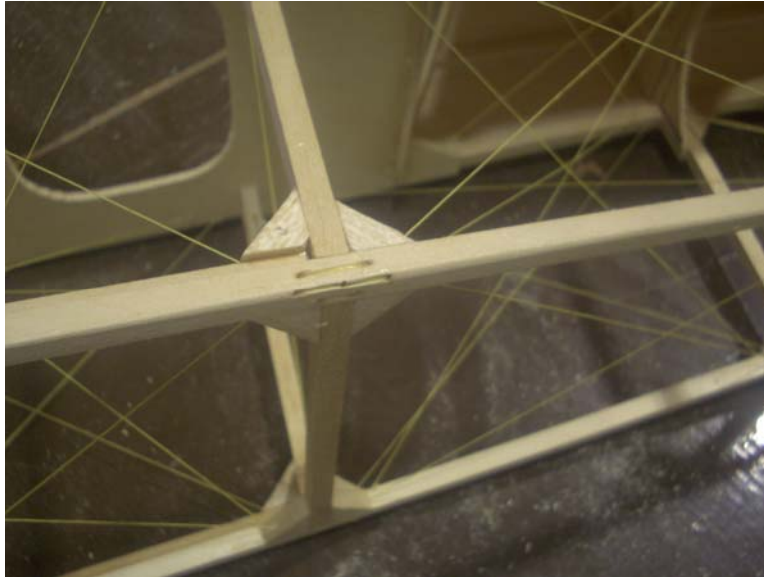
- Glue the vertical stabilizer to the formers using **medium CA**. Use a straight edge to ensure the stabilizer is in alignment with the aft edge of the fuselage; both the angle and the for/aft positioning. Adjust the angle if necessary by notching the balsa where it meets the fuselage formers. Use a builder's square on both sides of the vertical stabilizer to make sure it is square to the horizontal stabilizer.
 - Glue **small triangle balsa** stock to the joint where the forward post pass through the third turtle deck former with **medium CA**.



- Install the lower two hinges into the aft edge of the fuselage, using the techniques used in section IV.
 - Cut and bend a hinge pin to pass through the lower two hinges from the bottom up. Retain the pin with a #2 sheet metal screw and washer, but place the screw offset from the fuselage centerline. It needs to clear the tailwheel assembly.
 - Check the movement of the rudder and trim any areas that cause binding.

- Place a servo arm completely on your rudder servo and place the servo in the mount. You will have to trim the vertical stabilizer on ONE side to allow the servo to slip into position.
 - Install the rudder onto its hinges. Trim the pad on the rudder where the servo arm will mount to achieve a slight pressure fit when the rudder is in position.

- Remove the rudder and servo. Remove the servo arm from the servo and mount to the bottom of the rudder pad as in the photo. Use glue and two sheet metal screws. Note that a wire passed through the hinges should pass through the center of the arm retaining screw hole as shown in the photo.
- Using the same technique, install a servo arm on each elevator half.



- Sand the lower fuselage stringer to a round shape along its outside edge.

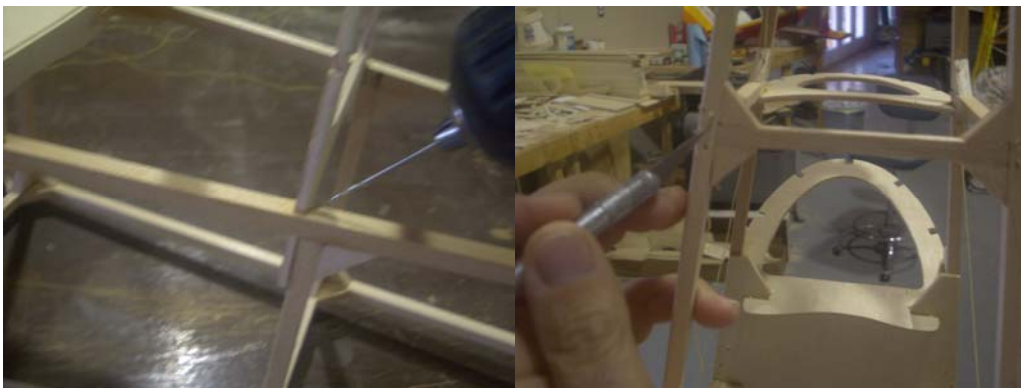
BALSA DIAGONAL TAIL BRACING

- If you chose the balsa tail bracing method, accomplish this step. Otherwise, skip to the next step.
 - Add crossed braces inside the fuselage squares formed by the cross braces and the turtle deck formers. Use the ends of the **3/16" X 3/16" X 36" balsa** sticks that you used for the former stringers. Only cut only brace from each stick as you will need the remainder as fuselage stringers. Use **medium CA**.
 - Gusset any remaining joints with **medium size** balsa triangle stock and **medium CA**.

KEVLAR TAIL BRACING

- If you chose to use balsa bracing for the tail, you may skip the following step. If you chose the carbon fiber rod bracing, then reading this step will be helpful, as the Kevlar method is similar. This explains the method for “stringing” the tail. This bracing technique uses Kevlar thread to make the absolute lightest and stiffest tail structure possible. The down side, is it will take the better part of an afternoon and evening to accomplish. The life expectance of the thread is over one thousand flights. Beyond this the plane is still structurally sound, but it will have lost some of its stiffness. Still, it is worth the effort over the life of an average plane.

- General explanation:
 - You will use the Kevlar thread to diagonally span each opening in the fuselage aft of the lower wing.
 - You can use all Kevlar, or a combination of Kevlar and balsa bracing – depending on the amount of patience you have.
 - The most critical opening is the one below the cockpit, as it is the most heavily stressed. This opening must be braced for structural integrity of the plane.
 - The remaining openings are held rigid by the turtle deck sheeting, and are not as critical to the strength of the tail. In fact, you could eliminate bracing aft of the cockpit; as it adds stiffness, but is not required structurally.
 - Let’s get started:





- Using a drill bit just larger than the diameter of the Kevlar thread, drill holes to accept the thread. Try to place them centered on the stringers, and aim each hole at the spot across the opening where the next hole will be drilled. It is helpful to use a straight edge and place marks on the stringers at the proper angles to guide while drilling.
- Using a hobby knife, cut a small “V” between adjacent holes you have drilled. Once again, center the slots on the stringers. Always cut with the wood grain, never across it. Make them only deep enough to recess the thread below the surface of the stringers.
- When ready to string, use a small amount of **thin CA** to wet the end of the thread.
 - When dry, snip the end at an angle to make a sharp point. It will now hold its shape while you thread it through the holes like a needle and thread.
 - Cut off about four feet or so of thread from the spool.
- Start each new section of thread as follows:
 - Pick a hole at one end of the tail, and drill a “starter hole” about ¼” from the original hole. Go with the grain from the original hole, and in the direction that will require the least angle from the thread.
 - Cut a “V” slot between the starter hole and the original hole.
 - Tie a double knot in the end of the thread opposite the CA.
 - Using the stiff CA’d end, thread the Kevlar up through the starter hole, and then down through the original hole. Gently pull it snug, not tight, when the knot lodges against the starter hole opening.
 - While holding light tension on the thread, place a drop of thin CA on the knot and in the slot between the holes. Wait a few seconds for the glue to set and continue.
- Continue along the tail:
 - Thread in one hole, along your slot, and out the next hole.
 - Pull quite tight, and place a drop of CA in the slot between the holes.
 - When the glue sets, move to the next hole and so on.
- Some important tips – I had to learn the hard way!

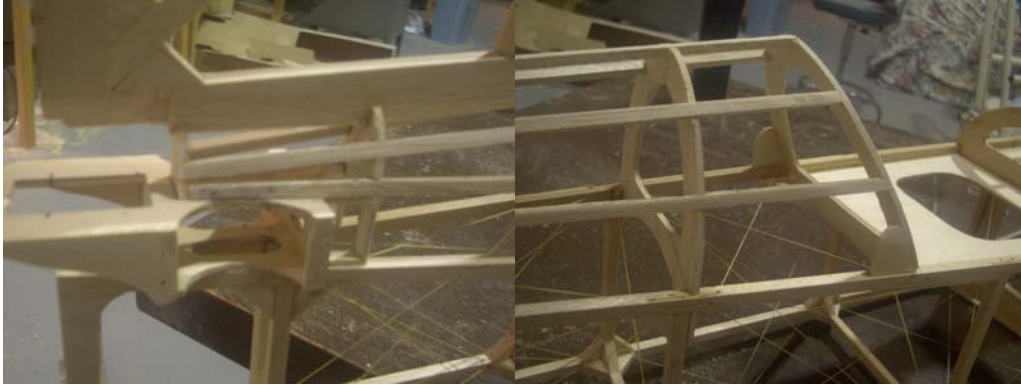
- Do not glue the thread on the opening side, as that will cause it to fray where it exits the wood.
- Run two threads simultaneously on opposite sides of the fuselage. Alternate sides as you go so the fuselage remains straight.
- When you run the first thread across an opening, only pull it snug. When you run the opposing diagonal over that opening, pull it tight. You will find the second diagonal tightens both!
- Keep a couple spare bits on hand. Drilling at angles is tricky and eats bits till you get the hang of it.
- End each thread:
 - By drilling an ending hole 1/4 “ from the last hole you thread.
 - Once again cut the “V” slot between the holes.
 - Thread the Kevlar through your last hole, along the slot and into the ending hole.
 - Place a drop of thin CA into the “V” slot while pulling the thread tight.
 - Run the thread in a convenient direction along the stringer where it exits the ending hole, and tack to the stringer with thin CA for about an inch.
 - Finally, cut the excess thread with the hobby knife.
- The process is just like sewing. It seems like a lot of work when you look at the whole, but you just keep working one opening at a time. Pretty soon you are done!

CARBON ROD TAIL BRACING

- If you chose the Kevlar or balsa tail bracing method, you may skip the following step. The following describes the method for bracing the tail with 1mm carbon fiber rods.
- General discussion:
 - You can use all Carbon diagonals, or a combination of carbon and balsa.
 - Carbon fiber rod bracing is the best compromise between tail strength and stiffness, ease of installation, and durability.
 - Carbon will provide the stiffest tail possible, with unlimited durability.

- It is only a few grams heavier than the Kevlar thread method of bracing.
- Let's get started:
- Drill holes in the stringers at the corners of each opening.
 - Use a 1.1 mm drill bit.
 - Using a straight edge, draw lines that are pointed directly at each other. Carbon does not like to bend, so you must provide a perfectly straight line for it to span.
 - Drill your holes in the center of the stringers parallel to the lines you drew.
- Run the rod as follows:
 - Thread the rod through one of your holes, across the opening, and through the opposite hole.
 - Insert the rod just far enough to go completely through the second stringer and no farther.
 - Place a small piece of tape on the rod where it enters each stringer.
 - Pull the rod out of the second stringer, but leave it in the first.
 - Rough the portion of the rod above the tape that was seated inside the stringers with sandpaper.
 - Reinsert the rod into the second stringer. Glue it in the second stringer **ONLY** with **thin CA** on both sides.
 - When the CA has set, pull the rod snug and apply **thin CA** to both sides of the first stringer.
 - When set, cut the rod off with a razor saw flush with the stringer.
 - Move on to the next diagonal.

CONTINUING



- Glue the **3/16 X 3/16" X 36" balsa** stringers into the slots in the rear turtle deck formers.

- Cut and add the **1/4" balsa** radius between the third former and the vertical stabilizer front post. Use scrap left over from building the tail surfaces. Do not sand to shape until after the turtle deck sheeting is installed. It should be high enough to be above the sheeting.

- Fit and glue the **5/16" X 5/16" X 12" balsa** fuel tank mounts to the top of the fuselage plate with **medium CA**. Cut two to run along the two lite ply stringers cut into the top plate between the instrument panel and the middle former. The second two are cut to line up with the first two, between the middle and front wing formers. They should touch the formers at each end.

- Begin sheeting the front of the fuselage first.
 - Remove the lower wing and center wing struts.



- Using a sanding block and 80 grit, gently sand the 3/16" stringers so they are straight and slightly curved to match the contour of the formers.

- Use the **1/16 X 3" X 24" balsa** sheet along the upper fuselage stringers.



- First, attach the edge of each sheet to the top of the upper fuselage stringers. Leave only a slight overlap at the front firewall. Use **thin or medium CA**.
- Wet the outside of the sheet with glass cleaner containing ammonia. Wait a couple minutes till it becomes pliant.
- Gently roll the sheet over the side of the fuselage. You will have to make a vertical slit along the center of the forward former. Glue the small front portion of the sheet to the firewall and former. Trim a VERY THIN triangle from the slit to make the remainder of the sheet lay properly.
- Glue the aft portion of the sheets to the formers and stringers.
- Cut the slots for the center struts.
 - This is the perfect time, as you can see and reach through the open center section to locate where the struts will exit.
 - Measure, eyeball, and cut small slots first until you are sure you have the right location.
 - If all else fails, just cut the slot all the way to the edge of the sheeting until you can install the struts. Then replace a small square of 1/16" balsa where it is needed – or leave it out! It is not structural and can be easily covered with monokote.



- True the edges of the side sheets with a straight edge and hobby knife.
- Fit the center sheet of 1/16" X 4" X 36" balsa to the remaining opening.
- If you have difficulty bending it, wet the outside with glass cleaner and wait until it is pliant.
- When ready, apply **thick CA** to the formers and stringers. Install the sheet and hold until the glue cures.
- Finally, join the edges of the two sheets by aligning them perfectly a few inches at a time and applying thin CA. Work your way down both joints.
- Trim the cockpit opening as shown in the photo.



- Sand the rear 3/16" stringers to match the contour of the formers.



- Sheet the rear turtle deck.
 - Glue the edge of a **1/16" X 4" X 36" balsa** sheet flush along the edge of each of the upper fuselage stringers with medium CA. Trim to clear the servo mount in the rear.
 - Wet the outside of the sheets with glass cleaner and wait a couple minutes for them to become pliant.
 - Gently roll the sheets over the formers. Mark and trim in the rear where the sheets meet the vertical stabilizer. Try to make the cut at the same angle as the stabilizer to maximize the bonding surface
 - Apply thick CA to the stringers, formers, and stabilizer. Hold the sheet in place until the glue sets.



- Use the end from one of the 4" wide sheets you just installed.
 - Wet one side with glass cleaner and gently wrap it over the top of the fuselage until it conforms to the curve. Work slowly and use plenty of glass cleaner, as this is a tight bend.

- Trim one side of the sheet with a straight edge and sand to match one of the side sheets. Note in the photo how you need to orient the grain of the sheet.
- Using **thin CA**, carefully line up the edge of the sheet with the first and glue. Work a little at a time to ensure you get the sheet flush with each other.



- Roll the top sheet over the formers and mark where it meets the other side sheet for and aft.
- Trim between the marks using a straight edge and hobby knife.
- Sand the edge to obtain a perfect fit between the sheets.
- Apply **thick CA** to the formers and stringers and hold the top sheet in place until the glue sets.
- Finish off by aligning the top and side sheets and bonding with **thin CA**. Work a few inches at a time to ensure perfect alignment.



- Cut and glue a piece of 1/16" balsa sheeting in the cockpit area to bridge the gap between the front and rear sheeting.

- Using a sanding block and 80 grit paper, sand the following areas of the fuselage:
 - Sand the sheeting flush with the face of the firewall and backrest.
 - Very gently "break" the CA edge at all sheeting joints. Use VERY LITTLE pressure and sand with the wood grain. You will clean up later, so don't go too deep with 80 grit. It can ruin your sheeting quickly if you are not careful!
 - Round the leading edges of the stabilizers where they meet the sheeting.
 - Sand any edges where plates meet. Place a small radius on sharp corners.

- Switch to 120 grit and sand all surfaces gently until the previous grit marks are gone. You may also sand any pen markings away and flush all gussets to the sides of the fuselage.



- Install the flying wire through-rods.
 - Draw a line along the forward end of the wing saddle $\frac{1}{2}$ " above the edge. Draw a second line $\frac{1}{2}$ " behind the front wing former.
 - Drill a $\frac{1}{8}$ " hole where the two lines intersect.
 - Repeat the operation on the opposite side of the fuselage.
 - Run the **4-40 X 9" threaded rod** through the two holes.
 - Bend two steel straps to a 70 degree angle.
 - On one side, place a washer, the strap, another washer, and a locknut. Tighten the nut so two threads protrude. Use a pair of pliers to hold the rod from the inside of the fuselage while you tighten.
 - Install the washers, strap and locknut on the opposite side. Tighten the nut until just snug, but not tight.
 - Cut the excess rod off using a dremel with a cutoff wheel.

- Set your fuselage aside while you build the ailerons.