## **Thunder Gazer Building Instructions**

### By Fred Cesquim - Brazil

Be proud! You have the leading edge kit of an amazing design by Mr. David Fitzgerald, designed, laser cut to perfection and packaged with care by RSM using the best available materials.

This is not a novice's plane regarding flight or building, we assume that you have some reasonable building knowleadge with other designs prior to the TG. Anyway, with this manual we are sure you can succeed and will end with a competitive stunt ship.

Study the plans carefully while reading the manual to fully understand the whole process, decide what is best for your engine choice and finishing method. There are at least two ways to do something, so we will present our version of building and sometimes an alternative, stick with the one you feel more confortable.

### RUDDER:

Lay a straight ruler over the plan and pin RD1 and RD2 to the building board, adding the bracing, do not glue RD1 to RD2. Cut the bracing close to final size and fine tune with a sanding block, aim for a perfect fit, as this will make a stronger piece. Make the top alignment pin now (you may use some CF tube and pin or a small piece of wire and suitable tube on the other side as an insert. The original design calls for an iron-on covering finish here, but the rudder is really flimsy and I have opted to sheet 1/32 balsa both sides with no significant weight gain.

TIP: when opening holes on soft balsa don't use a drill, it will oversize, instead use a dremmel and a sanding bit.

STABILIZER:



Laminate ST1, ST2 and E1 using medium CA

Laminate Carbon Fiber .007" strip to LE and TE as follow: cut stock to lenght with some spare, cut CF strip the same, and scuff both sides of the CF with 80 grit sandpaper (be very carefull with CF splinter)

Laminate CF to balsa wood with medium CA holding the balsa against a long metal ruler to avoid warps. I wrap some masking tape on the finger and run over the CF to adhere firmly on the balsa, and then laminate the second balsa layer. These laminations are required for leading edge and trailing edge of stabilizer (check the plan stab cross section detail) and DO NOT SKIP this step!

Sand the taper on the stab TE: trace a centerline on the hingeline of the  $\frac{3}{4} \times \frac{1}{2}$  laminations, then mark a  $\frac{3}{8}$  taper at the tips, trace a second line from center to tip and block sand up to that line.

Lay a ruler on the plan and pin LE and TE over the plan, shimming them to make centerline parallel to the bulding board. LE should be equally shimmed, TE center resting on the building board and tips shimmed to align the centerline, double check this!





Glue ST1, ST2 & E1 to LE and TE and proceed with bracing and hardwood horn anchor block (sand this one roughly before glueing).

Now block sand the ribs and tips to match TE taper. Plans shows a slight airfoil taper sanded, but i see no way to do it freehand properly on four sides of the satb, you're more likely to ended up with 4 different airfoil shapes. You may try to do it, or sand all four sides flat following the taper lines, assuring a fully symmetrical stab (I've opted for that approach)





Sheet elevator with 1/32 balsa: lay the balsa sheet on the bench, and press the assembly over it while slow CA dry, turn it over and repeat, be amazed of how strong this unit will turn out!

Butt glue 2 sheets of 1/32 balsa to make the stab skin, block sand the seam and press the stab (from center to tip) right side over the sheet, and then repeat for the left side, flip and do the other side.

TIP: never edge glue sheeting over open bays, Always do the whole sheeting on the bench, otherwise you won't be able to sand the glue joint properly and itps likely to warp badly.

Open holes for the nylon bushings to pass the stab bolts and glue tem with epoxy, but scuff outside with 80 grit sandpaper prior to glueing.

Round LE and tips, sand the "V" shape the elevator LE (i've opted to leave TE square for better aerodynamic response), open hinge slots, drill horn insert and you're done!

HINT: draw lines on LE centerline on elevator top/bottom maximum deflection point, then with a sanding block, sand up to that point keeping it perfect and true.

# WING:

Now the fun begins! Don't let the odd ribs alignment intimidate you, it's as easy to build as any conventional

wing but with more strenght and less weight! I'm gonna run through two methods, the original kit and a slightly modified option.

#### KIT OPTION:

The kit comes with JIG alignment holes on the ribs to be supported on steel, alluminium or fiber rods that fit's snugly and the rods shimmed over the bench.

Find 2 steel or alluminium rod that fits perfectly on the holes of the ribs and slide the ribs R0 to R20 both sides

Stretch the plan and lay the rods over it, shimming the rods in several places with equal height balsa supports. They have to be high enough to clear R0 from the bench.

Use weight or rubber bands to prevent the rods from moving.

The picture bellow is from another model but ilustrate the method.



Get the 3/8 x ¼ TE balsa stock, cut ends at 45 degrees, and butt join them, draw a centerline and using a straight edge as reference, pin it over the plan, blocking up with balsa to meet the ribs ends, aligned to the laser marks. Be sure it leave a 1/16 overhang top and bottom to meet the TE sheeting later. I have used a 1/8 x 60" x 2" L shaped alluminium stock and clipped the spar to it.



Glue the notched 3/32 rear spar to each other and slip on the rib notches, loosely positioning the ribs to the angles shown at the plan.

Laminate the 007 CF strip to the 3/32 x 3/16 laser cut balsa spars as you have done with the stab.

Be sure to scuff the CF with 80 grit sandpaper, stretch the CF along a metal ruler and with medium CA glue the spar following the metal edge to avoid warps. Turn it over and finish the lamination to the other side. You will end up with a 3/16 square spar with a CF strip laminated within the balsa, running vertically. Sand the surplus CF strip to have a perfect straight spar, be really picky here, this will pay off when finishing the wing.

Now slip the spar top and bottom to the ribs and be sure to use it vertically (when looking over the wing you willseethe3laminationslines.



With a square angle, align each rib with the plan, checking if it's perpendicular to the building board and tack glue to TE, notched rear spar and then spars, work one rib a time and keep checking while you go. Be sure that the main spar is not warping, checking with a long metal ruler.

Glue the TE 1/16 sheeting to the ribs, TE spar and rear spar with wood glue and pins. Again check straightness with a steel ruler

Laminate 1/32 plywood landing gear suport to R6 and R7 with CA.

Glue the half ribs to the spars aligning LE laser mark with aid of a steel ruler butt against the full ribs

Assemble the landing gear blocks: glue GBS 1/16 ply gear support to the slots on R5-R8 ribs, 3/4 x 3/8 RSM gear block to the GBS support and R6/R7 lamminations with epoxy (see gear block detail on the plan)

Build the weight box and glue against R19-A, line it around with 1/8 balsa and sand all to conform to adjacent ribs. See Picture above.

Now comes the tricky part: sheeting! With a straight edge, true one side of 1/16 sheet and edge glue 2 sheets.

HINT: true both sheets edges with a metal ruler, butt them and hold with masking tape, flip the joint open, run wood glue (aliphatic works best) on the edge, turn it over, clean excess and let it dry with some weights to prevent warps. After glue set, block sand the glue joint on both sides.

Now take the wing off the bench (leave the rods & TE support blocks there) and using the seam glue as a reference, align it with the center laser mark on the ribs LE and tack glue the LE of the ribs to the sheeting, just a small part to keep it centered. Now moisten the whole sheeting with Windex and when plyable enough, pull it back over the ribs using masking tape to hold it, be carefull not to bend the wing or induce warps. Tape it back over the ribs and put it back to dry on the blocks aligning everyhting again, this is the most important step to avoid warps, double check everything and use some weights to keep it laid down flat on the supports. When the windex dries, mark the sheeting where ends the spar, and cut the sheeting surplus spanwise to fit. Open the sheeting and run wood glue over the ribs and spars top and bottom. With masking tape, pull it back to the ribs and spars and after all checked for proper contact of parts, lay the wing back to the building board over the support blocks and hold everything back with clips and weights. Check again TE and spars with a steel ruler. If all straight let it dry overnight. You may do both panels left/right at once or one at a time, but you must make top and bottom at the same time to avoid warps.

Now cut and glue the 1/16 shear webbing between R2 to R8 as close as possible to the ribs and then add the cap strips (do a nice job here, please!).

Assemble the bellcranck to the steel rod and attach the lead-out by your preferred method. Glue the 1/8 plywood BCM2 to R0 and R1 with the bellcranck in place, now you may need to open a bigger hole on R0. Solder washers on the ends of the bellcranck steel rod and glue BCM1 over it attaching to R0 to R2. Dry fit and check if you need to sand a bit of BCM1 to conform to the wing skin. When satisfied, glue in place then attach the pushrod to the bellcranck by your preferred method (I use 4-40 ball link). Now sheet the center section top and bottom

Drill holes for the landing gear and weight box cover. Assemble the cover plates by the plans, laminate scrap balsa over, sand to contour, open holes for the bolts and countersink for the bolt heads (see picture bellow). Glue wing tips and adjustable lead out ply parts.

With scrap balsa add a small LE block to the tip of the wing to make covering easier later and a 1/4 brace following the spar location (you can cut it straight or sand a small radius and copy for the other 3 sides)



Sand TE stock to meet the 1/16 sheeting with a large and flat block and you're done!

If you want to dress up the wire LG leg, scuff the wire with 80 grit sandpaper and epoxy the 1/8 balsa and 1/32 ply LG cover. Do this with the LG wire bolted to the wing to align it properly.

Edge glue the Flap parts, 'V' sand the LE and open the hinge pockets.

HINT: cap the inboard end of the flap parallel to the fuselage with 1/8 plywood to stiffen the area;

Insert a short piece of ¼ hardwood dowell to the LE of wing and to the FL5 trim tab to act as anchor for the ball links push rod assembly.



# ALTERNATIVE OPTION:

For this assembly method (wich is trongly recommend) you will need 1/8 alluminium L shaped stock (2" x 2"). Using the laser marks on the ribs centerline file a 1/8 notch at the LE on all the ribs and half ribs.

Get the 3/8 x ¼ TE balsa stock, cut ends at 45 degrees, and butt glue ends, draw a centerline using a straight edge as reference.

Use balsa as support or tack glue TE  $3/8 \times \frac{1}{4}$  to the L shape, cut a LE support spar with  $1/8 \times \frac{1}{4}$  and fix it to the front L shaped support. I have blocked up both with balsa sticks and clamped to hold in place. LE and TE should be flat and exactly parallel to the building board and center lined to each other.



Now insert the ribs LE notch to the LE support spar and with square help tack glue there and to the TE. Do it with wingtip ribs and center rib, check straightness and add 3/32 rear spar.

TIP: L shaped alluminum stock and a clamp are great for positioning ribs (see bellow)







Add the laminated spars and half ribs.



Dry fit sheeting against the 1/8 support LE spar lip and trim as necessary for final assembly.

CA 1/16 sheeting lip to the remaining LE balsa 1/8 spar checking if it butts perfectly against the ribs, use a straight edge to check. When dry, spray windex and when plyable enough, pull it back to the main spar. For this task I use wood glue on the ribs and CA on the spar, gently bend the sheeting back and clamp it to the spar, be VERY carefull not to induce warps when performing this, it's easy to press down the spar or pull hard the LE and induce a warp.

Note weights to keep the wing resting flat on the supports.

From this step on, follow the same directions described before when building the kit version.

I belive this method is easier and faster, my wing came up fast and perfect.





Weight insures the wing lay flat on the support. Flip the wing and rest again on the supports for the bottom side.

# FUSELAGE:

Using a long straight ruler for alignment, CA glue fuse sides.



Now we have to make a JIG to laminate the nose ply doubler and set spinner curvature at the same time. From scrap 1/16 we're gonna make a "ramp" with the same curvature of the nose on the plan top view. Cut 2 bases and sand both together checking with plan curvature, when satisfied, glue 1/16 balsa crosswise to make the ramp.





Cut carbon veil to the nose shape back to the 1/32 TD and BD ply doubler and laminate to the fuse with finish resin (avoid epoxy because of the weight and it's hard to spread), spread with some plastic card and remove excess. Lay the 1/32 TD and BD ply doubler over it and rest nose on the "ramp", with heavy weight over the lamination, check if fuse rests perfectly on the ramp. Let it dry overnight.







Repeat for the other side (double check that you're doing a left and a righ fuselage side!!) And admire your work, you should have 2 perfectly shaped fuse sides.

Now laminate F10 1/64 ply doubler over fuse zig-zag joint leaving 1/8 gap close to TD doubler end. Laminate RFD 1/32 ply doubler that acts as stab support, and glue RD4 reinforcement to RFD and AFT fuselage sides. Tack glue AFT to the fuse sides for now. I have overseen this information on the plan and regretfully learnt that the hard way!!

Note that AFT protudes over fuse top, with a ruler, cut it flush so you can rest fuse on top while building (see plan details with shaded area)

Laminate 3/32 ply BD doubler to fuselage wing saddle, laminate LWFD to the assembly and tack glue to the fuselage sides

Using top fuselage view, sand the hardwood engine mounts to follow the nose curvature. You may want to carve a bit of it to save weight, this is optional, use your discretion.



Laminate 1/32 ply BD doubler to the bottom balsa fuselage wing saddle, laminate ply LFWD to this assembly and tack glue to the fuselage sides.

Trace formers location on the fuselage sides.

Engine mounts have negative incidence of 1/8 at the nose (check plan carefully!). Trace the tilt down alignment line for the engine mounts and laminate with epoxy to the fuse sides. Since there is the nose curvature, rest each side over the JIG you have made and add some weights to keep it perfect. Square and epoxy glue F1 and F3 formers to one side. Support fuselage sides up and glue the other fuselage side to this assembly checking straightness in several spots.

Draw a centerline on your bench and mark mid point on the other formers. Align fuse assembly to this centerline and block firmly with L shaped supports. Add formers F4 to F8 using center line to square up fuselage. Use a scrap balsa spacer  $1/8 \times \frac{1}{4}$  to glue the tail end.

When attaching F5B and it's doubler, glue them slanted following the fuse line separation angle, this will make wing assembly at the field easier.

Now checking if sides are square to the building board, and if half marks on formers are lined to the centerline drawn on the bench, tac glue the fuselage in several spots.

TIP: glue large masking tape on the bench and draw the centerline on it. Tack glue the fuse to the masking tape with CA, to avoid ruining your building board.

Glue bottom half formers F2B to F8B. Glue F9T, F9B and F9, this one with the blind nut already glued. You will have to make from scrap a former to butt agains the cowl. I have made a copy of F2B and doubled with 1/32 ply scrap, add a 1/8 cross piece to keep fuse side from collapsing, see pic bellow:



Laminate scrap 1/32 ply to F8B back side and shape a hardwood block for the tail wheel wire. Round the block to match F8B (round before you glue it!!). You may assemble the block / wire later and glue after the bottom sheeting is ready (strongly recommended).

Now you have to decide, if you haven't yet, about the powerplant. If your engine calls for a tuned pipe, then you must add internal walls and support to suit your engine. Plan ahead as this will be much harder to do after

bottom sheeting is ready.

Here I've deviated a bit from the plan: when you dettach the wing from the fuse, the lack of formers on the mating faces will let the bottom sheeting too weak, so I made 2 copies of F5B and glue them to the fuse following the wing LE separation line angled as per the plan, this way, when you take the wing off one piece will be the end of the fuselage and the other will be the belly pan facing. Do the same at F2B and F9B station as well.

So far, so good but now let's have some real fun! The top and bottom of the fuselage are perfect half circles and the desing approach to achieve this is unique. After you've done it this way, you will never use a balsa block again!

To learn the process, try to do it first betwen the slanted F5B wing separation former to the cowl limit, these formers are paralell and fitting will be easy, do it with some overhang and trim when finished.

With the fuse firmly tack glued to the table, take a 1/32 balsa sheet and roughly conform over the formers, using Windex to help conforming, secure with masking tape and let it dry. When released the sheeting will retain the rounded format.

TIP: to mark where to cut the sheet, run along the fuse 1/8 sheet top corner some dark pastel chalk and press the sheeting against the edge on both sides. Take it off the fuse and cut a bit oversized. Then trim by sanding and checking.

Now comes the tricky part: align one side of the sheeting to the fuse lip, use a steel ruler, music wire or a hardwood stick to recess the 1/32 balsa on the 1/8 fuse lip perfectly lined and 1/16 deep inside the lip, as you will laminate another 1/16 sheet over it and needs to be flush with fuse sides. When satisfied with the alignment, run CA from the inside, carefully not to stick the alignment piece you used outside.



Dry fit the sheeting and check if will butt PERFECTLY to the other fuse lip, if not, carefully sand or add scrap balsa to achieve a perfect fit, belive me, this will pay off when done properly! When satisfied with the fit, run wood glue on the formers and the lip, roll the sheeting over with masking tape aid, and use another stick to line up the end recessed on the lip as you did on the other side. Go for a coffe or a beer, you deserve it!

When dry, do the same procedure with 1/16 sheeting for trimming, again, when Windex is dry, make a last test fit. All good? Ok! Cut carbon veil and laminate to the 1/32 sheeting with finish resin (epoxy works, but weight is a penalty, messy to spread, cures faster and don't dry hard as finish resin.), let the carbon overhang fuse sides, now add the 1/16 sheeting and with masking tape attach it to the fuselage. The overhang carbon and finish resin at the lip will perfectly seal the joint. Go to bed, and run to the model in the next morning to be delighted how stiff and light this assembly turns out!! Sand the excess carbon veil overgang. Great, isn't it? Now do the remaining sheeting. One thing to be very carefull here is to avoid twisting the fuselage while building the sheeting, so before you glue anything, use a square angle to check.



For the remaining bottom sheeting on the removable tail part you may find easy to use two  $\frac{1}{2}$ " light stock (surplus form the laser cut parts) to form a shell and sand to shape, as the radius is too tight to be properly formed.



Epoxy the ¼ AC ply WM2 to the fuselage, but glue the 6/32 blind nuts and bevel the bottom (indeed top of the fuselage) part that will touch the wing TE beforehand. Epoxy ¼ balsa triangles to the back of it, DON'T FORGET!

Epoxy the  $4 \times 6/32$  blind nuts to F3, add 3 layers of masking tape to the front face in order to provide a gap and attach with the bolts to F2.

Tack glue scrap 1/64 Ply to the wing saddle in 3 spots (see Picture above) and lay 2 layers of masking tape on the wing center where touches the fuselage.

Now slip the wing to the fuselage saddle and check squareness of the fuselage with your building board. Carefully center the wing on the saddle, and check for: wing to building board paralelism and wing to fuse alignment. This is one of the most important steps and should be triple checked at least! My method here is to trace wing center, then transfer fuselage LE and TE measures to the wing and rest the wing aligned with this marks. Then I use a string attached to a fixed spot at the tail center and make equidistant marks at the wings to check if both sides are aligned straight with wing center, when satsfied I block the wing with T pins. Next i use a caliper and check if the distance of the LE to the building board is equal on both sides. Not rocket science but you should do it properly.

Tack glue the wing to F3, then test fit WM1 ¼ AC ply to the TE and chamfer as necessary to rest perfectly on the TE and aligning the bolt holes to fix the wing to fuselage. Now add 3 layers of masking tape betwen the WM1 and WM2 and lightly tight the bolts. Check the wing alignment again and tack glue it. Unbolt the wing and epoxy wing to WM1 and F3 properly. Shape the balsa block that reinforce wing/WM1 and epoxy, be sure to allow room for the belly later! Open the hole for the 6/32 bolt head. With 3/32" balsa make the LE balsa box (shaded on the plans). This box will have to slip to the fuselage top and will be glued to the inside of the belly, so plan ahead and check for fitting before final glue.



Bolt the wing from the front and align as much as possible the LE, assuring that the wing is resting perfectly on the scrap ply that you have glued before. When satisfied, glue the belly to the wing with epoxy, this have to be as tight as possible and glued perfetcly to the WM1, reinforcement block and to F3 and TE balsa block, as this unit will hold your wing! Be carefull to avoid glueing the wing to the fuse! Unbolt the wing and using the TE WM1 hole as alignment use a long drill to make a hole for the TE bolts through the belly sheeting. Use plastic or carbon fiber tube segments to make a guide for the bolts later, otherwise they may fall into the fuse and assembly will be a maddening task.

HINT: cut a tube segment that fits the bolt head and slight longer than the bolt lenght, next find another tube that fits inside this short tube and that allow your hex wrench to slide in but small enough to prevent the bolt head to enter it. Now insert the bolt with a washer (glue this washer) to WM1 then glue the outer tube to the balsa block and WM1, next push back the bolt just shy of facing outside, and slide the guiding tube to the outer tube until touches the bolt head, then glue to the belly sheeting and to the outer tube. This way the bolt will never fall off the plane, always align with the wrench and the glued washer prevents wood crushing. Look at the pictures bellow:



Guide tube exit on the belly:



Release the fuselage form the building board.

Glue the ¼ balsa vibration dampener between motor mounts and top formers F1T, F2T, F4T and FF. Using the same procedure used for the bottom fuselage, sheet the front top, being very carefull to avoit twisting the fuse and inducing warps as the fuselage will be off the bench. Now drill the mounts for your engine and epoxy the blind nuts. Fit your fuel tank and make any necessary cuts and adjust to it. Glue the nose balsa block and sand to shape.

HINT: don't allow the nose block to contact the blind nuts, in case you over tight the engine, the blind nuts won't disturb the balsa and ruin the nose finish. (Don't ask...)

Bolt your engine (don't forget to add the 1/16 alluminium motor pads under the engine), and glue the 1/8 ply NR nose ring using your spinner as a reference. Use 1/32 plywood shims betwen the backplate and NR to allow room for finish. Sand all the nose to blend perfectly, remember: this is a pretty airplane!

HINT: don't be lazy (pretty obvious!) Bolt and unbolt your engine and spinner as much as needed to sand it properly, NEVER sand with engine attached or even worse, sand and scratch your spinner backplate! Sand for a perfect match to the spinner or even a bit more as finishing layers will make the fuse nose a little bigger later. This is a percentage of the little things that makes the WOW factor shows up.

COWL:

As the fuse tapers from the back to the nose you will have to shape the 3/16 balsa sides to this taper. Protect the fuselage nose area with non sticking tape, laminate carbon veil with finish resin to the cowl sides and attach with clamps to the fuse lateral to follow the countour while dries. See picture.



Now glue the CNR 1/16 ply cowl nose ring. Glue 1/8 wood dowl to the half ring and four 1/8 ply attachment tongues with the blind nuts already glued to the tongues.

HINT: to avoid damages to the fuse mating flange, line it with 1/64 scrap plywood. This lip will be great when installing engine and sanding finish, avoiding hitting the soft balsa.

Attach the cowl with the bolts to the fuselage and shape a 3/16 balsa sheet to fit between sides following contour. Shape and glue front balsa block and ddd ½" triangle stock inside corners to allow room for shaping. Now sand everything to shape and to blend with fuse sides and bottom round sheeting. Open holes for cylinder head, muffler and cool air acess.

Install your engine again and do the necessary cut to fit the muffler or tuned pipe. You may line the pipe chanell with 1/64 ply or balsa, just leave enough clearance to avoid overheating.

Plan shows a basic installation for this set-up but ech engine will call for specific installation, so do it accordingly.



Protect the wing with 2 layers of masking tape where faces the fuselage and attach to the bolt it. Now slip the 1/64 ply saddle lips and glue to the fuselage, you may need to make some cuts at the LE to properly follow the wing contour. Glue balsa FR flap fairings to the fuse this time. Check fit against flaps and line faces with scrap 1/64 ply. CAREFULLY check to align the FR part with the neutral flap position! Allow 1/16 room between flap/fairing to prevent interference when assembling the wing later.

Release the wing and make a nice radius with soft balsa and filler material to the fairing and to the belly pan as well. (I use epoxy/microballon mix or Super Fill)



Glue top formers FT, F5T, F6T, F7T and F8T and proceed with top sheeting as previously mentioned. Laminate the laser cut canopy blocks, sand to shape and glue to the top fuselage, using filler to blend it perfectly.



HINT: if you will finish your plane with iron on covering, you can use balsa filler, but if you plan to paint it, do not use it! Instead use super fill or automotive filler, otherwise paint will lift from the balsa filler, even if you cover it with sylkspan or carbon veil.





TAIL FINISH: Bend the tail wheel wire and glue to a hardwood block previously shaped, open the bottom sheeting and permanetly epoxy to the laminated ply reinforcement on F8B (told you before, remember?)

Laminate 1/32 ply base to the 1/64 ply satb saddle so the blind nuts can be attached, trimmed to fit inside the fuselage. The saddle will make an outside lip to the fuse. Add 2 layers of masking tape to the stab center, this will make room for finish later. Glue the 2/56 blind nuts and bolt the base to the stab. With the wing attached and fuselage blocked on the bench, proceed with stab alignment: check if it's paralell to the wing hinge line and with wingspan. Use an incidence meter to make sure that the wing is set at 0 degree and block up fuselage intil you read 0. Now check stab incidence, as shown on plan it must be 1/64 positive in relation to the wing, triple check everything and glue the stab saddle to the fuse sides.





Be patient and carefull here, this step is one of the most importante for the final flight charcateristic of this plane!

With another 1/64 ply saddle make oval holes to clear the bolt heads on top of the stab and tape it in place, next laminate 2 balsa R10 & R10R, glue the pin and insert tube (as previously mentioned on the fin) but now you can use a thicker pin. Glue this assembly to the 1/64 base, carefully to avoid glue on the fuselage face.



Get the top portion of the tail that you have previously cut free and glue it back again to the bottom part, top saddle and R10 assembly base. With ¼ scrap, make a lingeron from R10 to the rudder post, moisten the top lateral with Windex and when pliable enough, glue around R10 and the top longeron. Sand everyhting and glue the rudder and dorsal fin aligning with the stab. Install hinges to the rudder.

HINT: to aid on assembly and keep alignment of the movable parto f the tail, glue small 1/32 ply tongues that will interlock when you joint parts again. One tongue on the fuse and another on the tail part, see bellow:





Using the same procedure done to make the guiding tube for the wing belly attachement, prepare the removable tail and bolt it to the fuselage.

Instead of having the bolt inserted through the rudder hinge line, I've deviated the tube a bit to enter from the fuse side, this way we can permanently attach the rudder.

On the right side of the fin / rudder add the hardwood dowels as done with the wing trim tab.



Now your plane is completely built! Congratulations!

Proceed with final finish sanding everything, fine tuning contours and fit of dettachable parts.

HINT: use thin CA to harden balsa flanges, sand with 320 paper, protect one side with non-sticking masking tape and use super fill on the other flange to get perfect fit all the time.



## FINISHING:

Fuselage and flaps MUST be covered with carbon veil with dope, this will add strenght and will make a strong finish. Flaps may twist if you skip the carbon veil! This is called for on plans!

You can use iron on covering on the wing and stab and paint the fuselage. No it's up to you and your trust method of finishing.

Thanks a lot for reading carefully and go for the field ASAP!

Best luck with your stunt machine!

Fred Cesquim, Brazil, May 2016