



*Phone: 704-799-1658*

*Website: [www.jtecrc.com](http://www.jtecrc.com) Email: [sales@jtecrc.com](mailto:sales@jtecrc.com)*

## **3.1m & 3.2m Extra 300 / 330 Kit Builders Guide**

**Please read through the entire manual first. It contains important instructions and warnings concerning the finishing of the model.**

## **WARRANTY AND PRODUCT DISCLAIMER**

**Jtec Radiowave guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. In no case shall Radiowaves' liability exceed the original cost of the purchased kit. Further, Radiowave reserves the right to change or modify this warranty without notice.**

**In that Radiowave has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.**

**If the buyers are not prepared to accept the liability associated with the use of this product, they are advised to return this kit immediately in new and unused condition to the place of purchase at the buyers' expense.**

## **INTRODUCTION**

Congratulations and thank you for purchasing the Radiowave 3.1m or 3.2m Extra kit.

Flying the Extra 300/330 is a very rewarding experience, as it should be for such an aerobatic model. With the aircraft control surfaces set for precision aerobatics, the aircraft will perform prescribed aerobatic patterns as used in IMAC (International Miniature Aerobatic Club) events exceptionally well. With control surfaces set for freestyle flying, the aircraft will perform today's modern 3D aerobatic maneuvers to really showcase the aircraft's aerobatic potential.

## **PRECAUTIONS**

Please finish the Extra 300/330 according to the instruction provided in this manual. We do not recommend altering the model in any way that could result in an unsafe model. To prevent any possibility of flutter, please make sure that there is no slop or backlash on the control linkages. Install gap seals, especially on the ailerons. Use only high quality, high-torque servos for all the control surfaces.

	<b>Minimum Number of Servo's per Panel</b>	<b>Minimum Torque Per Servo</b>
<b><i>Aileron</i></b>	2	300 in-oz
<b><i>Elevator</i></b>	1	300 in-oz
<b><i>Rudder</i></b>	2	300 in-oz

This manual provides very detailed assembly instructions for this model. Experienced modeler may find these instructions much too detailed but we felt it is better to provide more detail than not enough as to avoid mistakes that could be costly as well as time consuming.

The 3.1m & 3.2m Extra's are designed for engines from 150cc to 200cc. Unlimited vertical performance is achievable with these engines.

## **A NOTE FOR SAFETY AND PRODUCT DISCLAIMER**

Please fly the Extra 300/330 safely and in a professional manner. Jtec Radiowave accepts no risk or liabilities when customers use our products for any circumstance, occurrence, happenings, bodily harm or death to yourself or anyone. Please follow the Academy of Model Aeronautics (AMA) flight safety rules and regulations. Assume the use of our products at your own risk.



### **3.1m & 3.2m Extra 300/330 Kit Features**

Constructed with laser cut lite-ply and birch-ply, and balsa parts

Interlocking Fuselage Design for self aligning & quick building

Foam core Wings, Horizontal Stab, Vertical Stab, & Rear Turtle Deck

Premium Fiberglass Cowl & Wheel Pants

Aluminum Wing Tube, Tail Tube, & Landing Gear for 3.2m Extra

Carbon Fiber Wing tube, Tail tube, and Landing gear for 3.1m CS Extra

Designed For Canister Style or Tuned Pipe Exhaust Systems

Designed to Accommodate up to 3 Servos per Wing

Designed to Accommodate up to 2 Servos per Elevator Half

Built-in Rudder Tray for Pull-Pull Setup

Optional Bays for up to 4 Rudder Servos in the Tail

## **PREPARATIONS**

### 1. Required Accessories

There is no hardware provided with the kit since most modelers prefer to use their own brand of hardware and accessories. Listed below is the hardware and accessories that you will need to complete the model. In some cases, we have listed the brands that we have used and recommend, although by no means are you required to use the brands mentioned.

<b><i>Item Used:</i></b>	<b><i>Qty.</i></b>	<b><i>Recommended Brand</i></b>	<b><i>For</i></b>
8-32 Socket Head bolts	10	Du-Bro, Great Planes	Landing Gear
8-32 Blind Nuts	6	Du-Bro, Great Planes	Landing Gear
8-32 Lock Nuts	4	Du-Bro, Great Planes	Landing Gear
Landing Gear Axle	2	Du-Bro, Great Planes	Landing Gear
Wheel Collars	4	Du-Bro, Great Planes	Landing Gear
4 ½ Inch Wheels	2	Sullivan, Du-Bro	Landing Gear
8-32 x 1" Socket Head Bolts	14	Du-Bro, Great Planes	Hatch Mounts, Cowl Mount
¼ - 20 knobs	4	McMaster Carr	Wing Attachment to Fuselage
Tail Gear and Wheel	1	Graph tech, J&J Tailwheels	Tail Gear
4-40 x 1 ½ " Turnbuckles	4	Dubro	Elevator Control Rods
Hinges	44	Dubro, Robart	Air, Elev, Rudder
Control Horns	7	Dubro, Great Planes, Hanger 9	Air, Elev, Rudder
4-40 Ball Links	8	Rocket City, DuBro	Air, Elev, Rudder
4-40 x 2" Titanium turnbuckles	6	Hangar 9	Ailerons Control Rods
Fuel Tank (50-60 oz)	1	Du-Bro, 4titude	Fuel Tank
5 inch Spinner	1	Tru-Turn, Mejzlik	Spinner
8-32 x 1" Socket Head Bolts	4	Du-Bro, Great Planes	Horizontal Stab Attachment to Fuselage
8-32 blind Nuts	10	Du-Bro, Great Planes	Hatch Mount, Horizontal Stab Mount

#### **Note:**

- Accessories that are required to mount the engine, radio, and servos are not included in the list above.
- The Push Rods can also be made from carbon fiber tube with threaded 4-40 rods at each end.
- As we have made revisions some parts may no longer be required to build this kit

## **Fuselage Parts**

<u>Number</u>	<u>Material</u>	<u>Purpose</u>	<u>Part ID.</u>
2	1/8" lite ply	Fuselage side, front	FS1
2	1/8" lite ply	Fuselage side, rear	FS2
2	1/8" lite ply	Fuselage doubler	FD1
2	1/8" lite ply	Tail wheel mounting plate	TMP
2	1/4" lite ply	Motor Box Sides	MBSL & MBSR
1	1/8" lite ply	Motor Box Top	MBT
1	1/8" lite ply	Motor Box Bottom	MBB1
1	1/4" lite ply	Former, F1	F1
1	1/4" lite ply	Former, F2	F2
1	1/8" lite ply	Former, F3	F3
1	1/8" lite ply	Former, F4	F4
1	1/8" lite ply	Former, F5	F5
1	1/8" lite ply	Former, F6	F6
1	1/8" lite ply	Former, F7	F7
1	1/8" lite ply	Former, F8	F8
1	1/8" lite ply	Tank Floor	TF1
1	1/8" lite ply	Fuselage Top, Front	FTF1
1	1/8" lite ply	Fuselage Top, Rear	FTF2
2	1/8" lite ply	Horizontal Stabilizer Doubler	HSD1
1	1 1/2" Phenolic Socket	Phenolic wing tube housing	
1	7/8" Phenolic Socket	Phenolic tail tube housing	
1	1/4" Plywood Firewall	Firewall	Firewall
1	1/8" Plywood Firewall	Firewall	Firewall

## **Hatch:**

2	1/2" x 1/2" Balsa	Hatch longerons	
6	1/8" birch ply	Hatch mounting tabs	HMT1
6	1/4" lite Ply	Hatch Mounting Tabs	HMT2
1	1/8" lite ply	Hatch floor, front	H1
1	1/8" lite ply	Hatch former, front	H2
1	1/8" lite ply	Hatch former, mid	H3
1	1/8" lite ply	Hatch former, rear	H4

## **Rear Turtledeck:**

1	foam	Turtledeck	
1	1/8" lite ply	Front turtledeck former	TD1

### **Wing:**

1	foam	Right wing panel
1	foam	Left wing panel
2	1/8" lite ply	Wing Root Rib
2	1/8" lite ply	Wing False Rib / Wing Tube Support
4	1/4" lite ply	Alignment donuts
1	1 1/2 "x 48" aluminum	Wing tube (Carbon for 3.1m Extra 300CS)
2	1 1/2 " x 48" Phenolic	Wing tube socket

### **Horizontal Stabilizer**

1	foam	Right Stabilizer
1	foam	Left Stabilizer
1	7/8"x17.25 aluminum	Tail tube (Carbon for 3.1m Extra 300CS)
2	1/8" lite ply	Horizontal Stab Root Rib
2	1/8" lite ply	Horizontal Stab False Rib / Tube Support

### **Vertical Stabilizer:**

1	Foam	Vertical fin
---	------	--------------

### **Wood list:**

8	3/8" x 3/8" Balsa	longerons (Fuselage)
36	1/16" x 3" x 48"	Wing Sheeting
7	1/16" x 3" x 48"	Fin, rudder,
10	1/16" x 48" x 3"	Stab Sheeting
2	1/16" x 3" x 48"	Hatch
3	1/16" x 3" x 36"	Hatch
7	1/16" x 3" x 48"	Turtle Deck Sheeting
1	1/2" x 4" x 24"	Leading & Trailing Edge (Wing)
2	1/2" x 4" x 48"	Leading & Trailing Edge (Wing)
2	1/2" x 4" x 48"	Leading & Trailing Edge (stab & rudder)
2	1/4" x 1/4" x 48"	Hatch Stringers (outer stringers)
8	1/4" x 1/4" x 36"	Hatch Stringers
6	1/4" x 1/4" x 48" Bass	Fuselage Bottom Stringers
4	1/16" x 3" x 48"	spare balsa sheeting

### Landing Gear brackets

2	1/16" x1" x 1" x 6"	Aluminum angle plate
---	---------------------	----------------------

## **Assembly:**

**Note:** Before using any glue or cutting of wood, we suggest that you do some pre-assembly and read all the steps to make sure that you understand the assembly procedure and how the parts fit.

We suggest you use 30 minute Epoxy or Aeropoxy on Motor box assembly and Carpenters glue such as Titebond 3 for construction of the fuselage side. The benefit of carpenters glue during assembly is it is easily cleaned and allows time for fitting parts together; also it will not become brittle like CA does over time.

If you choose to run the DA-200 four cylinder engine you will notice the location for the firewall is engraved into the motorbox sides. You will need to cut the motorbox sides to align with the notches. (The pictures associated with this manual show the motorbox being cut for the DA-200)

### **Motor Box Assembly**

#### **Required parts:**

- Left Motor Box Side - MBSL
- Right Motor Box Side - MBSR
- Firewall (laminated 1/8" birch ply and 1/4" lite ply firewalls)
- F1 Former - F1
- F2 Former - F2
- F3 Former - F3
- Motor Box Top - MBT
- Motor Box Bottom - MBB1
- Landing gear former front
- Landing gear former rear
- Landing gear aluminum bracket

- 1) Slide Former F1 into tabs on MBSL & MBSR. Do not Glue until next step.
- 2) Take Fuel Tank Floor, the motor box bottom plate, and Firewall and slide into tabs on MBSL & MBSR. Using 30 minute epoxy or hysol glue in the tank floor, motor box bottom plate and firewall into place on Motor Box sides.
- 3) Glue Former F2 and F3 into place using 30 minute epoxy or hysol.
- 4) Clamp entire assembly and allow adequate time to dry before continuing to next steps.
- 5) Add aluminum landing gear brackets. the engine box is marked for 3 hole each side. Space the aluminum angle evenly on each side and flush to the landing gear indent on the engine box sides

**Note:** If you like you can Glue MBT into place at this time; however it may be easier to glue in after assembly is complete and you have mounted your throttle servo, ignition and all engine parts.

If you are building your airplane with the intention of using the DA-200 four cylinder engine you will need to cut the motor box sides at the engraved line in the wood.



## **Fuselage Assembly - Fuselage Sides**

### **Required parts:**

Fuselage Side - FS1 (2 required)  
Fuselage Side - FS2 (2 Required)  
3/8" x 3/8" Balsa  
Horizontal Stab Doubler - HSD1  
Fuselage Doubler - FD1

**Note:** Remember you need to build a left and Right fuselage side so before gluing anything make sure that you are building the correct side. We recommend building one side at a time so you do not confuse yourself on which side you are building.

- 1) Lay a small piece of wax paper where the two fuselages sides that will be joined.
- 2) Glue FS1 and FS2 together.
- 3) Take horizontal stab doubler (HSD1), align with rear servo bays, tail tube hole and glue into position with carpenters glue.
- 4) Take FD1 and match it to the tabs on the fuselage side making sure they align correctly before gluing in place. It may be beneficial to Take Former F5 and test fit before gluing anything in place. After checking alignment glue FD1 into place with carpenters glue.
- 5) Take 2 pieces of 3/8" x 3/8" balsa and splice pieces together with at least a 45 degree splice to form a strong joint. Repeat this step three more times to create all the longerons you will need to complete the fuselage sides.
- 6) Take longerons and run a bead of glue down one side and attach to bottom edge of fuselage sides. Longerons will stop at front edge of horizontal stab doubler. Repeat step for top edge of fuselage side but make sure not to cover any of the tabbed portion in which the fuselage top will join to. To help align longerons to top and bottom of fuselage sides you can use a square or something like the tail wheel mounting plate and use it as your square, as we did. Also, it is extremely helpful to tack glue longerons in place with a little CA.
- 7) Repeat Steps 4-6 for other fuselage side. Again make sure that you build the opposite side of the first one you did.
- 8) Rest fuselage side on flat surface and weights to FD1 and longerons to help make sure pieces are set in place correctly. Allow time to dry before continuing to the next steps.

## **Fuselage Assembly**

- 1) Lay the fuselage top pieces (FTF1 & FTF2) on your building table and glue the two pieces together using carpenters glue.
- 2) Lay the motor box assembly on the fuselage top, matching up the tabs on the motor box assembly with the slots on the fuselage top and test fit motor box to fuselage top. Repeat this step for every fuselage former.

- 3) Glue the motor box assembly to the fuselage top using at least 30 minute epoxy.
- 4) Now, take Formers F4 - F7 and after test fitting them glue them into position on the fuselage top using carpenters glue and a square to help you align them for the best fitment. To help you keep the formers in place you can also use a drop of CA to tack the formers into place.  
  
**Note:** You will glue Former F8 into place in a few steps from now.
- 5) Allow formers to dry for a few minutes before attempting to attach the fuselage sides.
- 6) Take a fuselage side and test fit against formers to make sure all tabs are correctly in place. If needed sand former tabs or longerons to help achieve the best fit. You are looking for no gaps in any of the joints.
- 7) After test fitting both fuselage sides, use carpenters glue to glue fuselage sides into place making sure to get an adequate amount of glue on the all formers and fuselage top. Use a square to help make sure that everything is aligned properly.
- 8) Take Former F8 and glue into position, butting former up against the horizontal stabilizer doubler.
- 9) Take long clamps and clamp fuselage sides into place on formers. While the fuselage is self aligning you do want to make sure that all your tabs are correctly seated and glued into position and nothing appears to be twisting because it is too tight.
- 10) Place the tail wheel plate TWB1 at the aft end of the fuselage sides. Check the alignment of the fuselage then glue in TWB1.
- 11) Before adding the bottom stringers, install the landing gear front and rear formers
- 12) After the fuselage sides are glue in place and cured you need to make the bottom stringers for the fuselage. Take (6)  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 48" spruce pieces and splice them so you end up with (3) pieces.
- 13) Starting at the tail wheel plate and working your way forward; glue the spruce pieces into place using titebond. The three long pieces are for the three center slots on the bottom of the fuse.
- 14) Cut the  $\frac{1}{4}$ " x  $\frac{1}{4}$ " spruce pieces flush with the front of the F1 former.
- 15) Use the excess spruce pieces to do the outer most bottom stringers. It may require you to splice the spruce pieces again to get the correct length you need.
- 16) After you have finished the stringers you need to sheet the bottom of the fuselage between formers F1 and F3. Starting at the bottom of the fuselage side take some  $\frac{1}{16}$ " x 3" x 36" balsa and sheet the bottom of the fuse, it may be easier to use come medium CA to glue the sheeting in place. Depending on the hardness of your balsa sheeting you may want to use some ammonia to get the balsa to follow the former shape.

**NOTE: Before sheeting the bottom of the fuselage you may want to jump ahead to the landing gear mounting section so it is easier for you to mount the angle aluminum that goes inside the fuselage.**

- 17) After you sheet the bottom of the fuselage between formers F1 and F3 you will need to go back and cut out the landing gear area. You will see that it is the notched section on the bottom of the fuselage.
- 18) Insert the phenolic tubes for the wing and tail along with the aluminum wing and tail tubes. With the fuselage still upside down on the workbench, from the rear of the fuselage, sight the wing and tail tubes to check if they are parallel to each other. You can also measure the vertical distance of the wing tube socket ends to see if both ends are equal. If the wing tube vertical distance from the workbench is not equal, prop up one side so that the wing tube distances are the same.
- 19) Now, check the vertical distance of the tail tube from the workbench to see if both ends have the same distance. If the tubes are not parallel to each other, prop up one fuselage side with shims at the tail tube end so that the distances are the same, and place weights on the fuselage so the fuselage will twist with the shims on the fuselage side. Sight again to see if both wing and tail tubes are parallel. The other option is to slightly file the holes for the tube sockets so that the phenolic pieces are parallel.

### **Removable Hatch Assembly**

#### **Required Parts:**

- Hatch Floor - H1
- Front Hatch Former - H2
- Middle Hatch Former - H3
- Rear Hatch Former - H4
- ½ "x ½" balsa stringers
- 1/4" x 1/4" balsa stringer
- 2) 3" x 48" balsa sheeting
- 3) 3" x 36" balsa sheeting

### **Hatch Mounting Tabs**

The first thing you want to do when constructing the hatch is to make the tabs for mounting the hatch to the fuselage. This will make it much easier to find the position of the mounting screws for the hatch.

- 1) Find the (6) ¼" and (6) 1/8" Hatch mounting tabs labeled HMT1 & HMT2. Laminate the 1/8" and ¼" pieces together using carpenters glue or epoxy. Mark the center line of the mounting tabs.
- 2) Now, take the lite ply hatch base and place it on the fuselage. Insert the hatch mounting tabs into the slots on the hatch base.
- 3) Next, using front of the fuselage as a reference measure the distance to the centerline you drew on each of the hatch mounting tabs.
- 4) After you have measured the distance to each mounting tab, measure and mark the locations on the fuselage. Once you have marked the distance to the center line of the tabs, measure

down approximately 7/8" from the hatch base. Where the lines intersect is where you will want to drill for your canopy bolts.

- 5) Drill the fuselage to accept either 6-32 or 8-32 bolts.
- 6) Next, glue in the (6) HMT2 pieces into the fuselage, again finding the center line on the HMT2. Glue HMT2 pieces into fuselage using carpenters glue or epoxy.
- 7) Glue the HMT1 pieces into there slotted position of the hatch base. (It may be best to have the hatch on the fuselage when doing this to keep the tabs aligned but make sure you do not get excess glue on the hatch base that would cause it to get stuck on the fuselage).
- 8) Once the glue has dried you can take your drill and using the fuselage as your reference drill through hatch mounting tabs and insert a blind nut on the back side of HMT1. (When drilling the mounting tabs feel free to countersink the fuselage for the bolt heads, just make sure not to go all the way through HMT2 when doing so).

### **Hatch Framework**

- 1) Find the Hatch base plate, H2, H3 and H4 former and while using a square glue them into position on the Hatch base plate. We suggest only tack gluing the H5 former because you will need to set the angle on it after the rear turtledeck is completed, if you wish to permanently glue H5 in place you will want to set it to a 25 degree rearward angle to match the angle that is on the rear turtledeck.
- 2) On each side of the hatch you will glue a 1/2" x 1/2" tall balsa block ( it may be necessary to splice an additional piece of 1/2" sq to the length of the side formers to make the correct length) which will give your hatch the strength it needs to prevent twisting or any other issues. (You will notice that the H3 & H4 formers are slotted for 1/2" x 1/2" balsa so you can either sand down the balsa block you are using or notch it out but make the block fit correctly).
- 3) Moving on to the 1/4" x 1/4" balsa stringers, glue into position on formers H2, H3, & H4 aligning them so they are flush with the front of former H2 and depending on how long you want your canopy to be you may want to leave some overhang after H4.

### **Hatch Sheeting**

**Note:** Before sheeting the hatch portion we recommend completing the rear turtledeck portion of the fuselage. This is because the angle on the H4 former needs to match the angle that is built into the rear turtledeck. So if you have not completed the rear turtledeck jump ahead to that section now.

- 1) After completing the rear turtledeck, you are now ready to complete the work on the hatch portion of the fuselage. To attach the sheeting to the hatch you can either glue your sheeting together or install them as individual pieces. It is also recommended to bolt the hatch framework to the fuselage to keep the hatch from warping when applying the sheeting.
- 2) Taking one of the 3" x 48" sheets, align the sheeting with the edge of the 1/2" x 1/2" balsa so the sheeting butts up to it. We have found that it may be easier to glue the sheeting in place if you lay the fuselage on its side so the glue does not want to run. Using CA, run a bead of glue

down the 1/2" balsa block to glue the edge of the sheeting in place. Lay some wax paper down on the fuselage to make sure you do not glue the hatch to the fuselage while doing this.

- 3) Next, take your CA and run a bead down the next 1/4" stringer and lay the sheeting in place. Depending on the hardness of your wood it may require some ammonia to help shape the wood. Repeat this step for the next stringer or until that first sheet is layed down completely.
- 4) Cut the additional 3" x 36" sheets to 18"each, Repeat step 3 and 4 for the other side of the hatch.
- 5) After gluing the outer most sheeting into place we are going to start moving inward with the sheeting.
- 6) Take (1) sheet of 1/16" x 3" x 18" and edge glue it to the sheeting already layed down. As like before run a bead of glue down the nearest stringer and lay the sheeting into place. Continue doing this until the sheeting is completely laid down.
- 7) As you come towards the center of the hatch you will be left with a triangle shaped section. You will need to cut the sheeting to the shape that you need.
- 8) As like the other pieces of sheeting, edge glue the triangular piece into place and glue it to the 1/4" stringers.
- 9) Before you cut your sheeting shorter we recommend mocking up your canopy and positioning at the length that you would like. If you want the plane to look like an Extra 300, you will want to leave the canopy long since it is a two place aircraft. For something like an Extra 330SC you will want to have the canopy short since it is a single place aircraft.
- 10)Once you decide on the length of the canopy you want use it as a template and mark the sheeting with a pencil where the canopy will sit.
- 11)We recommend measuring in about 2" from the canopy line you created and making your cut line for the sheeting at this point.
- 12)To complete the hatch section, fill in any low spots on the sheeting with some light weight spackle and sand the turtledeck to shape.

## **Turtledeck**

### **Required Parts:**

- Foam Turtledeck
- Balsa Sheeting
- Turtledeck former - TD1
- Turtledeck former - TD2

## **Sheeting Turtledeck**

- 1) Take six to seven pieces of pliable balsa sheeting and tape or edge glue them together along their long side.

- 2) On one side of balsa sheet apply an extremely thin coat of 2 hour epoxy or gorilla glue (if using gorilla glue, remember gorilla glue expands greatly when drying so be very careful of how much you use).
- 3) Remove Turtledeck and inner foam piece from foam block. Lay balsa sheeting (glue side up into block following the curve of the block. To help soften and shape the balsa you may want to dampen the balsa on the unglued side with some ammonia or water.
- 4) Lay Foam turtledeck and inner foam piece back into foam block so that the balsa take the shape of the turtledeck. At this point you can trim up excess balsa sticking out of the foam block. Apply a lot of weight to inner foam piece to help make sure balsa sheeting bonds to turtledeck properly.

**NOTE:** At this point you do not want to glue the turtledeck onto the fuselage until the front hatch has been completed. After the hatch has been completed you can get the correct angle for the rear hatch former (H4) and front turtledeck former

**NOTE:** Capping the front and rear of the turtledeck should be done after the turtledeck is glued to the fuselage. If the turtledeck width does not match up with the fuselage width, it will be difficult to force the turtledeck width to match the fuselage width front and rear already capped.

### **Installing the turtledeck Assembly**

**This step is to be completed before the front hatch is sheeted.**

- 1) Using the hatch to set the correct space for the turtledeck mark the location of the turtledeck on the fuselage.
- 2) Tack glue small pieces of scrap 3/16 by 1/2 x 3 balsa on the fuselage sides where the turtledeck is to be glued. This will help line up the turtledeck with the fuselage sides while it is being glued to the fuselage.
- 3) Glue the turtledeck to the fuselage with either epoxy or Gorilla glue and hold it down with several pieces of masking tape to the fuselage side. The nice thing about the Gorilla Glue is it sandable if you use too much glue.
- 4) Check the alignment of the turtledeck with the fuselage. If some part of the turtledeck is inside the fuselage line, place a balsa spreader bar at the inside of the turtledeck to force the turtledeck to match up with the fuselage side.
- 5) When dry, remove the temporary pieces of 3/16 x 1/2 x 3 pieces from the fuselage side. Take TD1 and TD2 formers and glue them into position on front and rear turtledeck portion. Former TD1 should match the angle that hatch former H4 is set to. Former TD2 should be square to the fuselage.
- 6) Sand the turtledeck flush with the fuselage sides and fill any low spots with light weight spackle as needed.

## Wing Construction

### Required Parts:

Foam Wing (2)  
1/8" Plywood Root Rib (2)  
1/8" Plywood False Rib (2)  
1/16" x 48" Balsa Sheeting (36)  
1/2" Leading & Trailing Edge Balsa Stock  
1/4" Birch Ply  
(4) 1/4"-20 Blind Nuts  
1 1/2" phenolic Tube  
3/4 oz. Fiberglass

To construct the wings the first thing we need to do is prepare the wings and make your sheeting.

**NOTE:** When building the wing if you would like to add a full length spar to the wing please feel free to do so. Many of the competition airplanes on the market today do not use any type of spar but if you feel that with your flying style it is a good idea then please do so. Since the wing is built by the consumer, JTEC Radiowave accepts no liability if you have any type of wing failure no matter if you build the wing with or without a spar.

In building our personal wings we used carbon toe and gorilla glue. We used a straight edge on the sheeting and taped the sheets together using a good clear packaging tape. Using gorilla glue it will expand into the slight gaps left between the sheets and is easily sanded off when dry.

If you choose to add a spar to your wings we suggest either a 1/4" x 1/4" hardwood spar or even a flat carbon fiber piece shaft (available from CST or Aerospace Composites). Route out the wing based on the size of the spar you chose, running the spar right down the wing tube the full length of the wing making sure to notch your root rib for the spar to help lock it into the wing.

- 1) The first step in building the wings is making your sheeting. To do so you will need to take (9) sheets of 1/16" x 3" x 48" per side. Cut 3) 48" sheets into 16" lengths. cut a 45 degree angle at the end of the 48" sheet and one 16" sheet, tape or glue together
- 2) Using your wing shuck as a reference for your sheeting, you will want to start your first sheet running parallel to the trailing edge of the wing. When laying out the sheeting, reverse the sheets for the opposite side of the wing so no two joints are in the same location for both the top and bottom. We are not gluing at this time, we are just using the wing to help visualize the layout of the sheeting.
- 3) Continue to stager the sheets as you work your way up to the leading edge of the wing. When laying out the sheets we suggest taping the sheets together and or using titebond to edge glue the sheets together as it will be easier to sand when finished than CA.
- 4) When you have your sheeting all layed out and edge glued or taped, sand the sheeting smooth on a flat surface.

**NOTE:** You can use the foam shuck as a template to make sure you have the correct sheeting layout by placing the shuck over the balsa panel you just made. If you do not start your sheeting at the trailing edge and work forward you probably will not have enough sheeting to complete the wings.

5) Moving on to the phenolic tube, take one of the 1 ½" x 18" pieces of phenolic tube that you have left over from the fuselage and seal one end of it with scrap balsa and sand smooth. A piece of thicker balsa is recommended for this.

**NOTE:** The phenolic tube should be approximately 18". Make sure it is at least 1/8" out of the root rib side of the wing. The phenolic tube needs to come through the root rib for additional support

6) Next lightly sand entire phenolic tube so when you are gluing it into place it bonds better. Trial fit phenolic tube, make sure it fits through the false rib support in the wing. Leave at least 1/8" outside the root rib

7) Before sheeting you need to trial fit the wing to the fuselage to set the correct angle for the root rib and mark the location for the wing attachment points.

8) The angle of the root rib has been cut to the approx angle. Test fit the wing at this time and check fit. Sand as necessary to fit snug up to the fuselage side

**NOTE:** You are not looking to take any material off the trailing edge.

9) After you have checked your angle, you may need to sand the root of the foam to get a perfect fit.

10) Next, find and trim the 1/8" lite ply root, sand flush with the foam wing.

11) Cut yourself out (8) 1/4" x 1 ½" x 1 ½" birch ply pieces laminate two each together. These are used for the wing retaining bolts. Drill them out for a ¼-20 blind nut. Align the blocks to the root rib using the mounting holes in the fuselage as reference. Once satisfied, glue the blind nut in place and then glue to the plywood root.

**NOTE:** Another option for your wing attachments would be to use something like the anti rotation pins that Desert Aircraft sells. These will leave a threaded stub out the root of the wing.

12) Next, square up the plywood root to the foam wing and glue in place with a minimum of 2hr epoxy.

13) Glue in phenolic & false rib wing tube support using polyurethane glue or epoxy. When gluing in your phenolic tube make sure to leave an overhang on the false rib and also make sure the phenolic is glued to the root rib.

**NOTE:** If using polyurethane glue like Gorilla glue, make sure to leave your wing tube inside the phenolic tube. If you do not your wing tube may become really tight when the Gorilla glue expands.

**14) If you opt not to use the carbon Toe it is suggested that after your phenolic and false rib are glued into place take some ¾ oz. x 12" x 24" fiberglass or carbon fiber cloth and glass over the phenolic and past the area around the phenolic tube, make sure to do this to both sides of the wing.**



- 15) Once you have glassed the phenolic section you are ready to sheet the wings. When sheeting the wings we recommend using Gorilla glue because it will bond extremely well with the foam and balsa and it is also very easy to sand if you have excess.
- 16) To sheet the wings we suggest pouring some Gorilla glue on the balsa sheeting and spreading an extremely thin coat of it evenly on the balsa. First spray a mist of water on the sheeting, the same side you will be applying the glue. This will help spread the glue and will cause the gorilla glue to start foaming. work quickly as the glue is now activated
- 17) Square up the sheeting on the wing and place in the foam shuck.
- 18) After both sides are complete, tape the shuck to keep the wing in place and then weigh down the entire wing. You will want to use around 300 pounds of weight when sheeting a wing and make sure you do everything on an extremely flat surface. If you have the option of using a vacuum bagging system we suggest just enough weight to hold down the wing shuck weight and approx. 5 lbs of vacuum
- 19) When the wing sheeting is completely cured, trim and sand sheeting flush with foam core and plywood root.
- 20) Next, cap the leading edge of the wing with 1/2" x 2" balsa, Cut the 1/2" x 4 x 48" into 2" wide strips, Cut the 1/2" x 4" x 24" balsa into 2" wide strips also. Make a scarf joint and join the 48" and 24" balsa strips together. Fit and trim to the leading edge of the wing. Trim the trailing edge with 1/8" balsa; sand flush with the wing sheeting.

**NOTE:** To give a superior snap when flying we suggest a slightly sharper leading edge.

- 21) To cut out the ailerons, refer to the wing reference for the aileron dimensions. Cut the 1/2" x 4" x 48" sheeting into 2" wide strips, Use 2" balsa for the wing trailing edge and the aileron leading edge, making sure to double bevel when sanding to maximize the amount of throw you can achieve.
- 22) As with the ailerons, refer to the wing reference sheet for the aileron placement.
- 23) Before gluing in the servo boxes use a long piece of copper tube to make your servo lead hole. You should be able to get a long piece of copper from your local hardware store. You can opt to heat one end or use it as a drill bit and work it in slowly and carefully. Be real careful with excess heat as you could remove too much foam. The fuselage has an opening for the servo wire leads already so you can use that as a guide for making your hole. Keep track of the tube as you go from servo box to servo box.
- 24) Your wings are now complete; you can now cut the slots for your hinges and make sure everything is beveled like you want it.

## **Horizontal Stab Construction**

### **Required Parts:**

- Foam stabilizer (2)
- 1/8" Plywood Root Rib
- 1/8" Plywood False Rib
- 1/16" Balsa Sheeting (10 sheets)
- 1/2" Leading & Trailing Edge Balsa Stock
- 7/8" phenolic Tube

The horizontal stab construction is virtually the same as the wing construction; it is just on a smaller scale.

- 1) Just like you did on the wing the first step is to prepare stab sheeting using 1/16" x 24" balsa.
- 2) Take the 7/8" phenolic tube and cut two phenolic pieces for the horizontal stab. Seal one end using a thick piece of scrap balsa.
- 3) The foam root has been cut to the approx angle, As you did on the wing you will need to check the fit and sand root angle of the stab for the best fit.
- 4) Glue in phenolic and false rib with epoxy or Gorilla glue; again leaving a little overhang on the false rib side and making sure the phenolic is locked into the false rib.
- 5) Sheet the stabs, place in the shuck and weigh down.
- 6) Once the glue is cured, sand sheeting flush with foam and add the root rib.
- 7) Glue on the 1/2" balsa leading and 1/8" balsa trailing edges and sand to shape.
- 8) Before cutting the elevators we suggest waiting until you set your stab incidence.

**NOTE:** We have found it to be easier to set the incidence on the stabs before you cut the elevators out. The stab is set to 0 degrees.

- 9) After you have set the stab incidence you can cut the elevators out using the elevator reference sheet for your dimensions. If you are building a Extra 330 and want the scale look then you will want to add the counter balance on the stab. If you are doing the Extra 300 then you will have no counter balance.
- 10) Again, just like the wing add your 1/2" trailing edge to the horizontal stab and your 1/2" leading edge to the elevator.
- 11) Sand and double bevel the elevator to achieve max throws.
- 12) Finally, cut the slots into the elevators for your hinges.

## **Rudder Construction**

### **Required Parts:**

- Foam Vertical Stab
- 1/16" Balsa Sheeting 48" cut 7 sheets into 24" lengths
- 1/2" Leading & Trailing Edge Balsa Stock
- 1/8" Balsa Strip

The rudder construction is very similar to the wing and horizontal stab construction; you just get to skip a couple of steps since you do not have to deal with wing tube and root rib.

- 1) As you did with both the wing and horizontal stab the first step is to lay out your sheeting and edge glue it together. To sheet the tail you will use the 1/16" x 24" balsa.
- 2) Just like you did on the wing lay your sheeting out from the trailing edge of the rudder and work your way forward.
- 3) Edge glue or tape your pieces together. With the rudder sheeting you will have some excess sheeting so instead of wasting another piece use as much of the excess pieces you have as your next piece.
- 4) Glue the sheeting onto the foam using the same technique to apply the Gorilla glue as you did on the wing and horizontal stab.
- 5) Place the rudder into the shuck and weigh down with a large amount of weight.
- 6) After the glue is dry, trim up any excess wood.
- 7) Add your 1/2" leading edge and 1/8" trailing edge to the rudder.
- 8) Cap the top of the rudder using your choice of balsa. We suggest anything from 1/8" balsa to 1" to achieve the look that you want.
- 9) Follow the Rudder reference sheet to cut the rudder and vertical stab to the appropriate size.

**NOTE:** If you would like to change the size of the counterbalance you are more than welcome to do so.

- 10) After you have cut your rudder, add your 1/2" trailing edge to the vertical stab and your 1/2" leading edge to the rudder. Double bevel the rudder to achieve the maximum throw. Make sure to leave 8" or so, on your trailing edge of the vertical fin because you will need to glue it to the rear of the fuselage.

- 11) Cap the bottom of the vertical fin with 1/8" x 4" sheeting and shape to the sheeting to match the taper on the fuselage.
- 12) When building your rudder you can so make it appear more scale like by tapering the bottom of your rudder and rounding the bottom rear portion of the rudder and the rudder reference sheet shows.
- 13) Now you are ready to glue the rudder to the fuselage. Using epoxy glue the vertical fin the rear of the fuselage. Make sure to square up the rudder to the fuselage before gluing it into place. You will want to make sure the fin is squared to the fuselage vertically.
- 14) Use masking tape to secure the vertical fin to the fuselage while the glue is drying.
- 15) To make a smooth transition from the rear turtledeck to the vertical fin you will need to make a fairing that tapers to the rear of the fuselage.
- 16) After the rudder is mounted take some 1/16" balsa and edge glue it to the rear of the turtledeck following the curve of the turtledeck. At the rear of the fuselage your fairing should be tapered down to about 1" tall or so (use the sweep of the turtledeck to find the correct angle).

### **Setting Wing Incidence**

- 1) To help level the airplane the first step we suggest when setting the incidence is installing landing gear to fuselage. The (4) landing gear bolts should pass through the aluminum angle.
- 2) Without the hatch on the fuselage, bring the tail of the airplane up until the front top plate is level.
- 3) Install one wing panel and use an incidence meter to set the wing incidence at 0 degrees. To set the incidence on the wing it may require you to slightly open up the wing bolt holes in the fuselage.
- 4) Once the wing is set to 0 degrees glue in the round anti-rotation donuts with epoxy or titebond.
- 5) Before moving on to the other wing, go back and double check that the wing is set to 0 degrees.
- 6) Repeat steps 2-5 for the other wing.

### **Setting Stab Incidence**

Setting the stab incidence will be very similar to setting the wing incidence.

- 1) Install one stab to the fuse. Trial fit the stab to the fuselage and sand if needed so there are no gaps between fuse and stab.

- 2) Use your incidence meter to set the stab incidence to 0 degrees.
- 3) You will see that the root has (2) hole locations for the stab bolts. Take a pencil and mark the center of those hole locations while the stab is still set to 0 degrees.
- 4) Remove the stab and drill the fuselage to accept the 8-32 bolt that will hold the stab on.
- 5) Install the stab again and double check your incidence to make sure it is still at 0 degrees. If needed open your hole in the fuselage to get the stab to 0 degrees.

**NOTE:** When setting the stab incidence, do not remove any material from the root rib on the stab if you need to adjust, remove from fuselage only.

- 6) Now insert 8-32 blind nuts into the fuselage and glue them into place. Depending on the length of your blind nut it may be necessary to glue the blind nut into a plywood block.
- 7) Before glue has set, check your incidence one more time to make sure it is still correct.
- 8) Repeat steps 1-7 on the other horizontal stab.

### **Installing Hard Points**

Installing the hard points for the ailerons, elevator and rudder are the same so repeat these simple instructions to do so for every surface. As you will see in the instructions we like to use a plywood plate on both sides of the surface to create the hard point. We do this to spread the load of the hard point. If you prefer to use a hardwood dowel as your hard point, please feel free to do so just install your servos first to make sure the hard point is in the location you want.

- 1) Get yourself a sheet 1/8" plywood (preferably birch or aircraft ply) and cut it into 1 1/2" x 3" pieces for the ailerons and elevators. Depending on the number of servos you are using, you will want anywhere from (6-8) pieces this size. For the Rudder cut yourself (2) 3" x 3" pieces.

**NOTE:** The larger the piece you cut for the hard point, the more it will spread the load. So, feel free to make the hard points slightly larger.

- 2) Find the location on the aileron, elevator and rudder that you want the hard point to be.
- 3) Remove the balsa sheeting and foam if needed from this location to get a nice flush fit of the hard point.
- 4) Glue the hard point into place with 30 minute epoxy. Do this for both sides of the surface, making sure you line up your hard point locations exactly.
- 5) Sand surface to make sure hard point fit perfectly.

## **Servo Boxes**

Included with the kit you should find some lite ply pieces to make the servo boxes for the wings and stabs. You should have enough parts to make (10) servo boxes, so depending on how many servos you are using you should be set.

- 1) The servo boxes should assemble just like a little jig saw puzzle, when putting them together you can use CA glue them.
- 2) Use the wing and horizontal stab reference sheets to find the approximate placement of the servos.

**NOTE:** For placement of the wing servo boxes we suggest squaring the servo box to the aileron and not to the wing tube. When you look at the wing reference sheet you will see that the servos appear to be at a slight angle. This will line your servos better and give you a more linear throw and better resolution on your servos.

- 3) Using a Dremel with a Rotozip bit remove the foam from the area you marked for the servo boxes. Be sure that the bit does not cut into the surrounding top sheeting. To do so set the Dremel on a slow speed or the foam will melt. Remove the foam all the way up to the top sheeting but make sure you do not go all the way through.
- 4) Glue the servo boxes in using epoxy or Gorilla glue. If using Gorilla glue, be careful of how much the glue expands.
- 5) Repeat steps 1-4 for all the remaining aileron and elevator servo boxes.

## **Mounting the Cowling**

Mounting the cowl should be a fairly simple process because the F1 former and cowl ring already have the mounting holes. You may want to temporarily mount your engine before you do the cowl ring to make sure you get the correct cowl spacing.

- 1) Take some ¼" or 3/8" birch ply and cut it into (6) 1" x 1" blocks.
- 2) Drill the block to accept an 8-32 blind nut and glue the blind nut in place.
- 3) Next, take the cowl ring and mount the ring to the fuselage using (6) 8-32 x 1" bolts and large flat washers. The upper and middle bolts will mount from the fuselage side while the bottom two bolts will mount from the cowling side.
- 4) Take some titebond and spread it on the inside of your wood blocks that you created and then thread them on to each 8-32 bolt. Tighten the bolts so the wood blocks seat on the fuse and cowl ring and allow enough time for them to dry.
- 5) After the blocks cured, remove the cowl ring and slide it into position on the cowl. The cowl ring should but up to the back of the cowling (this may depend on what engine you are running).
- 6) Using epoxy or hysol, glue the cowl ring into place.

## **Mounting the Landing Gear**

Before sheeting the bottom of the fuselage it is recommended that you get the gear mounted.

- 1) To mount the gear to the fuselage you will need (2) pieces of angle aluminum that are 1/16" x 1" x 8".
- 2) Take your aluminum angle and align it so one side of the angle is flush with the notched section on the bottom of the fuselage; you will notice that the F2 former is also notched to accept the angle aluminum.
- 3) Use your motorbox sides as a template to mark the center of the bolt hole locations on the aluminum angle then drill the bolt hole locations in the aluminum angle.
- 4) Using 8-32 x 1" bolts and large flat washers run the bolt through the aluminum angle and motorbox side and tighten down using the 8-32 blind nuts. (The head of the bolt should be on the angle aluminum side).
- 5) After the blind nuts are set into place, glue them to make sure they do not ever back out.
- 6) Re-insert your 8-32 bolts this time using blue or red locktite. This is a permanent piece so it is ok to use red locktite if you prefer.
- 7) Repeat steps 2-6 for the other side.
- 8) Now, take your landing gear and center it on the fuselage and aluminum angle. Find the center on the aluminum angle and then mark the gear for (4) 8-32 bolts.
- 9) Use a drill press to drill out the landing gear for the 8-32 bolts.
- 10) Mock up the landing gear on the fuselage again and drill the aluminum angle for the (4) landing gear bolts.

**After a final sand of everything you should now be ready to cover your airplane. Remember sanding is one of the most critical parts of building an airplane, if you do a good job of final sanding your results will show when your extra is completely covered.**

## **Prepare Cockpit Area and Install Canopy**

- 1) Paint the cockpit area with a color of your choice, and install front and rear instrument panels, and a pilot.
- 2) Trim the canopy slightly larger than the trim line marked on the canopy and check the fit to the front hatch, and re-trim, if required.

**NOTE:** When looking at the canopy and airplane from the side of the airplane, the canopy should follow the rear turtledeck line. This may require you to cut a fair amount of material off of the front

of the canopy. Take the time to get the canopy trimmed up properly because it will really improve the overall profile of the airplane.

- 3) When satisfied with the fit, glue the canopy to the removable front hatch. Do this with the hatch bolted to the fuselage.
- 4) After the glue has dried, add some vinyl trim (3/4 inch wide) around the canopy/hatch glue line for improved looks. Vinyl trim is available in any sign shop in your area.

### **Install Fuel and Smoke System**

- 1) Install the fuel tank on top of the fuel tank plate located in the front of the fuselage. You will see slots cut into the fuel tank floor to accept Velco.

**NOTE:** If using the 4titude fuel tanks, JTEC offers a tank mount designed to work with the tank (tank mount sold separately form kit).

- 2) You also may want to make preparations for a smoke tank now, should you decide to install a smoke system later.
- 3) When mounting the fuel tank we recommend mounting it as close to the wing tube as possible, this way as fuel burns off while flying the CG is not effected. Depending on the fuel tanks you are using it may be possible to make a mount so the fuel tank sits on top of the wing tube.

### **Radio Installation**

- 1) Install the servos for the ailerons and elevators in the locations that you selected. The servo boxes may need some sanding to achieve a proper fit for your particular brand of servo. Once the servos are installed, fabricate the push rods to connect the servos to the control horns. The elevator push rods can simply be made of 4-40 all thread since the push rod length is so short.
- 2) We recommend that the rudder servos be installed in the rear of the fuselage with a direct linkage to the rudder. If you prefer you can mount the rudder servos in the provided rudder tray and run a pull-pull setup on rudder. You may want to see how your airplane is balancing to determine the location to mount the rudder servos
- 3) Make appropriate mounts for installing you receiver, batteries, switches, and antenna routing tubes. Remember to keep the receivers at least 12" from the ignition module and separate the antennas from the servo leads as much as possible. Additionally, we try to keep the batteries positioned so that they can be mounted securely, but also easily moveable for quick CG changes if needed during initial set-up.

### **Servo Recommendations**

	Futaba	Brushless	JR	Hitec
Aileron	9157 x 4 or 6	LS 157 x 4	S-8711 x 6	5955 x 6
Elevator	9157 x 2	BLS 157 x 2	S-8711 x 2	5955 x 2
Rudder	9157 x 2	BLS 157 x 2	S-8711 x 3	5735 x 2
Throttle	S-9650 Mini		S-8101 or any coreless	



## **Engine Installation**

As you should have noticed while building the airplane, the firewall is installed with 3 degrees of right thrust built in it and the mounting locations for the Desert Aircraft DA-150/170 or DA200 are already cut out.

- 1) Prior to mounting the engine we strongly suggest using a lightweight fiberglass or carbon fiber cloth with resin to provide extra strength to the firewall mounting. This can be done easily by laying the cloth across the firewall and down the sides of the engine box about 4 inches.
- 2) Using (4) 1/4-20 bolts, (8) large fender washers, and (4) lock nuts; mount the engine to the firewall using blue locktite and the large flat washer on both sides of the firewall to help spread the load of the bolt.

**NOTE:** We recommend 1 degree up thrust on engine (equal to about 1 fender washer); this will give you improved flight tracking on upright and inverted 45 maneuvers.

- 3) Cut holes as required for fuel tubing, and connect the tubing to the engine and route the vent line as necessary. Determine your servo location and cut holes as necessary for the throttle push rod, and install your throttle servo. If you have any servo boxes left over from the wings or tail they will work great for mounting a throttle or choke servo.
- 4) Cut holes in the cowling for muffler exhaust pipes and install cowl. The two bottom bolts of the cowl ring are bolted from the front of the cowl ring; reach in from the exhaust hole at the bottom of the cowl to secure the bottom cowl bolts.

**NOTE:** For canister exhaust or tuned pipes use a 90mm drop stainless steel flex header and we recommend either MTW 110 canisters, MTW RE3 tuned pipes, KS 95 canisters, or KS 1090 tuned pipes. Also, if using canisters or tuned pipes we recommend boxing in pipe tunnel with light weight balsa to keep the heat of the exhaust away from your electronics.

## **Setting Your Center of Gravity**

Now, with everything on the airplane such that it is practically ready to fly except for the wing panels and wing tube, check the initial CG using the method described below. Note that this method does not actually determine the actual CG, but a balance point, which, when the wing panels are installed will place the CG at a good position for initial flights.

- 1) With the wing panels and wing tube off, lift the aircraft with your fingertips at the wing tube socket on both sides of the fuselage. The aircraft should balance level, or with the nose just slightly low.

## **Control Throws**

1. When setting your throws we recommend using CRC or similar throw meters. On all surfaces we use 1 1/2" metal servo arms, except for throttle which we use a 3/4" metal servo arm on.

**NOTE:** Your transmitter percentages will be different than the measurements below, especially if you need to add differential for the ailerons.

<b>Aileron:</b>	Low Rate - 15 degrees up & down	Expo - 25%
	Middle Rate - 20 degrees up & down	Expo - 45%
	High Rate - 30 degrees up & down	Expo - 65%

**NOTE:** You may find the airplane rolls more axial with up to 5 degrees more up than down when setting up your Ailerons (especially on the Extra 330 due to the wing position). Again, this is a physical measurement with throw Meters, if you choose to do this through the differential settings in your transmitter the percentages will most likely be higher.

<b>Elevator:</b>	Low Rate – 12 degrees up & down	Expo - 25%
	Middle Rate – 25 degrees up & down	Expo - 45%
	High Rate – 35 degrees up & down	Expo - 65%

<b>Rudder:</b>	Low Rate – 30% available throw	Expo – 50%
	Middle Rate – 65% available throw	Expo – 65%
	High Rate – Full throw	Expo – 85%

### **Initial Radio Mixes:**

- 2 - 6 % up elevator with either left or right rudder
- 2 - 4 % right aileron with left rudder
- 2 - 4 % left aileron with right rudder

**NOTE:** Due to the wing position on the Extra 330 your initial Radio Mixes may be slightly higher than what is listed above. The mixes in your airplane will also be dependent on things like your balance, control horn placement, and control throws. Every pilot has their own preference on how an airplane should feel, the above settings are what we have found to work very well and give you an extremely competitive flying airplane no matter your skill level. We strongly suggest not put any of your mixes on a switch because there may be that time that you forget to activate your switch and end up getting yourself in trouble. We have the philosophy that no matter what attitude your airplane is in it should still need the same amount of mix.

### **Flying your Extra**

Initial Flight – We suggest before your initial flight you go through the entire airplane and make sure all your nuts and bolts are tight and loctite everything. Make sure to seal all your flying surfaces to help reduce the risk of flutter. Have another pilot check over everything for you including the direction of all surfaces. Make sure that you have all your fail safes set like you want and that you can cut your engine through the radio if needed.

For the first few flights we suggest flying your new airplane with a little extra altitude until you are completely comfortable with it. During the first flight, check the glide and stall characteristics so when you come in for landing there are no surprises. If setup properly your extra should stall straight and not look to drop a wing. Please land and check control surfaces, hardware and engine for tightness. Remember, to setup your airplane properly you first need to get the balance of the airplane how you like it and then you can work on your mixes.

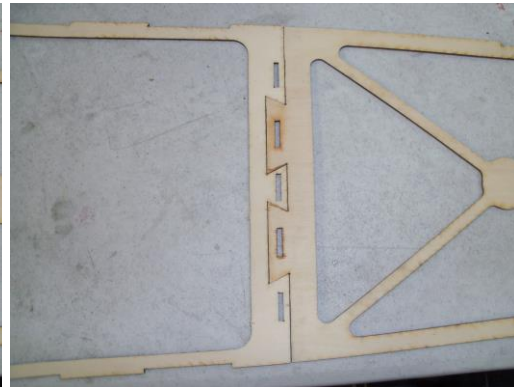
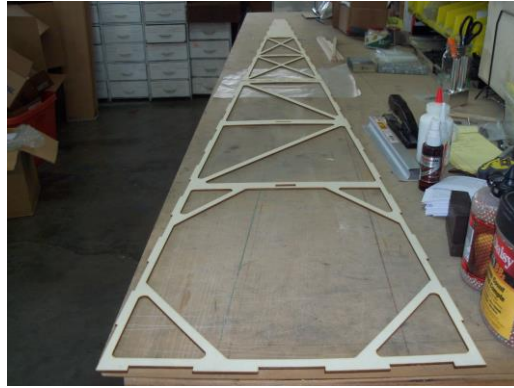
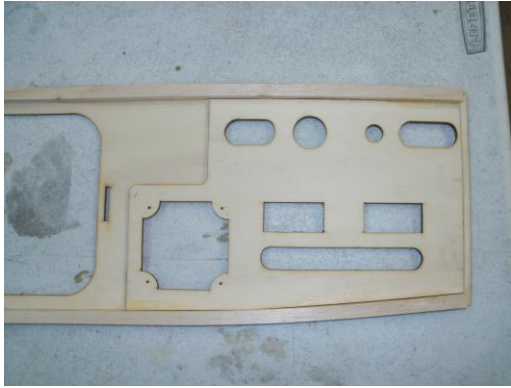
If you plan on using your aircraft for precision aerobatics please take the time to trim your aircraft properly. If your CG is set up for precision aerobatics and you want to fly 3D/freestyle aerobatics, you may want to experiment with moving the CG aft by adding a small amount of weight in the aft end of the fuselage to see you like the way the aircraft flies in the 3D/freestyle mode this way.

We at JTEC Radiowave hope that you enjoy owning and flying your Extra 330 or 300 far into the future.

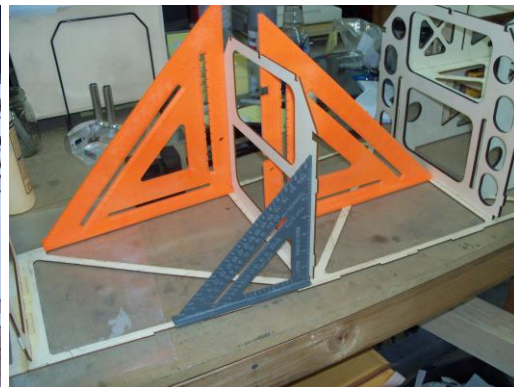
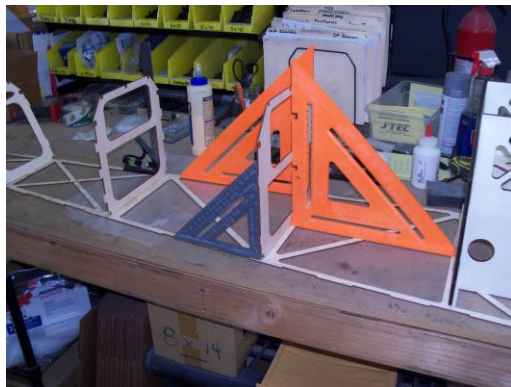
### **Reference Pictures**

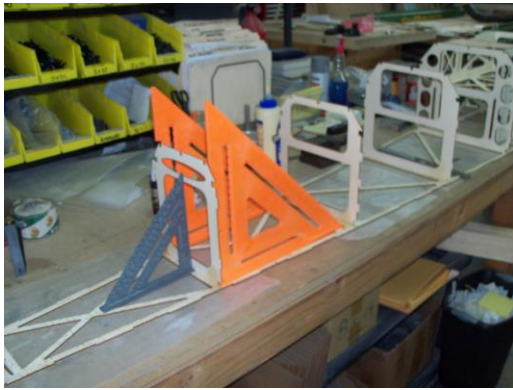
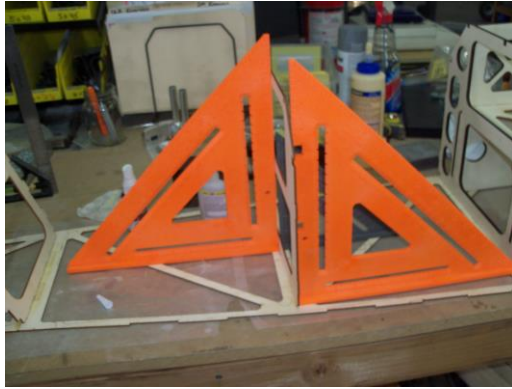
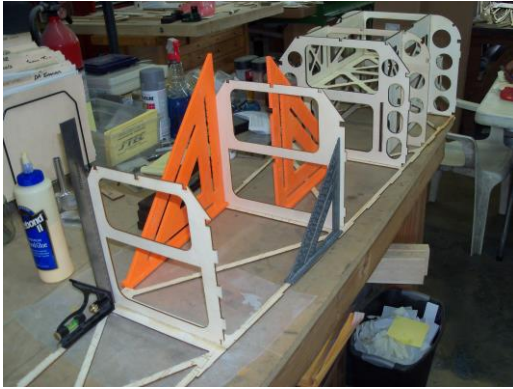
#### **Joining the Fuselage sides And Fuselage Top Plate**

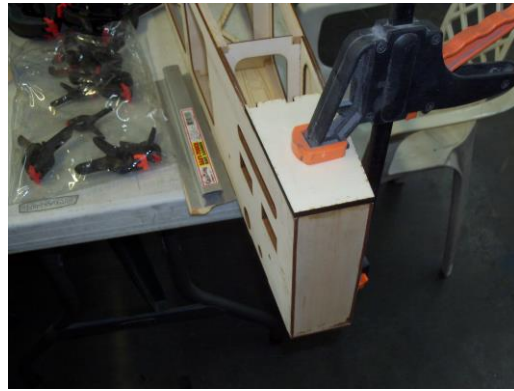




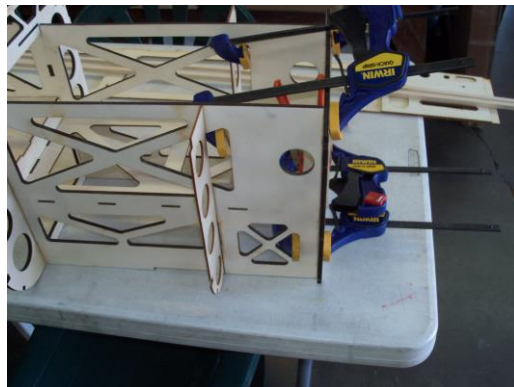
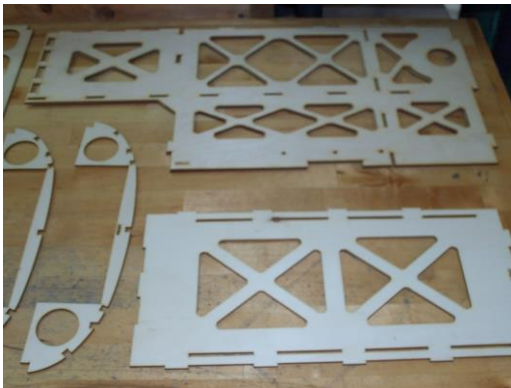
**Setting the Fuselage Formers**

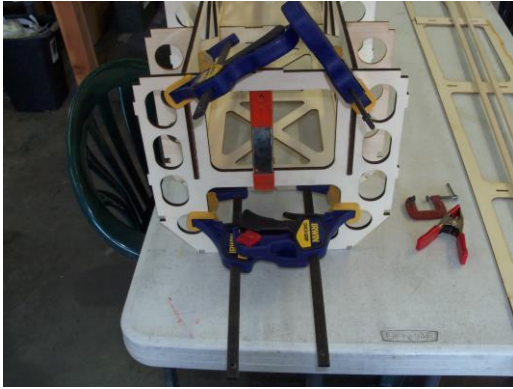




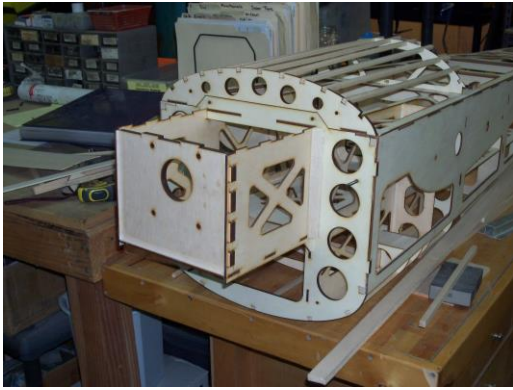
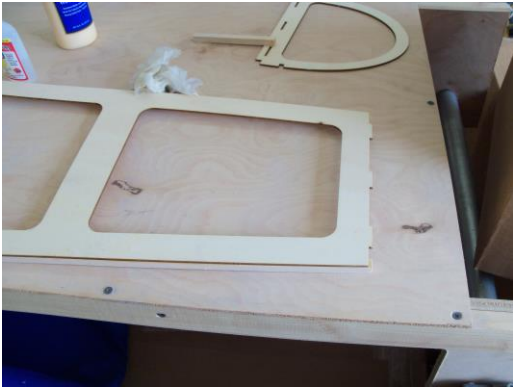
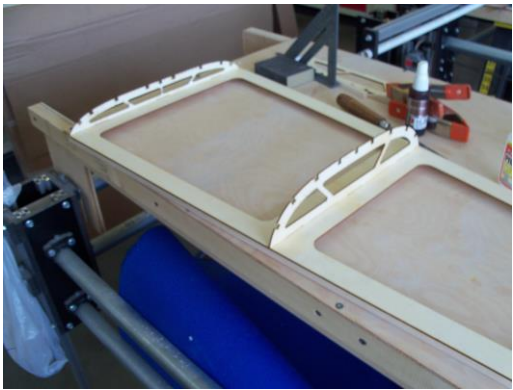
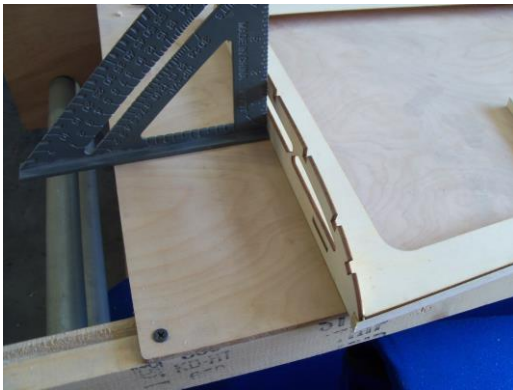
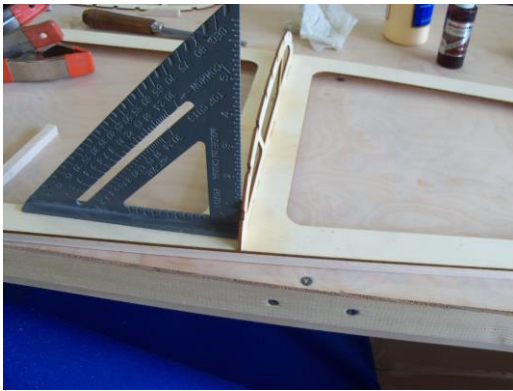
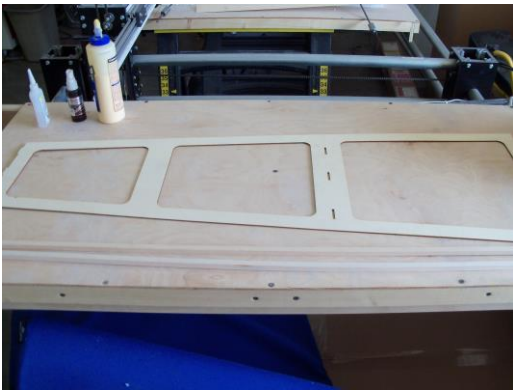


**Building the Motorbox**

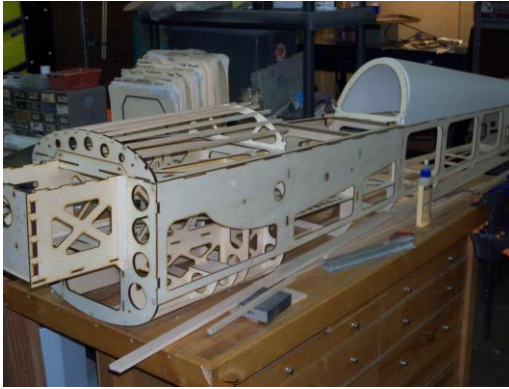




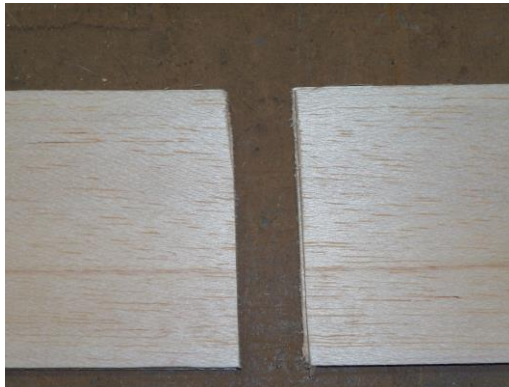
**Building the Removable Hatch**

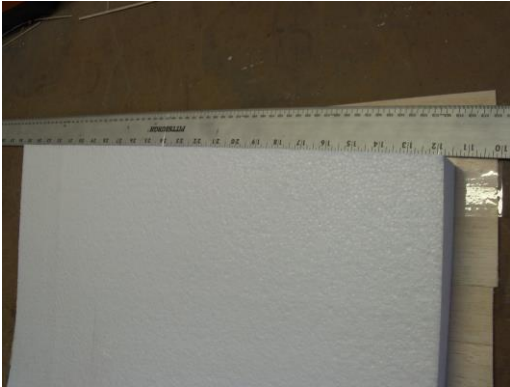
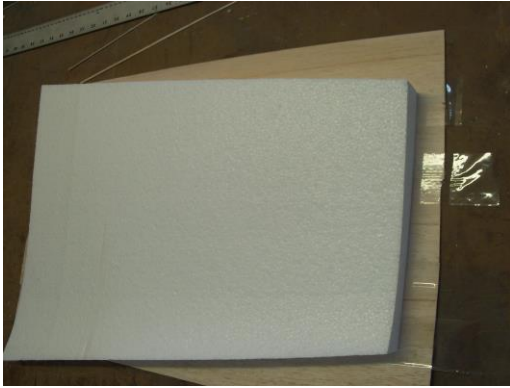
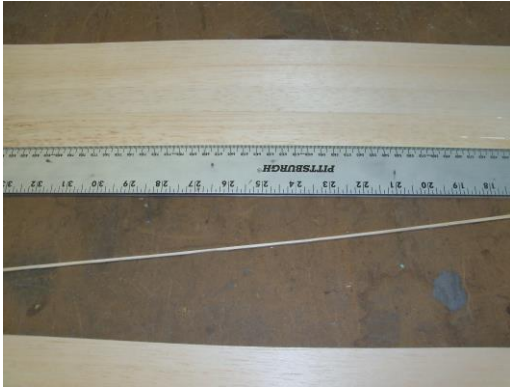




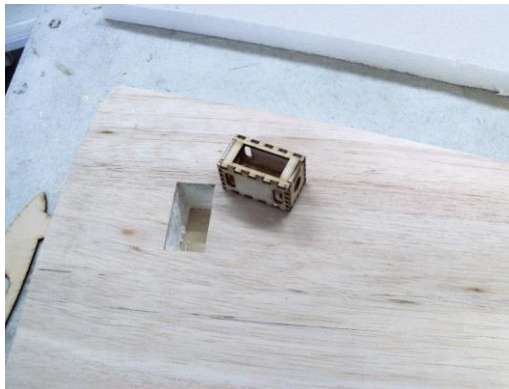
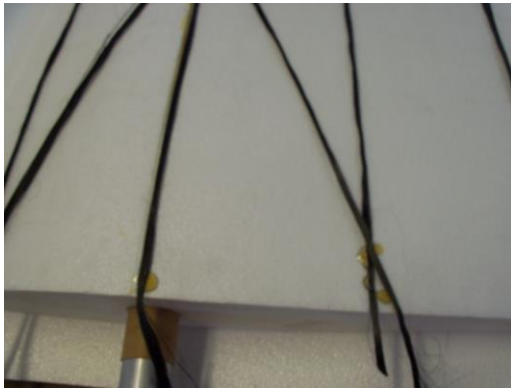


**Sheeting Wings, Stabs, & Rudder**



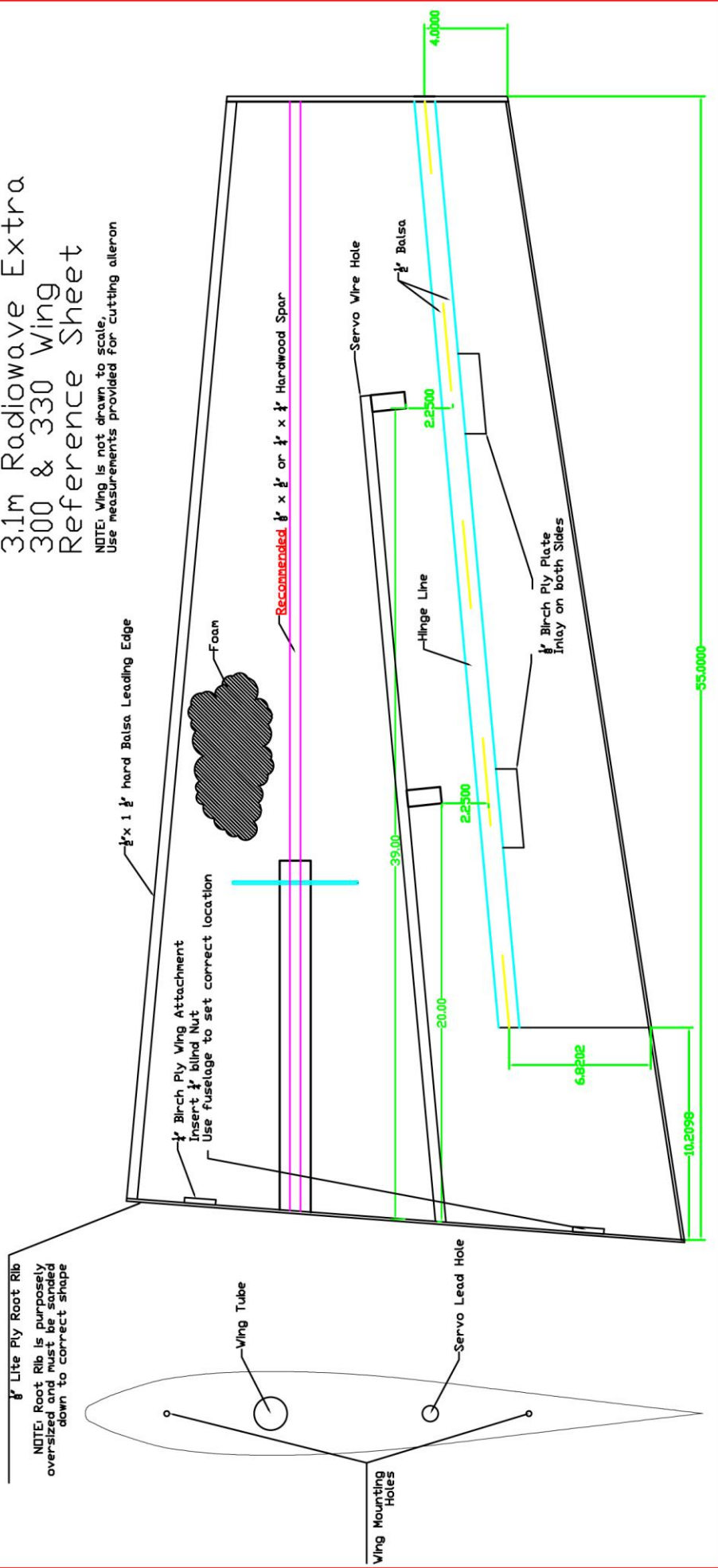




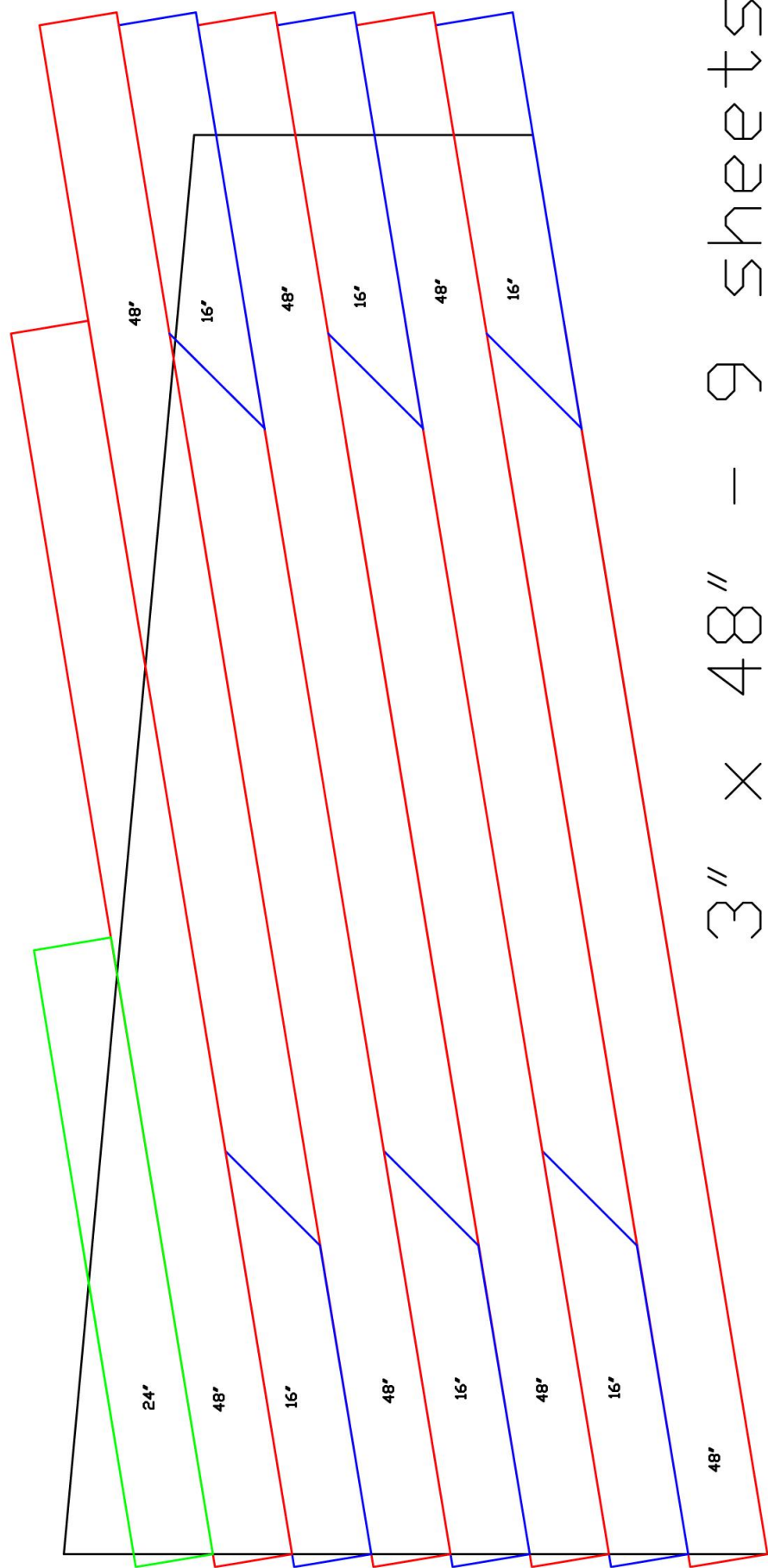


# 3.1m Radiowave Extra 300 & 330 Wing Reference Sheet

NOTE: Wing is not drawn to scale.  
Use measurements provided for cutting aireron



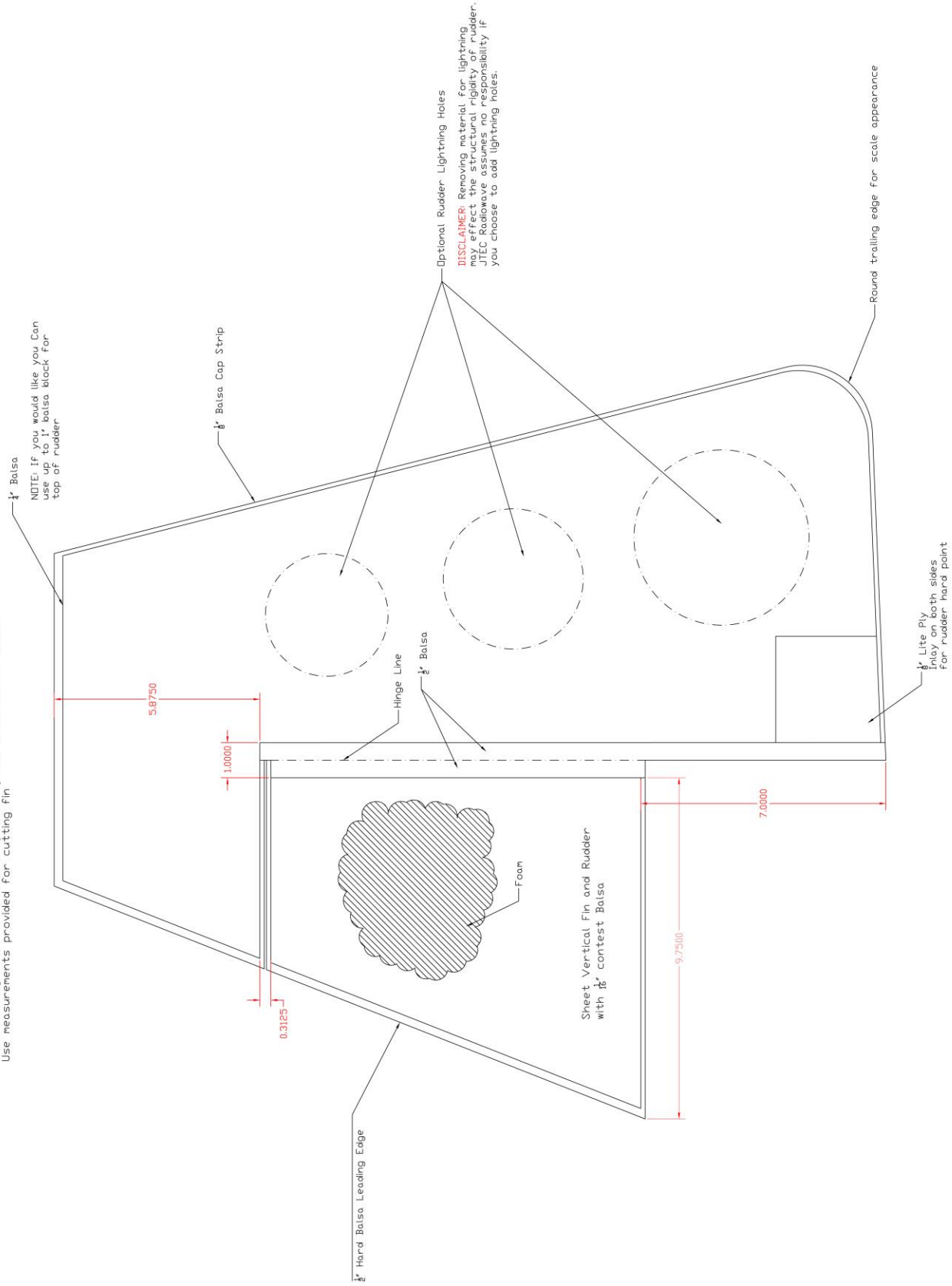
# 3.1m Radiowave Extra 300 & 330 Wing Sheeting Layout



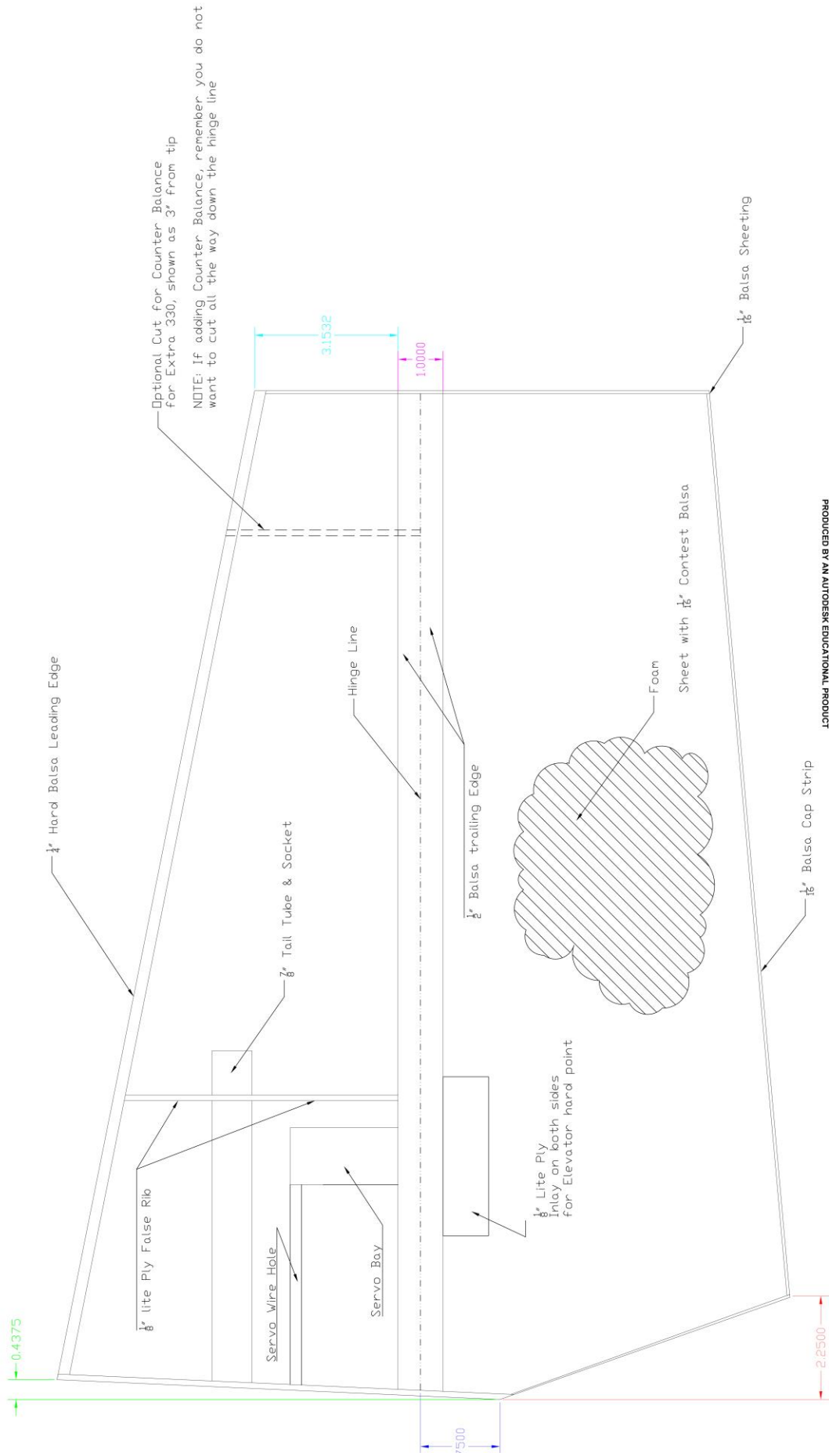
3" x 48" - 9 sheets

# 3.1m Radiowave Extra 300 & 330 Vertical Fin Reference Sheet

NOTE: Drawing is for reference only and may not be drawn to scale. Use measurements provided for cutting fin.



NOTE: Drawing is not drawn to scale.  
Use measurements provided for cutting stab



PRODUCED BY AN AUTOBESK EDUCATIONAL PRODUCT