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INSTRUCTION MANUAL



EXTRA 300 39% SCALE

Winner of the 2006 Tucson Aerobatic Shootout!

SPECIFICATIONS

WING SPAN	123"	POWER	150cc
WEIGHT	37lbs+/-	RADIO	4 CH
WING AREA	2850 sq. in.		

INTRODUCTION

Thank you for purchasing the 39% Dalton Aviation Extra 300. The builder of this model should be experienced in giant scale model building. If you are not experienced please seek the advice of a qualified builder. The materials and techniques explained in this instruction manual have been flight tested thoroughly. However, the builder of this kit must make the final determination of the construction of his/her aircraft. The pilot of this model should be a member of the Academy of Model Aeronautics and experienced in RC Model Flying. Please read through the instruction manual before starting construction so you can get an idea of how the airframe is constructed and the construction sequence.

Before starting construction it is a good idea to figure out what equipment you intend to use.

The Extra 300 has been engineered to use 2 servos in the tail to drive the rudder. When using this setup it is important to keep the tail as light as possible. It is recommended that you use a lightweight tail wheel assembly and if you intend on using 4 servos for the elevators you should cut the optional lightening holes in the rudder and elevators. A pull rudder system can also be used if that is preferred.

The following is the adhesives that I use. For most all of the fuse construction I use Titebond Original wood glue.



For edge gluing all of the sheeting together and

also gluing on all leading and trailing edges I use Titebond white glue. This glue will dry clear and makes a nice invisible joint for the sheeting.



For gluing all of the sheeting to the foam cores I use a polyurethane glue called Ultimate glue. There are a couple different manufactures of this such as Probond or Gorilla glue and all work just as well.



PARTS LIST

LASER CUT PARTS

QTY	ITEM	DESCRIPTION
(1)	MBSL	Motor Box Side Left
(1)	MBSR	Motor Box Side Right
(2)	Stab Support	Stab Support
(2)	FSS	Fuselage Side Support
(1)	LG1	Landing Gear Former 1
(1)	LG2	Landing Gear Former 2
(1)	TWSP	Tail Wheel Support
(1)	Firewall	Main Firewall
(1)	EMDA150	DA 150 Firewall Doubler
(2)	SP3	Fuselage Corner Supports
(1)	GP	Gear Plate
(1)	MBT	Motor Box Top
(1)	IBF	Ignition, Battery Floor
(1)	FTF	Fuel Tank Floor
(1)	Chin	Motor Box Bottom
(1)	F1T-F3T	Hatch Formers
(4)	HS	Hatch Supports
(2)	HS1	Hatch Supports
(6)	HDD	Hatch Hold Down
(1)	F1B-F9	Fuselage Formers
(1)	FTF 2	Fuel Tank Floor Support
(1)	FS	Fin Support
(2)	Root cap	Wing root cap
(2)	Root cap	Stab root cap

FOAM PARTS

QTY	DESCRIPTION
(2)	Foam Wing Cores
(2)	Foam Stab Cores
(1)	Foam Rudder Core
(1)	Foam Turtle deck

FIBERGLASS PARTS

QTY	DESCRIPTION
(1)	Cowl Bottom
(1)	Cowl Top
(1)	Wheel Pant Left
(1)	Wheel Pant Right

CARBON FIBER PARTS

QTY	DESCRIPTION
(1)	48" Wing Tube
(1)	15" Stab Tube with Phenolic

MISC. PARTS

QTY	DESCRIPTION
(2)	Wing Tube Supports
(3)	1.5" Phenolics
(2)	Aluminum Brackets
(2)	Carbon Stab Brackets
(4)	3" Nylon 1/4 x 20 Threaded Studs
(4)	1/4 x 20 Nylon Wing Nuts
(1)	5/8" x 24" Dowel
(2)	1/2" Square x 9" Hardwood
(1)	Instruction Manual, photo cd
(1)	Full Size Plans
(4)	1" X 1" dowel

- (1) 3.75" aluminum tube
- (2) 1/4" X 3" dowel
- (1) Aluminum landing gear
- (1) Canopy

BALSA PARTS

QTY	SIZE	DESCRIPTION
(4)	3/32" x 4" x 42"	Fuselage Side Sheeting
(4)	3/32" x 3 x 42"	Fuselage Side Sheeting
(26)	3/32" x 4" x 48"	Wing Sheeting
(13)	1/16" x 36" x 4"	Fin & Rudder Sheeting
(14)	1/16" x 24" x 4"	Stab Sheeting
(5)	3/32" x 4" x 36"	Hatch Sheeting
(2)	3/32" pre cut	Balsa Fin Fairing
(17)	1/8" x 3/8" x 48"	Balsa Stringers
(5)	1/2" x 4" x 48"	LE & TE Stock
(3)	1/4" square x 36"	Top Former Doublers

SPRUCE

QTY	SIZE
(24)	1/4" Square x 48"

FUSELAGE INTRODUCTION

The fuselage needs to be built upside down over the top view of the plans. It is very important that the fuselage is built straight. I recommend that the builder purchase two pieces of 1” aluminum angle from Home Depot. These pieces can be screwed down over the top view of the plans to keep the sides of the fuselage perfectly straight.

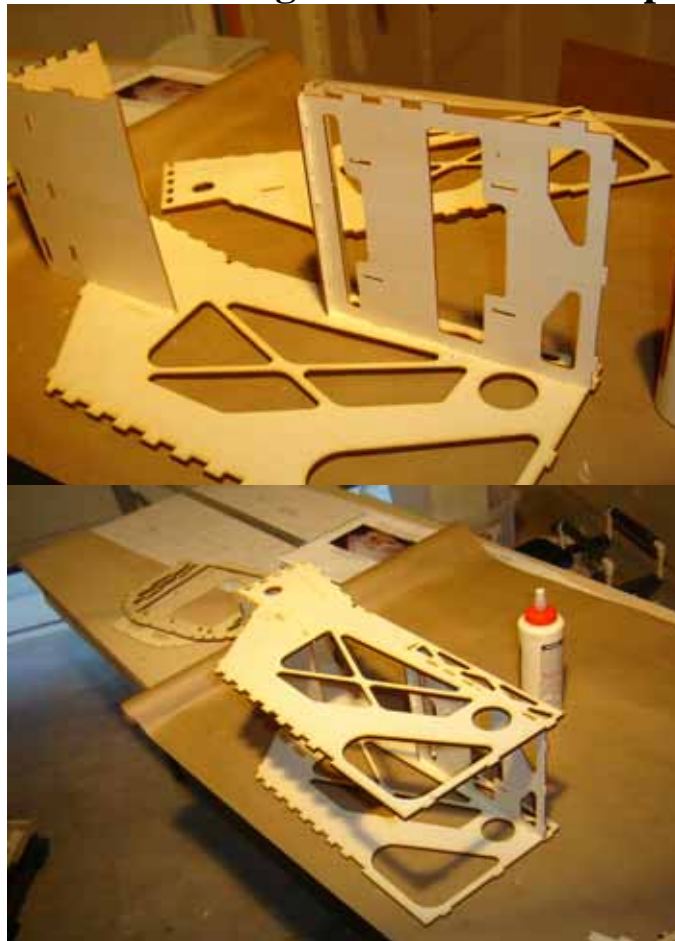


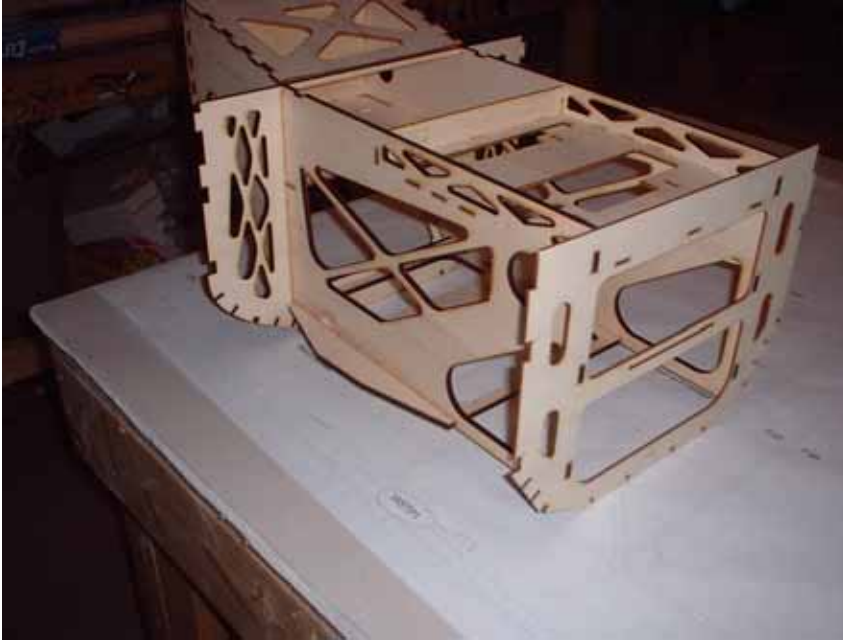
FUSELAGE CONSTRUCTION

- (1) Start by locating all the motor box parts. They**

have all been taped together for you and include MBSL & MBSR, GP, Chin, FTF, FTF2, MBT, IBF, Firewall, F1B, and F2B.

- (2) Trial fit all these parts together without using glue. **Make sure you have MBSL & MBSR on their proper sides. There is right thrust built into the motor box.** Once you are satisfied with the fit of all parts reassemble using an aliphatic glue or equivalent. Use an epoxy brush and brush over all seams with glue. Make sure all parts fit.





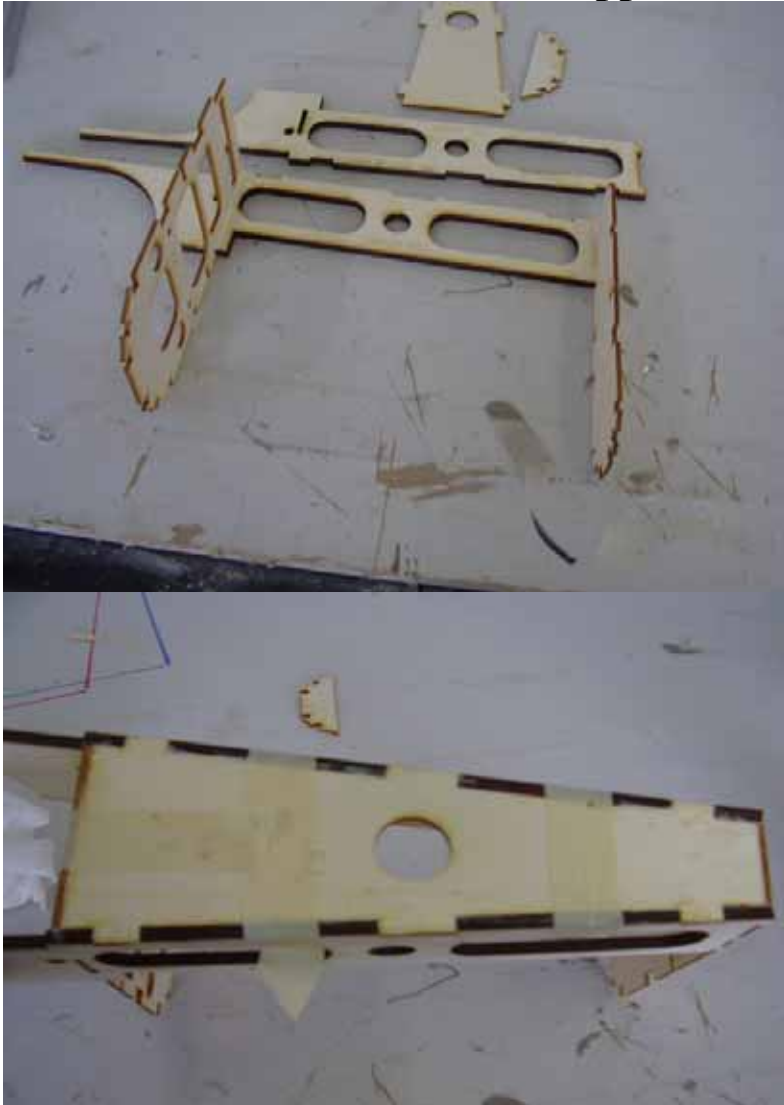
- (3) **Install the $\frac{1}{2}$ x $\frac{1}{2}$ hardwood and aluminum angle for the landing gear plate per plans.**
- (4) **Glue in the tri stock at the joint where the motor box meets F1 and F2.**



- (5) **Glue on both fuselage sides supports (FSS). There are notches in F1 & F2 that they glue into. Glue both SP3 support to F1 & FSS.**
- (6) **Glue in the $\frac{1}{2}$ " X $\frac{3}{4}$ " Hardwood blocks for the firewall and then pin the firewall in place with $\frac{1}{8}$ " dowels or screws.**

Cut two (2) pieces of $\frac{1}{4}$ square spruce to exactly $33 \frac{3}{8}$ ". These pieces are used to connect FSS to stab support and make up to total length of the fuselage. Glue one end to FSS on both sides.

- (7) Glue F8 & F9 to the stab supports. There are notches in the stab supports for these formers. Glue FS to the stab supports.**



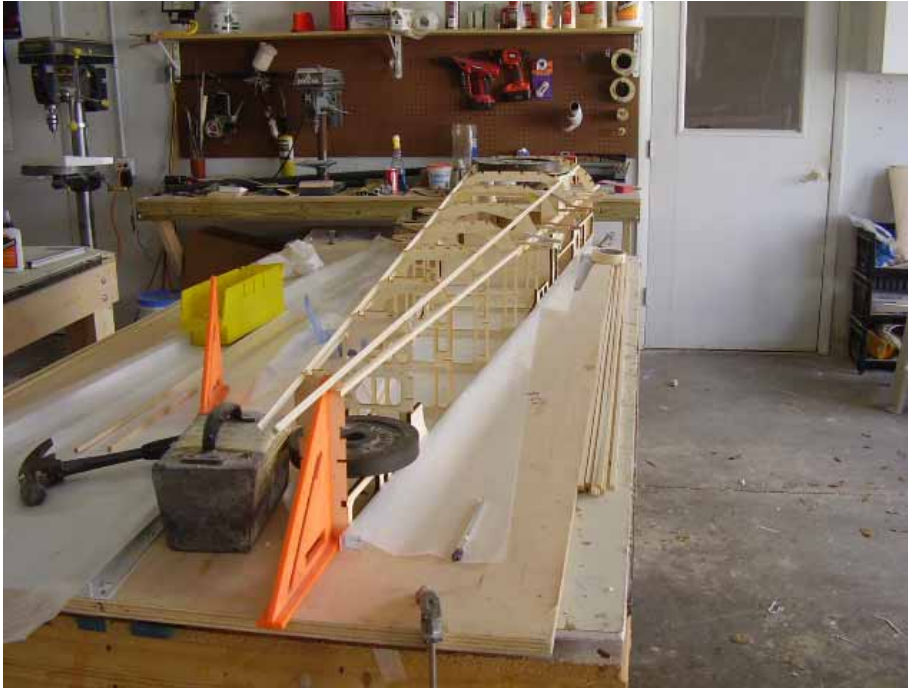
- (8) Glue the stab support assembly to the other end of square spruce. Make sure that this assembly stays flat to the building table.**



- (9) **Make up (6) $\frac{1}{4}$ square x 6'6" long stringers and (2) 43" stringers.**
- (10) **Starting at F1, glue in the two corner stringers to F1 & F2. Then start gluing in F3 through F7 making sure to keep the formers flat and square to the table. Glue stringers to F8 and F9. Make sure F9 is square to the building table.**



- (11) **Glue in the side stringers and doublers (43" long x $\frac{1}{4}$ square), which runs from F1 to the front of F5.**



- (12) Glue LG1 & LG2 to the gear plate and then glue in the remaining $\frac{1}{4}$ square stringers and the $\frac{1}{8} \times \frac{3}{8}$ balsa stringers that run from F1 to F2 and from notch in FSS just behind F3 to F9.**



- (13) Cut and glue in all cross bracing top and bottom. Make sure that the top brace runs in the opposite direction of the bottom. The cross bracing is where the fuselage gets most of its torsional strength from so make sure that all joints are tight.**



- (14) Glue in both RCS pieces between F8 & F9.**
- (15) Put a piece of tape under the joint where the stringer meets the landing gear plate and then put a bead of glue at this joint. The tape is to keep the glue from running out as it dry's.**



- (16) Install (2) 6/32 blind nuts into TWSP1 and glue TWSP1 between F8 & F9 and between the two bottom stringers. If using a wire style tail wheel you will want to install a block for the wire to plug into before gluing the tail wheel plate in. Glue a small piece of tri stock at the joint of WTSP1 and F8. Pin WTSP1 through the bottom stringers using 1/16 dowel or round toothpicks. Glue in the 3/4" tri stock between the stringers at the tail wheel plate and sand smooth.**



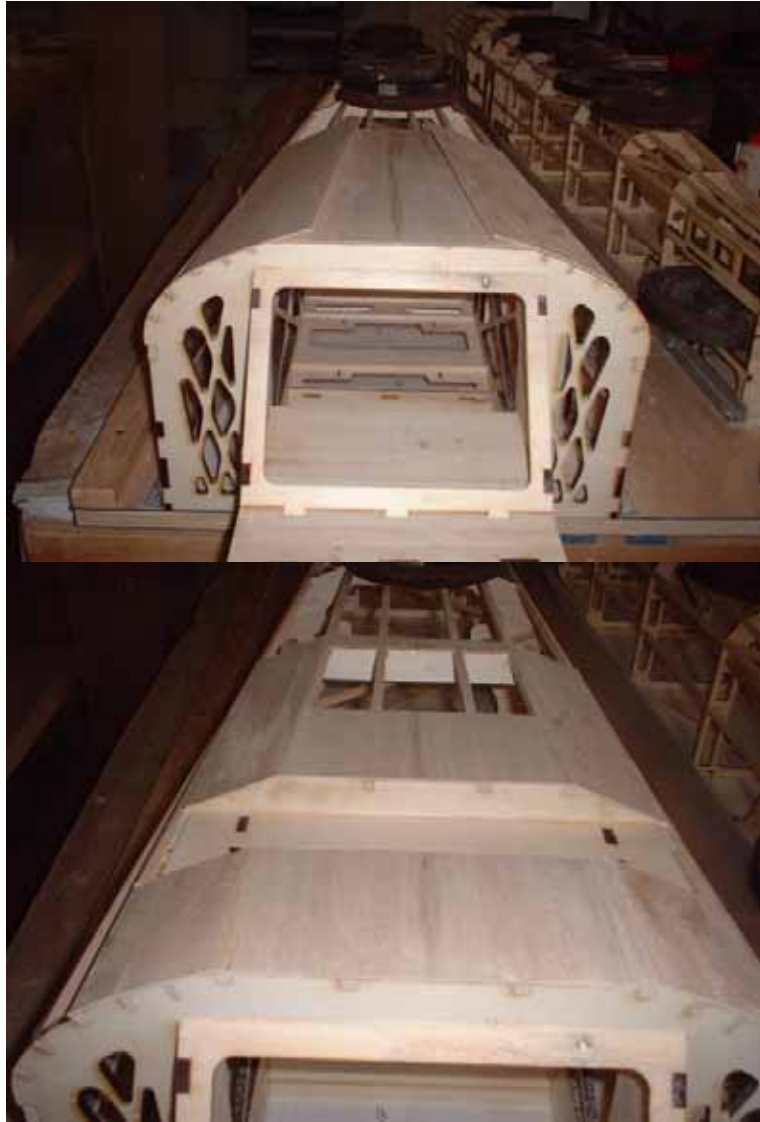


- (17) **Trim and sand all stringers flush with F9 & F1.**
- (18) **Locate (4) 7" x 42" x 3/32" sheeting and make (2) sheets 7" x 79" long. Use a long straight edge and make sure one side is straight.**
- (19) **Lightly sand the fuselage sides to remove any excess glue before the sheeting is applied.**
- (20) **Glue the side sheeting in place with the fuselage upside down over the plans. Use tape and T pins to hold sheeting in place until dry. You can also make the pieces seen in the photo to hold the sheeting in place till dry. I used 3/8" square hardwood and some strips of 1/8" door skin from Home Depot. The lower part fits between the aluminum angle and then uses rubber bands to pull it tight. Make sure that you keep the fuse weighted while glue on the side sheeting.**



- (21) Trim side sheeting flush with the bottom of the side stringers.**
- (22) It's now safe to take off all weight and clamps. The fuselage should be straight and true.**
- (23) This next step is optional. I like to sheet the bottom of the fuse around the landing gear area to give the covering more to stick to. Use 1/16" balsa sheeting for this**





- (24) Trim the sheeting away from where the wing and stab phenolics will exit. Trial fit the phenolics. Slide the wing and stab tubes in and make sure you have equal distance on each side. Make sure the tubes are parallel with each other. Once satisfied with alignment glue in both phenolics with epoxy.**



- (25) **Using $\frac{1}{4}$ " square spruce make doubles for the top of formers F3,F4,F5,F6 & F7. Cut some 1" strips of $\frac{3}{32}$ " balsa and glue to the top of the fuse starting just behind F4 former. This helps tie in all of the cross bracing and provides a solid surface for the turtledeck to glue to.**



- (26) **Install the 3.75" aluminum tube into $\frac{1}{4}$ " holes just in front of former F8. The holes will need to be drilled out to $\frac{9}{32}$ " to fit the tube.**



- (27) Make sheeting for the turtle deck and sheet turtle deck on a flat surface. Be careful when using polyurethane glue as the foam can slide off the sheeting as it cures. Use clamps to hold it in position until dry. It's best to check it every 5 minutes or so for the first 30 minutes.**



- (28) Glue sheeted turtle deck in place. Cap front of turtle deck with the laser cut 1/8" piece and the back of turtles with 3/32" scrap balsa. There are 2 pieces that look alike. The piece that has the**

wider outer edge is used to cap the turtledeck.



- (29) Using 6/32 hardware attach the 6 hatch hold down's to the fuselage and put wax paper between the mounts and the fuselage. Cut 2 1/4" square sticks that run from the front of the turtle deck to the front of F1 and glue them to the 6 mounts only.**
- (30) Glue on formers F1T through F3T. Make sure that F1T is not tilted forward or backward. Use a straight edge up against F1 to line up F1T. I like to move F1T former back about 1/32" to provide a slight gap between the hatch and cowling top. Glue in the hatch support HS & HS1.**
- (31) Take 8 1/8" x 3/8" x 48" balsa sticks and cut in half to 24". These will make up the hatch stringers. Glue in all hatch stringers. Make sure the formers stay square as you glue in the hatch stringers.**
- (32) Locate the (5) 4"x36" balsa sheets for the hatch and cut them down to 23" in length. Edge glue the balsa sheets together to make up the hatch sheeting. The scrap sheeting is used for the pilot floor and any other areas such as the back of the**

turtledeck.

- (33) **Locate the pre cut balsa & ply canopy support and glue these pieces together. The ply wood piece goes toward the back of the canopy. Trial fit up against the front of the turtle deck and sand as needed. It needs to be slightly smaller so that when the canopy is glued on it is flush with the top and sides of the turtle deck. You can now glue the canopy support to the hatch longerons only. Using 3/32" balsa make a floor for the pilot.**
- (34) **After all glue has dried remove this assembly from the fuse. Using round toothpicks or 1/16" dowel drill and pin the mounts in place. Sand these flush as well as all of the hatch stringers with F1T and F3T.**



- (35) The hatch sheeting should be glued in place with the hatch mounted on the fuse to avoid building a twist in the hatch. I like to use polyurethane glue to attach the sheeting. Apply a small bead to all of the stringers but do not put any glue on the longeron that the hatch mounts are glued to. It may be necessary to wet the outside of the sheeting to keep it from cracking. If you used white glue to edge glue the sheeting do not get it too wet or the seams will split apart. Use tape to hold the sheeting in place until the glue dries.**
- (35) Once dry remove the hatch and glue the sheeting to the longeron. You can use CA for this. Sand the sheeting flush with F1T and F3T and trim the excess sheeting flush with the bottom of the longeron.**
- (36) Using 1/2" balsa make a piece for the front of the canopy to rest on and glue it to the back side of F3T. You can also cut out the center of this piece the same as F3T former to remove weight.**

WING CONSTRUCTION INTRODUCTION

There are a couple of adhesives that can be used to apply the balsa sheeting to the foam. The first is a 2-hour laminating epoxy. The epoxy works very well but takes a little longer to cure. It's best to let it sit for about 12 hours under weight. I recommend using polyurethane glue such as Ultimate glue for gluing sheeting to foam. If you have never used this adhesive before there are a few things you need to be aware of. If you are building inside with air conditioning or in a very dry climate you will need to mist the foam with water before applying the sheeting. If the humidity is high this will not be necessary. Included with your kit are Dalton Aviation laser cut servo boxes. It is not necessary to layout the servo box or hand points before sheeting. Installation of the servo boxes will be covered later in the wing construction.

WING CONSTRUCTION

***Some of the foam cores may have ridges. This is due to the cutting wire moving at a slower speed than the root end. This is normal.**

- (1) Prepare the wing skins by edge gluing the 4" x 48" x 3/32" sheets together. Start your first sheet running parallel to the TE. Stager the sheets as you work your way up to the LE.**

Building Notes

Tape sheets together and use white glue to edge glue sheets together. Tape across the seam to hold the seam together and let it dry. Sand smooth on a flat surface.

- (2) Seal one end of a 1.5" x 18" phenolic with scrap balsa and sand smooth. Lightly sand entire phenolic.**

Trial fit phenolic & wing tube support. Sand tube support flush with the foam core on both sides.

wing



- (3) Glue in phenolic & wing tube support. Using polyurethane glue or equivalent. Then sheet the wings. Use polyurethane glue and around 300 pounds of weight when sheeting a wing. The wing must be**

sheeted on a flat surface. Topside up.



- (5) Trim and sand sheeting flush with foam core. Leave a 1/8" of phenolic extending out past root. Cap L.E. with 1/2" balsa and T.E. with 1/8" x 3/8" balsa and sand flush with the wing sheeting.**





- (6) Glue in the (4) 1" x 1" dowels into the root of the wing with epoxy at the anti rotation pin locations. Refer to plans for there location.**
- (7) Locate the 2 1/8" plywood root caps and test fit wings to fuselage. You may need to sand the root of the wing slightly to get a perfect fit. Now glue on wing root caps and sand flush with the wing once dry.**
- (8) Refer to the plans for the aileron cutout. Use 1/2" balsa for the wing T.E. and the aileron L.E.**



- (9) **Refer to the stab construction section on how to make the laser cut servo boxes and how to install them as well as the 5/8" dowel hardpoints. Before gluing in the servo boxes use a long piece of copper tube. You can get a 5 ft piece from Home Depot for a couple bucks and heat the end with a torch. Drill a hole in the root of the wing where you want the wire to exit. I like to burn the hole along the T.E. of the servo box hole and keep it running along the top of the sheeting. Keep track of the tube as you go from servo box to servo box.**



- (10) You can now hinge and bevel the wings and ailerons.**

STAB CONSTRUCTION

- (1) Prepare stab sheeting using 1/16" x 24" balsa.**
- (2) Cut two phenolics 5.75" and seal one end using scrap balsa.**
- (3) Trial fit phenolic.**
- (4) Glue in phenolic and sheet the stabs.**
- (5) Sand sheeting flush with foam.**
- (6) Glue on the 1/2" balsa L.E. and 1/8" balsa T.E. and sand to shape.**
- (7) Locate the 2 1/8" plywood root caps and fit the stabs to the fuselage the same way you did for the wing and sand flush.**
- (8) Do not cut elevators at this time. Install the hard point per plan that holds the anti-rotation bracket on the bottom of each stab.**



WING AND STAB INCEDENCE

- (1) **Install landing gear to fuselage. The landing gear bolts should pass through the aluminum brackets.**
- (2) **Level the top longeron of the fuse by blocking up the tail of the fuse.**
- (3) **Trim the balsa side sheeting from the 3/16" anti-rotation holes. There are two on each side.**
- (4) **Install one wing panel and use an incidence meter to set the wing incidence at 0 degrees.**



- (5) **Using a 3/16" x 18" drill bit, drill the two anti-rotation holes. Go through the opposite side of the fuse and drill into the root of the wing 2".**
- (6) **Drill and set both wings, then proceed with the stabs.**



- (7) Glue the 1/4" x 3" nylon studs in the root of the wing and leave 1" extending out of the root. Polyurethane glue should be used for this and I have never had one pull out.**
- (8) Install one stab to the fuse. Trial fit the stab bracket. You may need to sand the bracket a little so there are no gaps between fuse and stab.**
- (9) Use a #6 wood screw and install stab bracket to stab.**



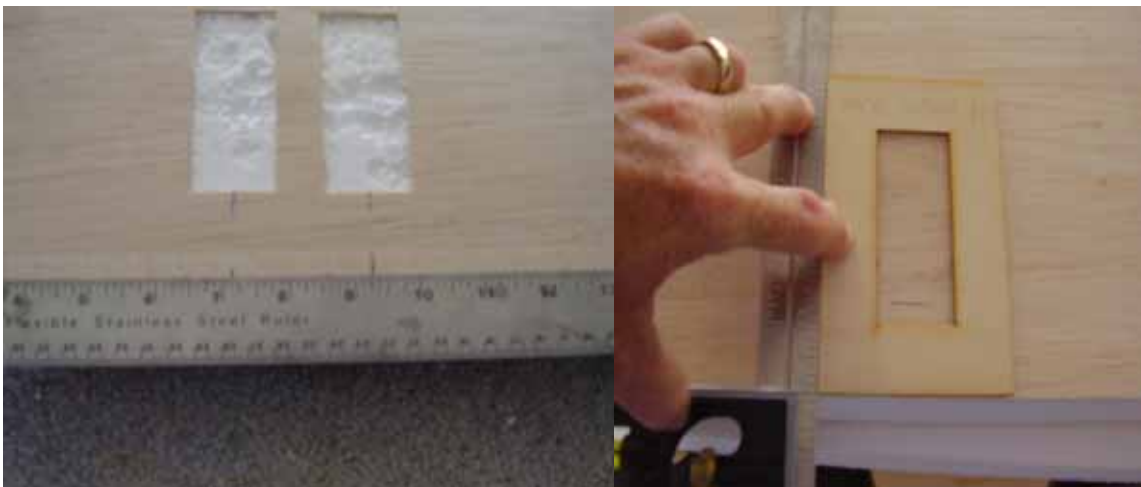


- (10) Using an incidence meter set the stab incidence at 0 degrees. Use a 6/32 screw and blind nut to secure stab in fuse.**

- (11) Using a 1/4" drill bit drill through the aluminum tube and into the root of the stab.**
- (12) Remove the stab and glue in the 3" x 1/4" dowel with polyurethane glue and leave about 3/4" extending out of the root. Check to make sure that the antirotation pin slides into the aluminum tube smoothly.**
- (13) Repeat steps 9 thru 11 for the opposite side of the stab.**
- (14) You can now finish stab construction and install all hard points and servo wells per plans.**
- (15) Install the laser cut 3/32-ply plate into the fuse sides. Slide the stab onto the fuse and use the bracket as a template to trace the location of the plate. Cut away the sheeting on the fuse side and glue in the ply piece. Make sure that you do not get glue into the blind nut on the inside of the fuselage. This will provide a plywood footprint for the stab bracket.**
- (16) Refer to the plans and cut out elevators from the stabs. This can be done easily with a band saw. Place the stab in one of the foam shucks. This will hold the stab at 90 degrees while cutting. Save these foam pieces for drilling the hard points in the elevators.**
- (17) Glue on the 1/2" leading and trailing edges and sand flush with sheeting. I use the Titebond white glue for this.**



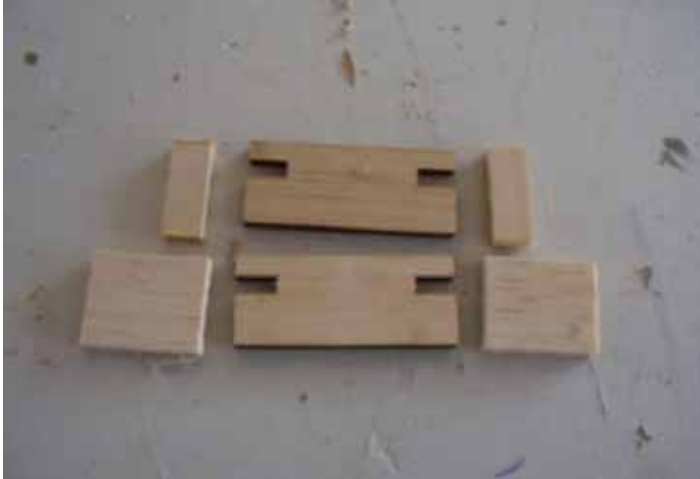
(18) Measure from the root and put a mark at 7 and 1/8" from the root and 9 and 1/4". Use a combination square and draw a center line approximately 2" up from the trailing edge. The cutout should start 1.5" up from the trailing edge. Use the supplied servo cutout jig and center it on the line and remove the sheeting. Make sure that you are doing this on the bottom of each stab.



(19) Using a dremel with a rotozip bit remove the foam. Be sure that the bit will not cut into the top sheeting. Do this on a slow speed or the foam will melt to the bit. Remove the foam all the way up to the top sheeting.



- (20) Make up the laser cut servo boxes. It's important to keep them square. They are a bit oversized on purpose so they can be sanded down and have a nice snug fit in the cutouts.**



(21) Glue the servo boxes in using polyurethane glue. Leave about 1/8" extending out from the stab. Once dry sand smooth.



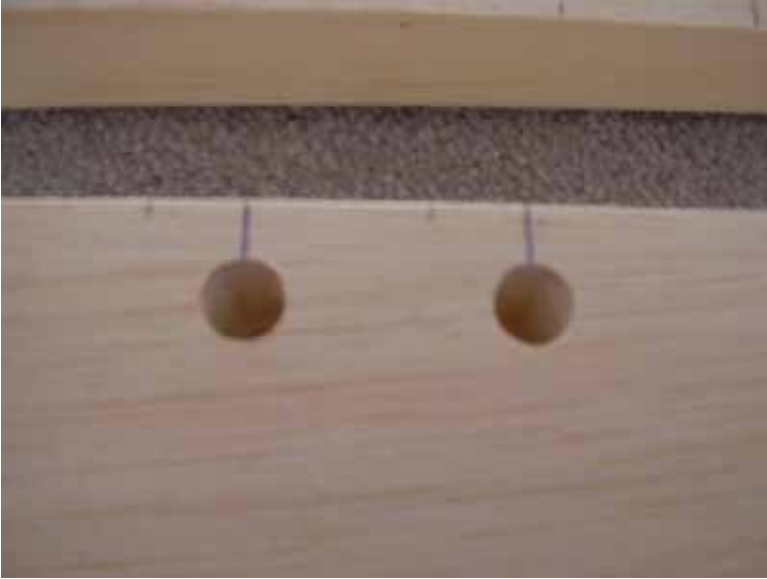
- (22) Line the stab up with the elevators and transfer the centerline marks on to the elevators.**



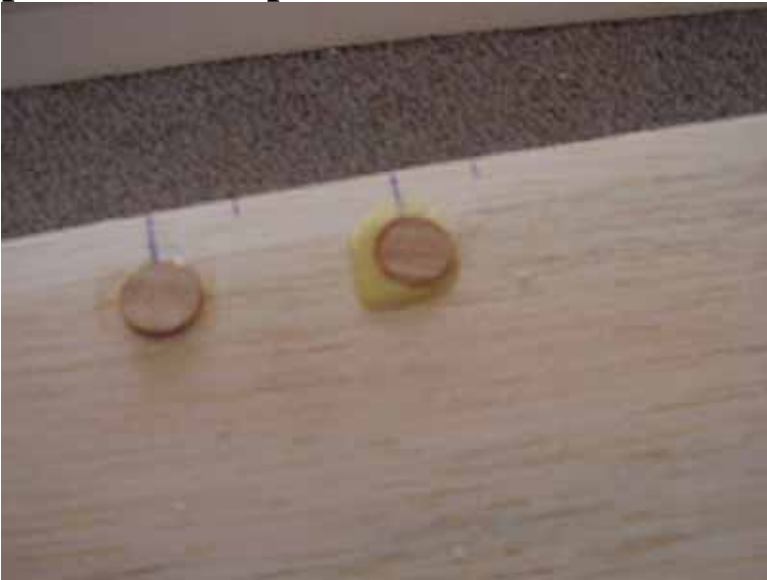
- (23) Measure $\frac{3}{4}$ " out from these marks towards the tip. This will be the location for the hard points for the control horns.**

- (24) Using the foam shucks to hold the elevators square drill a $\frac{5}{8}$ " hole on the centerline with a forstner bit. I like to just touch the edge of the $\frac{1}{2}$ " balsa when drilling the holes for the hard points. Drill to the top sheeting but not through it.**





(25) Cut and glue in the 5/8" dowel hard points with polyurethane glue. It's best to glue these in and keep an eye on them. Go back every few minutes and wipe off any excess glue and make sure that the expanding glue does not push the hard point out.



(26) Once the hard points and servo boxes are dry sand them flush with the sheeting.

(27) Next drill a 1/8" hole in the hard points for the 8/32" control horns.



(28) Using 2 t pins locate the center lines on the stabs and elevators.





(29) Put a mark along the center line at each hinge location.

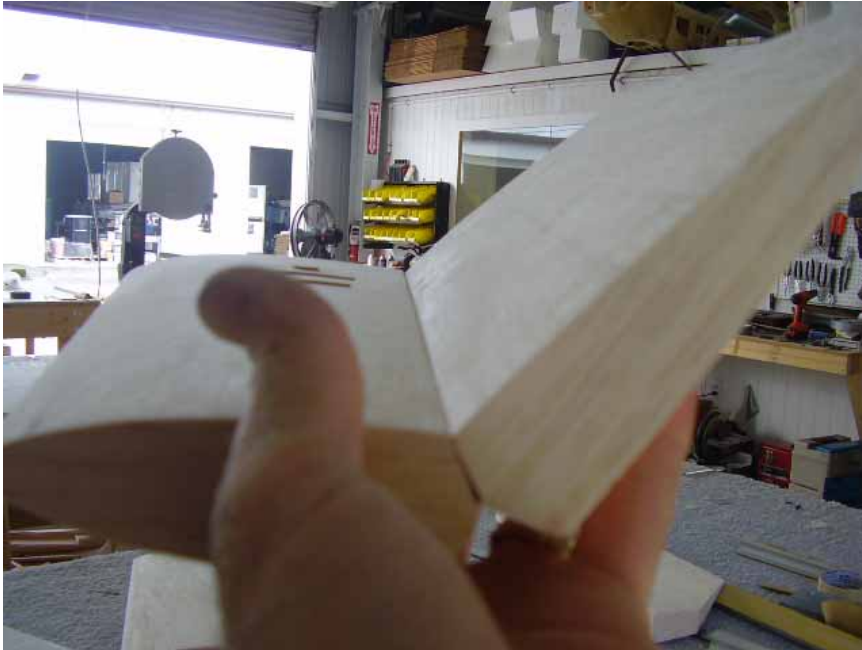


- (30) The Great Planes hinge slotting tool with the heavy duty blades works great for cutting hinge slots. I prefer to use Klett hinges. If using Robart hinges use there center line drill jig.**



- (31) After all hinge slots are cut measure up from the trailing edge on the stab at the root $3/8''$ and $1/4''$ at the tip. Draw a straight line connecting these 2 points. This is the line that you will sand the bevel to. The measurements are the same for the elevators. Use a long razor knife to remove most of the material and then sand with a t sander to finish.**





(32) Install the stab tube into the fuselage and measure to make sure you have an equal amount on each side. On this plane it was 5.75". The tubes can vary in length up to 1/4" so if your measurement is not the same don't worry.



(33)

I like to put the stab tube screw $\frac{1}{2}$ " from the end of the tube. So we need to put are hard point for this at 5.25" from the root of the stab. Put the stab tube into the stab and use a straight edge to locate the center of the hole for the hard point. Use the foam shuck to hold the stab square and drill the $\frac{5}{8}$ " hole for the hard point. Make sure that you **DO NOT DRILL INTO THE STAB PHENOLIC! It's best to just cut through the sheeting and use a #11 xacto blade to remove the foam down to the phenolic tube. You don't want any glue to get into the phenolic when gluing in the hard point. Cut and glue the 2 hard points and sand flush to the sheeting.**



- (34) **Using some scrap 5/8" dowel sand them down to fit inside the stab tube. Cut these about 1/2" in length and ca them into the tube. Push them in about 1/4" from the end of the tube. This should put your hole in the center of this block.**



- (35) **Install the stab tube back in the fuselage and make sure you have equal distance on each side. Install one stab and drill and tap the tube and secure with 6/32" hardware. Next slide the other stab on and have someone compress the stab together while you drill and tap the other stab tube hole. Drill a servo lead hole through the root end of the stabs.**



RUDDER CONSTRUCTION

- (1) Using 1/16" x 36" balsa sheet rudder on a flat surface.**
- (2) Sand sheeting flush with foam then glue on 1/2" balsa L.E. and 1/8" balsa T.E.**
- (3) Cut out fin and rudder per plans.**





- (4) **Glue the leading edge of the rudder and trailing edge of the fin using $\frac{1}{2}$ " balsa. The fin post gets wider as it goes towards the bottom of the plane so you will need to cut this piece wider than the fin and the sand flush.**
- (5) **Use scrap balsa and make a ledge for the fin fairing to glue to.**



- (6) **Glue on fin to fuselage keeping it 90 degrees to the stabs. You will have to cut the front of the fin so that it fits up against the back of the turtldeck.**



- (7) Hinge and bevel fin and rudder.**
- (8) Glue on balsa fin fairings. The fairings are cut oversized so they need to be trimmed to fit. Use filler as needed for a smooth finish.**



Optional rudder lightening.



COWLING AND WHEELPANTS

- (1) Drill (6) 6/32 holes in the cowl mounting blocks.**



- (2) Attach cowl top to cowl bottom using 6/32 hardware.**



- (3) Measure down from the top of the fuselage and put a small mark at 1 and 1/16" from the top.**

The seam of the cowl should be real close to these marks. Tape cowl in place on fuselage and mark and drill the (6) mounting holes into F1.



Once satisfied with the fit mark the top locations. I use some lipstick on the end of a ball driver to mark the holes. Use 6/32 hardware to mount cowl to fuselage.





(4) Mount wheel pants to landing gear.

Your airplane is now ready for final sanding and covering.

Install the radio and engine following manufacturer's instructions.

Refer to the plans for the CG location.

Recommended controls throws for the first flight are:

	Up	Down
Aileron	18	18
Elevator	12	12
Rudder	40	40