# EXTRA 300S 25% SCALE

## BUILDING INSTRUCTIONS for 72" VERSION

Thank you for purchasing our Extra 300s kit. In it we have attempted to give you the type of model and kit you have always wanted. We have gone to added expense to add accuracy and quality to the material and plans in this kit. For example, all of the fuselage bulkheads and parts are laser cut, with exception of the sides which are die-cut. The plans are Cad generated for greater accuracy. Much time was spent engineering the fuselage construction so that it would assure the builder of success. We have continued our successful BPPF ( Balsa, Plastic, Ply and Foam ) concept in this kit which has been so successful in our Laser 200 and Stinger Series. We use only top grade lite ply however, we cannot control the warpage that occurs. We hope that you will enjoy building it and know that your finished Extra 300s will perform beyond your expectations and will be a joy to fly.

Before starting to build, we urge you to read through these instructions while reviewing the plans. They contain some important building sequence as well as instructions and warnings concerning the assembly and use of the model. Some building tips have been included along the way to help you out. Or, if you have your own way of building , which some modelers have, so be it. At least read what we have to say then make your own determination. It might save you some time. We expect that you have some building experience to take on a model so, every minute detail is not covered. However, the plans and the instructions together will allow you to produce a first class model, if your skills and motivation are up to it.

**WING CONSTRUCTION**

1. Remove the foam wing cores from their shells and inspect them. Note that there is a LH and RH panel. Hold up a panel and view it from the front. Notice that one side is flat and the other has a taper. The side with the flat surface is the top. You will also note that the tubing wing spar hole in the end of the core is closer to the top surface as well as the cut where the hot wire entered. Mark each panel once you have identified the top surfaces. Handle the cores carefully because of the fragile trailing edge. **Do not throw away the foam core packing shells ( packing ).** These will be needed later as the wing construction progresses.

2. Sand the surfaces of the cores lightly, if necessary, with 100 grit paper to remove any ridges and irregularities you might find. Do not over-sand.

3. Locate and install the fiber tubes in each wing core. Spread a thin coat of epoxy or white glue around the periphery and length of the fiber tube. Insert into the core with a twisting motion. Slip WR2 over the end before the tube is completely positioned. Use epoxy to secure WR2 to the foam and tube. Wipe off excess glue around the exit point of the tube allowing it to extend 3/16" minimum. It is important that this area be free of glue.

4. Locate 16 - 1/16" x 4" x 36" balsa sheets. It will be necessary to edge glue these pieces together to form a skin to sheet the wing panels. Many times the balsa edges are crowned and need to be trued up. A 36" straight edge and X-acto knife are required to perform this task. Take off as little as possible to attain a straight edge.

5. Lay down a strip of wax paper on a flat surface. Edge glue four sheets of 1/16" x 4" x 36" together. Four skins are required for the top and bottom of both wing panels. Use white glue or thin CA. When

using CA, hold the joint together firmly and apply the glue sparingly along the seam. Block sand the skins flat to ensure good contact with the foam.

6. Lay one of the wing core packing pieces on one of the wing skins and trim, allowing 3/16" all around. You will note that a small piece of sheeting will have to be added at the root end trailing edge of the panel. Once the skin is trimmed to size add this piece from the scrap. A piece 1-1/2" x 8" should do it.

9. **Please read the tip first before applying epoxy.** We recommend, Zap Finishing Resin or Hobbypoxy Smooth 'N' Easy finishing resin. **TIP: You may find, with a hard piece of sheeting, that weight will not be enough to bring the sheeting up against the foam core. Especially at the leading edge. If this is the case, spray the skin, along the leading edge on both sides, with a foaming action glass cleaner. Work it in with your finger and form the sheet over a rolling pin while rubbing it. You'll be amazed how flexible the wood becomes. When dry it will retain the set. A heavy board the size of the core will help distribute the weight. One gallon Zip-Loc bags filled with play sand make good cheap weights.**

**10.** Using a coarse brush, **apply a thin coat on one side of a skin**. Locate one of the packing shells and place on a flat surface. Place a strip of wax paper along the leading and trailing edge of the packing shell. Position the skin in the packing shell allowing it to extend 3/16" beyond the trailing edge. Next position the core flush with the packing shell on all sides. Finally lay the top packing shell in place. Apply weight evenly across the panel and allow to cure overnight. **Note: both skins can be applied at one time however we recommend doing them one at a time for better control.**

11. When cured, remove wing from packing shell and sand a slight bevel along the complete trailing edge to accommodate the adjacent sheeting. Use a little extra epoxy along the trailing edge for added reinforcement. Prepare the sheets with epoxy and install on the core. Place it in the shell, as described above, weight it down evenly and allow to cure overnight.

12. Sand the excess leading edge sheet flush with the foam core. Locate and install the 1/4"x7/8"x36" balsa leading edge with white glue and tape in place. Sand flush at trip and root.

13. Now is a good time to cut out the ailerons. Strike a line 3" in from the trailing edge starting at the tip 26-5/8" long. Mark the inset cut (aileron root end) as shown on the plans. Next, place the wing in a packing shell and tape in place. This will keep it level during the cutting operation. Use a band saw and carefully cut along the line and remove the aileron.

14. Sand the aileron inset (wing trailing edge) smooth with a long sanding stick and cap with a 1/4" x 1" x 36" balsa stick. Sand flush with wing tip. Cap the inboard end with 1/16" sheet scrap.

15. Place the aileron in a packing shell, in its respective place, and tape in place. Using a band saw cut a strip off the leading edge 5/8" wide. Sand the leading edge surface smooth and install a 3/8" x 1" x 36" leading edge with white glue and tape in place. Sand the both ends flush with the foam. Cut inboard offset and angle as shown on plans. Cap both ends with scrap 1/16" sheet using white glue and tape in place.

16. Locate and drill the 1/2" hole for the dowel supporting the aileron control horn. Place in a packing shell, to hold it level, and drill using a drill press and a Forstner drill bit. With this bit you can drill into half balsa and half foam and be assured of a round hole with no lead off. Sand flush with top and

bottom surfaces. Mark off and drill the holes for the hinges. Its easier now. Plane and shape the leading edge with a 30 degree angle on both sides of a line drawn down the center. See plans for shape.

17. Plane and shape the wing leading edge as shown on the plans using a long sanding stick to keep it straight and true.

18. Locate and layout the servo well on the wing. Cut around the well as deep as you can with a sharp X-Acto knife using a straight edge. Now dig out the depth required to accommodate the servo.

18. Epoxy in the 3/8" sq. ply pieces at each end of the well to support the servo. Check to see that the servo fits properly before the epoxy cures.

19. A 1/2" hole from the wing root to the servo well is required for the servo lead. This can be done several ways. Heat a piece of tubing and burn a hole. You will have to reheat it several times. Or if you have a 1/2" drill 24" long you can drill it. Or you can make your own drill from from a long piece of 1/2" brass tubing to accomplish the task.

20. Locate the **WR1** wing root ribs from the laser cut parts. Note that these ribs are slightly oversize to allow for building and sanding tolerances and give you some sanding material. Set these aside until the fuselage is built and you are ready to set the incidence.

21. Install the 1/2" dowels, wing to spar locking hard points, as shown on sheet 2 of 2, Section B-B. Use epoxy to glue them in place.

22. We recommend using the Robart Hinge Point for hinging all control surfaces. The center lines on the plans show their location. Install the aileron Hinge Points where required in accordance with the manufacturers instructions. Now construct the other wing.

23. This completes the wing construction. Sand the parts and set them aside for covering and final assembly.

**TAIL SURFACES**

1. The tail surfaces are foam covered and will be covered with 1/16" sheet balsa. Inspect them for any irregularities and lightly sand them with 100 grit paper if necessary. Handle them carefully because of the feathered trailing edges. Keep the packing shells handy because they will be used when applying the sheet balsa and cutting out the rudder and elevators.

2. Locate 4 pieces of 1/16" x 4"' x 30" and 2 pieces of 1/16" x 2" x 30" sheet balsa. Cut each of the 30" pieces in two 15" pieces. Sand or trim them with a straightedge to get true edges if necessary. Now, on a flat surface with wax paper, edge glue two pieces of 4" x 15" stock and one 2" x 15" piece. Make up three more skins as described previously.

3 Block sand the skins to provide a smooth surface. Place a packing shell, which is the exact shape of the foam core, down on one of the skins and trace around it allowing 3/16" of extra balsa beyond the foam. Now mark the other three skins. **Tip: Lay a strip of 3/16"sq. balsa next to the foam block to help offset the line.** Now cut out all four skins.

4. Place two packing shells with the flat side down on a flat surface. Place strips of wax paper along the leading and trailing edge. Spread a thin coat of Zap Finishing Resin on one side of both skins. Lay the skins in the packing shells. Now place the core on the skin and position carefully. Allow 3/16" skin beyond the trailing edge of the core. **See step 9 of wing construction.**

5. Sand a shallow bevel on the trailing edge of each of the two remaining skins. This is to help make a better joint at the trailing edge. Mark the skin so that you don't apply glue to the wrong side.

6. Spread a thin coat of epoxy on both skins. Spread extra epoxy along the trailing edge to help reinforce it. Lay the skins over the cores aligning the trailing edges. Lay down a strip of wax paper at trailing and leading edge. Place a packing shell over the skins, aligning it carefully, and weight down evenly. **Tip: The sand filled Zip-Loc Bags will come in handy here. Allow to cure over night.** Sand the balsa ends flush with the foam core.

**7.** Note the skin layout for the fin/rudder on the plans. It is important here to manage the wood as called for on these instructions so you won't cut up the wrong pieces.

8. Locate a 1/16"x3"x36" sheet and cut two length 13" long and one 9". Do the same on another 1/16" x 3" x 36" sheet. Locate a 1/16" x 3 x 12" sheet and cut it into two 6" pieces.

9. Edge glue these pieces together in the configuration shown on the plans. Now make up another skin for the opposite side. Block sand both skins to ensure flatness. Place them on a flat surface and lay the fin/rudder foam core packing shell on them to trace the outline. Allow 3/16" extra around the edges as described in step 3 above.

10. Bond the balsa to the foam core using the method described in steps 4, 5, and 6. When cured sand the balsa ends flush with the foam core.

11. At this point it is necessary to cut out the elevators and rudder. Starting with the elevator, lay both stab/elevator covered pieces back into their respective foam core packing. Place them so the ends are flush with the packing, centrally located fore and aft. Now tape them in place. This will keep them level when cutting out the elevators.

12. Measure back 3-1/8", from the leading edge at the foam tip on one of the stab/ele panels. Now draw a line perpendicular to the tip, the length of the core. Cut along this line using a band saw. Leave the elevator piece in the packing shell and trim off 5/8" from the leading edge. Now trim off the other elevator the same way.

13. Trim off the inboard edge and angle of each elevator as shown on the plans. Cap the leading edge of each with 3/8" x 3/4" using white glue. Tape in place with masking tape. Sand the ends flush and cap them with scrap 1/16" sheet.

14. Now sand the leading edge of the stab flush with the foam. Also sand the trailing edge smooth. A long sanding stick is a must here. Cap the trailing edge with 1/4"x1" balsa using white glue. Cap the leading edge with 1/4"x1/2". When cured sand both ends flush with the foam core. Plane and shape the leading edge to the configuration shown on the plans. Finally cap the tip with scrap 1/16" sheet and sand to shape of airfoil. Now finish the other stab.

15. Now is the time to join the stab panels. Make sure the root ends are square and true. Place each panel in a packing shell on a flat surface. Don't forget the wax paper under the joint. Spread a coat

of epoxy on each panel root end and push together. Align and weight down until cured. **Note:the stab panels must be placed in the packing shells when joined because they are tapered top and bottom. Do not try to join them on a flat surface without the packing shells. It may be necessary to shim one packing shell so that the panels will align at the center.** Glass the center section of the stab with 2 oz cloth as shown on the plans.

16. Next, sand the leading edge and tip of the fin/rudder panel skin flush with the foam. Layout the rudder hinge line and top offset by measuring down 1-13/16" from the top of the fin and draw a line parallel with the top of the panel. Extend a line from the corner of the cutout at the bottom, in line with the foam leading edge of the rudder, to the line you just drew. Both lines should be perpendicular to each other. Place the panel in one packing shell and tape in place. Cut out the rudder along the lines with a band saw.

17. With the rudder still in the packing shell trim 3/16" off the **bottom of the offset** and 5/8" off the hinge line. The bottom of the fin is configured to match the stab.

18. Sand all the saw edges smooth and cap the rudder (hinge line) leading edge with a 3/8" x 1-1/4" x 12". Sand the bottom edge flush with the foam and configure with the radii shown on the plans. Finally cap the tip and opposite side of offset and bottom of rudder with 1/16" scrap balsa.

19. Cap the fin leading edge with 1/4" x 1/2" balsa. Cap the trailing edge with 1/4" x 1-1/4" balsa and let it extend beyond the bottom of the fin to the bottom of the rudder. Centrally locate it (center it) on the trailing edge of the fin. This will tie the fin with the end of the fuselage. Cap the tip with 1/16" scrap balsa. The tail post will be configured at the end of the fuselage when the fin is mounted.

20. Tack glue the fin and rudder together and sand all surfaces to the airfoil except where the fin post mates with the fuselage. Plane and shape the leading edge of the fin as shown on the plans. Locate and drill a 1/2" hole in the rudder leading edge for the control horn hardwood dowel. Install a short piece of 1/2" dowel and epoxy in place. Now sand flush with surfaces on both sides.

21. Cut the fin away from the rudder and locate the hinge holes on each side before shaping the rudder leading edge (hinge line) to configuration shown on plans.

22. Set aside the pieces for final sanding and assembly.

## FUSELAGE

You will find the fuselage a pleasant piece of structure to assemble. All parts except the fuselage sides, which have been die-cut, have been manufactured to a precise degree of accuracy, thanks to the computer and the laser cutter, allowing you to comment to yourself, " I'll be darned, it fits."

1. The fuselage die-cut sides (**FS1**) are made in four pieces. Locate the parts and pop out the sides. Take care, especially around the finger joint where it's a good idea to trace over the cuts with a sharp X-Acto knife to ensure a good clean separation. Sand off the flashing where necessary.

2. Lay the two side mating pieces, front and back, on a flat surface over a piece of wax paper. Apply epoxy to the mating surfaces and push them together. Pin down the sides with a long straight edge along the top edge to ensure a good straight edge along the top. Weight down the joint to assure all surfaces are in alignment. When cured, do the other side. Next, drill the 5/8" wing dowel holes. The location for these are center punched on the fuselage side. The dowel pin holes are made larger to accommodate adjusting the wing incidence. (see Wing Assembly and Incidence Setting on page 12))

3. Place one side on a flat surface and glue a 1/4"sq. x 36" balsa stick along the top edge flush with the top edge of the side. Cut a piece of 1/4" sq. 9" long and splice onto the top rail to complete the length of the fuselage. You can splice before or after gluing down. It can be a butt joint or diagonal splice. Your choice.

4. Using the bulkheads as a gage, locate and glue in the bottom rail using 1/4" sq. balsa. Note: It is important to use the bulkheads to gage the distance between rails because the notches are cut very sharp and accurate. The 1/4" sq. will very in size causing looseness or tightness in the notches.

5. Now do the other side **making sure it is opposite hand.**

**6.** Lay one side on a flat surface and glue in bulkheads **F2, F3, F4** and **F5 i**nto the slots provided. When locating each bulkhead, tip them aft slightly using the fuselage bulkhead gage provided. Make sure each is fully engaged in the slot and against the side. **Tip: Use gap filling CA to position the bulkhead and then follow up with epoxy or white glue.**

7. Cut off the bottom view shown on sheet two of the plans and place on a flat surface laying wax paper over it. Pin down the side with the bulkheads attached, up-side-down, over the plans, **aligning F2 bulkhead in proper location**. Align the side leaving a small amount of black line showing. Allow **F1** to overhang the workbench about 1/2". Note: The rest of the bulkheads may not line up with the plans because of the paper instability so don't be alarmed.

8. With side properly aligned over plans assemble opposite side in place **making sure of alignment at F2**. Pin down and glue at all locations. Make sure all bulkheads are fully engaged in the slots and the rails in the notches. Both sides should now be straight.

9. Using 1/4" sq. balsa install one set the diagonal braces down the top rail of the fuselage **FS1**. Except over the servo area. See plans. This will help keep the fuselage square.

10. Before installing the **F1** bulkhead make sure the sides are pinned to the plans close to the edge of the bench. Hopefully you did leave the sides overhanging it some.

11. Slide **F1** between the sides (remember it goes in up-side-down) with the notch engaged at the top rail on one side only. Make sure it is flush with the side end and aligned with the other side end and glue in place with CA to hold. Now rotate **F1** and pull the opposite side into its respective notch making sure it is flush with the side end and CA. Do this carefully. Thank god for CA. Unpin the sides at the bottom and bend in to glue the bottom rail in the notch. Do them one at a time. When completed re-glue the entire bulkhead inside, to the side, with epoxy.

12. Locate and slide into position, through **F1**, both **FS2** engine box supports. A very slight sanding of the edges may be necessary for them to slide through **F1**, however they must fit tight. Locate the aluminum wing spar tube and assemble it through the holes to align both **FS2's** with the holes in the

sides. Note: The spar fits tight and it maybe necessary to lightly sand the holes. Align both FS2's with those shown on the plans. **With the spar in place epoxy both FS2's in place.**

13. Locate both **FS3's** and epoxy in place noting alignment with stringer notches at bottom of **F2.** Locate a 1/4" sq. x 36" balsa stick and epoxy on top of **FS3,** keeping the end flush with the notch, and glue down to the rest of the bulkheads. Now do the other side. The center stringer should extend beyond the landing gear notch and trimmed off later when **FB2** is installed. Do not trim off the aft end of the stringers.

14. Remove the fuselage from the plans and glue in **F6** and **F7** bulkheads. Now epoxy in both **FS4** stab supports and **TW1** where shown on the plans. Glue and trim off the stringers flush **TW1.** Install the rest of the stringers where shown on the plans.

15. Locate and layout the landing gear bolt retaining hole pattern on **LG1** as shown on the plans. Install a # 8-32 blind nut in each hole. Epoxy **LG1** in place with the blind nuts on the inside. Epoxy in both **LG2** reinforcement doublers making sure they make good contact with **FS3.**

16. Locate **FB1** and epoxy in place. Find **FB2** and epoxy in place. Trim off center stringer flush. Find and glue in the two **G2** gussets where shown on the plans. Now glue in both the **G3** filler pieces.

19. The basic fuselage is now finished. Set aside until further work on it is required.

**COWL ASSEMBLY**

1. Locate former **CW1**, slip over the motor box bearers (**FS2**) up against **F1** and tape in place with the **CW1** facing out. Match drill the four mounting holes with a 5/32" drill. Remove **CW1** and install #6 blind nuts in each hole on the back side of **F1. Note: Because of the close tolerances held in laser cutting, it may be necessary to lightly sand the edges of FS2 to allow CW1 to slide over them.**

2. The cowl is made of three pieces of ABS plastic. The nose piece, main body, and cover. Starting with the nose piece, cut out the air vent and engine crankshaft openings in the front. Use a Dremel Motor with a drum sander to clean out the material. Clean the flashing off the back edge.

3. The main body is next. Note the offset in the front and along each side. Trim off the front to the mold line letting the offset extend out 3/8" to accept the nose piece. Trim off the back portion to the mold line in the plastic. The part will seem kind of flimsy at this point but don't worry, it will get strengthened up soon.

4. Lay down a piece of wax paper and pin down former **CW1** with the **CW1** facing up. Note the centerline mark at the bottom edge of **CW1**. Looking at the inside rear edge of the main body note the line indentation in the center. Now place the main body over former **CW1**, align the centerlines and glue to **CW1** with thick CA. This step is important so get it right.

5. Locate and glue on the nose piece to the main body. Aligning it with the carb intake vent making sure it is up against the rear edge of the offset. Tape in place and use CA glue.

6. Trim out the cover. Note the offset along the front edge. Trim off to the mold line leaving a 3/8" flange across the front. Note the notch on either side and trim out. This will allow the cover to tuck

under the nose piece and remain on the outside along the sides of the main body. Trim off each side to the mold lines. Do not trim the back edge yet.

7. Next, glue in both side rails **CW2**. When placed against **CW1** they should extend into the nose piece and against **CW3**. Thick CA in **CW3** offsetting it back from the nose piece rear edge 3/8". This will stiffen the nose piece. Now glue a gusset, **G2,** in all four corners under the bottom edge of each rail, against **CW1** and **CW3.**

8. We recommend you fiberglass the inside of the cowl to make it more rigid and durable. This can be quickly and easily accomplished using 2 oz glass cloth. Cut a piece of cloth to size, lay on surface and coat with clear Multi Purpose Cement. The cement can be purchased from Ace Hardware, no. 43691. Or, go to your local Hobby Dealer and purchase some Goldberg Cowl Bond #797. It has a dauber applicator so you won't need a brush. Work from the center out. Put an extra strip where the cowl meets the former **CW1** and over the joint where the nose piece meets the main body. **Warning: Do not put on heavy coats of glue as it might affect the cowling material. It is better to use thin coats.** For more durability lay on a coat of thinned epoxy over all this.

9. Install the cover on the cowl and trim off the back edge flush with **CW1.** Now remove the cover. The cover is held in place at the forward end by 4 wooden blocks glued to **CW3** on the nose piece. Position the blocks so that there is space between them and the nose piece wall to trap the cover flange. See section C-C on the drawing. Next, place a strip of wax paper along the top edge of **CW1**. Place the two short pieces of 1/4" dowel thru the dowel holes in the top of **CW1** and slip **CW4** over the dowels. A piece of tape on the bottom edge will hold it against **CW1** temporarily. Apply glue along the top edge of **CW4** and install the cover. When cured remove the dowels and cover.

10. Layout the hole locations for holding the cover in place along each side. Space them as shown on the plans. We have been a firm believer of using Ohio Superstar "All-Threads". They are cheap, light, easy to install and have the added benefit of locking the thread without the use of a lock washer. Blind nuts can be used in their place if you prefer. Add a strip of glass cloth along the inside of the cover over the retaining holes on both sides. This will reinforce the holes and prevent them from cracking and spliting outward.

11. This method of holding the cowl cover in place eliminates the need for screws on the top side of the cover thereby preventing cracking around the holes in the plastic due to vibration. However, in order to remove the cover, you must first remove the canopy, hatch , and the 4 screws on either side of it.

12. This concludes the cowl construction. Set aside for engine cutouts and finishing. **CW1** will have to be trimmed out to fit over the engine at final assy.

**TURTLEDECK**

1. The ABS turtledeck needs to be trimmed and fitted around the tail surfaces. Note the trim lines on the front end and along the sides at the tail. Trim out the front end leaving a flange as indicated by the line. **Do not trim out the tail notch at this time.** Locate and install **T1** in the forward end using thick CA glue.

2. Epoxy the stab in the rear saddle. Make sure it is centered and straight. Install the wing spar as an aid for alignment. Epoxy the fin to the stab with the rudder post overlapping and up against the tail end of the fuselage. Check to see that it's square with the stab and allow it to cure thoroughly.

3. Trim out the notch on both sides of the turtledeck for the stab. Leave it a little under-sized. When placing the turtledeck over the fin trim the notch as necessary on both sides so the stab notch and fin fit at the same time. This is not impossible but will take some patient trimming. Most likely it will be too tight against the fin. Sand away the top of the fairing until the turtledeck fits both fin and stab. This is the only adjustment you have in achieving a good fit.

4. Once the turtledeck is fitted to the fuselage it can be glued in place with thin CA glue. Or if you intend to paint it separately, set it aside until the other plastic pieces are complete. If you are gluing it on at this point, note that it should overlap the fuselage sides about 1/4". Tape it in place and lay the fuselage on its side. Using a short strip of straight ply, hold down a section of the plastic edge and apply thin CA under it being careful to hold the wooden straightedge approx. 1/8" away from the edge. Move the straightedge to a new location and repeat the process. **Be sure the bottom edge of T1 is glued to the fuselage securely.**

**FRONT HATCH**

1. The front hatch is made of ABS and needs a few parts added to complete it. Clean the flashing from the bottom edges and trim off the front edge to the trim line. Locate bulkhead **H2** and glue in place on the inside surface of the back end of the hatch. Find bulkhead **H1** and locate it 1/4" back from the front edge. Place some wax paper over **F1** and pin **H1** in place with the two 1/4" dowels. Use tape on the back side to secure it. Spread glue across the top edge and place the cover on it. Note that the forward front edge of the hatch does overlap **F1** and is flush with **F1** surface**.**

**2.** Cut two 1/4" sq. balsa rails for either side and glue in place. It will be necessary to round off the edges on the outer forward corners to make them fit snug against the plastic. Now glue a **G2** gusset in each corner for added strength. Locate them as shown on the plans. Glue in two small pieces of 1/8" ply, on each rail, at the end next to the canopy, to keep the hatch centered when locating it on the fuselage. They will have to be shimmed out to fit between the rails. Make them from scrap 1/8" lite ply.

3. Locate the two pieces of 1/4" dowel, rounding the ends of each. Place one in each hole of **H1**. Locate the two **H3** reinforcement pieces and slide one over the inside end of each dowel and epoxy in place. The dowels should extend beyond **H1** the length shown on the plans to pick up the holes in **CW4**.

5. With the hatch back in place on the fuselage locate the hatch retainer. Locate it as shown on the plans. It may be necessary to trim the ends slightly to make it fit because of building tolerances. We have left it long for this purpose. Now drill and mount a 6-32 blind nut, where shown, to retain the hatch. Leave the hatch mounted on the fuselage.

**CANOPY**

1. Locate the canopy and trim off the extra plastic to the trim lines. Leave some extra along the front edge so it can be trimmed and fitted. Handle it with care and be careful not to scratch it.

2. Place a small piece of wax paper over the aft end of the hatch and likewise the forward end of the turtledeck. Locate **CA1** and **CA2** from the laser cut parts. Tape **CA1** against the forward end of the hatch and **CA2** against the aft end of the turtledeck. Cut two 1/4 " sq. spruce rails and glue them between the two bulkheads. Offset them in from the edge of the fuselage approx. .050 to allow for the canopy thickness. Don't forget to glue in the cross brace in the middle.

3. Glue a **G2** gusset in each corner. Locate the four **FS5's** and glue them in the positon shown. Looking at **section A-A** will help you understand better. Next, find the four **CA3's** and glue them to the canopy rails in position over the **FS5** blocks. You will have to shim them out approx. 3/32" so they will be in the same plane as **FS5**. Do this carefully and do not glue them to the fuselage side.

4. Now trial fit the canopy over the frame. Trim and fit as necessary in the front and around the sides. When satisfied, glue it in place with Zap New Formula 560 Canopy Glue.

5. When cured tape the canopy in place on the fuselage. Locate and drill the six holes to mount the 6-32 blind nuts. Use a 6-32 x 5/8" soc hd. scr., metal and plastic washer at each location.

**LANDING GEAR CUFF**

Install the landing gears temporarily. The landing gear cuffs will add more curb side appeal to your Extra 300s. They are easy to install but will need some trimming to fit against the fuselage. Once fitted, slit some black fuel line and place it around the edge next to the fuselage for added touch. Once painted they can be installed permanently on the landing gear with Zap-A-Dap-A -Goo.

**WHEEL PANTS**

1. Locate the wheel pants and pair them up. You will need to make up a **LH** and **RH**. Lightly sand the edges with a flat sanding block so the halves will mate better. Tape the halves together aligning the edges and apply CA along the seams where possible. Remove the tape and finish gluing.

2. Cut out the opening in the bottom of the pant to the trim line, to allow clearance for the wheel. Use a Dremel Motor with a drum sander.

3. Cut a strip of 2 oz glass cloth approx. 1" wide and place on the seam inside the pant. Here again, as you did when glassing the cowl, use the Ace Hardware General Cement. Lay the strip of cloth and paint it in place with the dauber. You will find it most effective. Do both wheel pant.

4. Locate the two **WP1's** and round off the bottom edge to fit in the pant. Find the center of the wheel opening and thick CA in place on the inside of the pant. Remember to make a LH and RH.

5. Now remove the plastic inside the 1/2" dia. hole on both wheel pant. Note the section of the wheel and pant on the plans as you proceed to the next step.

6. Locate the landing gear and install a wheel axle. Slide a wheel into the pant opening and slip the pant and wheel together on the axle. The 1/2" hole in the pant should fit over the hex on the axle.

7. Locate the **WP2** parts and glue a pair together aligning the holes when you do so. Round off the surface of one side which will fit up against the pant to help support it on the outer end of the axle. Now slip it on the axle.

8. Mount the landing gear on the fuselage and block up the tail to flying position. Position the wheel pant so that its level and match drill a 5/32" hole from the hole in the landing gear. Remove the wheel pant and install a 6-32 blind nut or #6 all-thread on the inside of the pant. Reassemble the pant and wheel on the axle and secure with a 6-32 soc. hd. bolt, metal and plastic washer. Orient **WP2** assy to fit and thick CA in place.

9. Now install the other wheel pant as described above. When installing the pants after painting, use wheel collars to space the wheel as shown on the plans.

**WING ASSEMBLY AND INCIDENCE SETTING**

1. Before setting the wing incidence install rib **WR1** over the fiber tube of one wing and centrally locate it with respect to the airfoil. **Do not glue in place yet.** Tape to hold temporarily. Install the alum. tubing spar in the fuselage. Now slide the wing on the aluminum spar and up against the fuselage side. **Pin WR1 to the fuselage** noting the 3/8" dowel holes, fore and aft, should be in alignment with the 5/8" holes in the fuselage side. Apply glue to the foam wing root and slide up against **WR1** centrally locating it on the rib. Tape or pin **WR1** in place against the fuselage. **Check alignment.** You will notice some gaps between the rib and wing. With the wing pushed tight against **WR1**, fill the gaps with epoxy mixed with micro-balloons. Wax paper between the rib and fuselage should prevent you from gluing it to the fuselage. This method of installing WR1 should give you a good fit between the wing and fuselage. Sand the rib off flush with the wing airfoil. Now do the other wing.

2. Next, install the 3/8" dia. dowel alignment pins. It will be necessary to drill holes into the foam. Locate these from the respective holes in **WR1** rib. Drill these holes parallel to the wing spar, **not perpendicular to the rib root surface.** Each pin should protrude 3/4" from the surface.

3. Now is the time to set the wing incidence. This is critical so take your time and do it right the first time. You want both wings to be at zero incidence with the stab. Set the fuselage up on a flat surface and block up the tail in flying position. Flying position means the stab should be at zero incidence. Use a Robart Wing Incidence Indicator to accomplish this.

2. With the fuselage firmly blocked up in place, slide the wing spar into the fuselage and slide a wing panel on it all the way in until the 3/8" dowels are in the 5/8" holes in the fuselage side. Place the Incidence Indicator, using the Robart long beam if necessary, on it and zero out the wing. If you can't zero it out because the 3/8" dowels hit the edge of the 5/8" holes, then enlarge them locally until you can. More than likely you did not centrally locate **WR1** as we told you to do when you glued it in place if this happens.

3. Locate two **FS5's** and slide one on each dowel, on the inside of the fuselage, up against **FS1.** Because of the fuselage side angle it is best to run a 3/8" drill through each of the **FS5** center holes at a slight angle to make them fit better against the sides. Now epoxy them in place.

4. Slide the other wing panel in place and repeat the alignment procedure as described above.

5. Remove the wing panels and aluminum spar. Measure in from the end of the aluminum spar 10-1/4" and make a mark. Slide the wing on the spar to this mark and tape it in place to hold it there. Now drill and tap a 6-32 hole through the 1/2" dowel and alum spar, as shown in **section B-B** on the plans. Install a 6-32 x 5/8" soc hd. bolt to retain it.

6. Slide the wing and spar assembly into the fuselage and position the other wing panel against the fuselage. Now drill and tap the dowel and spar as stated above.

7. In the future when it comes time to remove the wings, it is not necessary to remove both. Leave the spar in one wing, if possible. This will make it easier to locate the remaining wing retainer screw.

**ENGINE MOUNTING**

The OS 1.08 will fly this airplane reasonably for the average sports flyer however, don't expect endless vertical. If the airplane is kept exceptionally light you will have no problems with average maneuvers. Keep the radio, batteries and fuel tank as far forward as possible. Cover the model with film keeping the finish to a minimum. If you want more performance, install a larger engine which will give you much more vertical and plenty of maneuver pull-through power.

1. Before cutting off the engine box measure the cowl length and add 1/16" for spinner back plate clearance. Measure the engine from the back side of the spinner to the mounting surface. Subtract this from the overall cowl length and you have the distance required from the face of **F1** to the engine mounting surface on the firewall. If you decide to soft mount the engine, that distance will have to be taken in to consideration also.

2. It is important that the spinner is aligned properly with the cowl. In order to achieve this do the following: Place the cowl with **CW1** side on a flat surface. Cut a 3" dia. disc from a scrap piece of 1/8" lite ply. Drill a small hole in the center. Tape the disc on the top of the cowl centrally locating it over the engine crankshaft hole. Place the firewall in the opening on **CW1**. It should rest against the bottom edge of the opening and be centrally located in the middle with proper orientation. Now, using a plumb bob, place the string through the hole in the disc and find the center of the engine mount on the firewall. From this point layout the engine mounting hole pattern and install the blind nuts. This method will assure you of better spinner alignment with the cowl.

3. Because the two motor box sides (**FS2**) may be slightly warped it is a good idea to trim **MB1** to length and epoxy it on the bottom of the sides first. This will square up the sides on the bottom. Use the firewall as a gage at the forward end so the sides will fit against it when epoxied in place. When satisfied, epoxy in the 3/8" firewall between the sides. Add the 1/2" tri-stock as shown to reinforce providing more gluing surface. As added reinforcement we recommend you pin the sides to the firewall with short 1/8" dowels. Three on each side will do it. Now cut to length and glue a **MB1** on the top side of the motor box. Or, **MB1** can be left off until the fuel tank and throttle pushrod are installed and epoxied on at the very end.

3. Once the engine is mounted, trim out the opening in **CW1** so the cowl will slide over the engine. Be sure to leave the cowl mounting holes in tact.

4. Trim out the bottom of the cowl to facilitate the muffler exhaust pipes and other extruding parts where necessary. You will find it necessary to remove the muffler to install the cowl. This can be done easily through the large cutout in the bottom of the cowl for the muffler pipes.

**FINISHING AND RADIO INSTALLATION NOTES**

1. We leave the covering and finishing up to you and what you have had experience with. In order to keep your Extra 300s as light as possible we recommend you cover it with a film covering. Keep the

paint down to a minimum, also heavy decals. With extra power up front you can cover it with Super Coverite or Super Shrink and paint it making the model more durable. But, expect it to weigh more. Keeping the model light will give you added performance with lesser power.

2. Our prototype's were covered with Super Coverite and painted. We recommend using Formula U, K&B Superpoxy, Hobbypoxy, Perfect Paint, Coverite 21st Century or MonoKote paint over the ABS plastic. Do not try to mix different paints and thinners together and by all means test a small piece first before using any other paint not listed.

3. Make up the push rods as shown on the plans. The true length of each can be taken off the plans. We have shown 4-40 threaded rods and hardware for stiffness. Use them for better control response Install the radio and batteries up forward. Wrap them in foam and tie them down to keep them from wandering around. You have plenty of room to shift the batteries forward or aft to help offset any balance problems. We recommend you install the standard servos that come with your radio on all surfaces except the throttle which can be smaller. If you install a larger motor with more speed, then by all means install 70 oz servos.

**PRE-FLIGHT NOTES**

Before the first flight, and to ensure some longevity in your Extra 300s, you will do well to check out a few things before heading to the flying field.

1. Balance the Extra 300s at the indicated CG point shown on the plans with the fuel tank empty. Depending on your type of flying you may want to adjust it forward some.

2. Check the control surface travels. We have given you a starting point however, they need to be fine tuned to meet your flying needs.

3. Run the engine and check the idle. Have it ready so you don't encounter any problems at the field.

4. Turn on the radio with the engine running to make sure there are no intermittent glitches. Give it a good range check.

5. Check all hardware to be sure it is secure. There is nothing worse than losing an airplane on the first flight because of a lose nut or clevis

6. Hopefully by now you are ready. We know you will be thrilled with your first flight and that it was most successful. From now on - Happy Fly'in!

## MATERIAL LIST

**FUSELAGE**

1. F1 LC (1) (LC = laser cut) (1/4" ply)
2. F2 LC (1)
3. F3 LC (1)
4. F4 LC (1)
5. F5 LC (1)
6. F6 LC (1)

7. F7 LC (1)
8. FS1 Die-cut (4 pieces) (2 front / 2 back)
9. FS2 LC (2)
10. FS3 LC (2)
11. FS4 LC (2)
12. FS5 LC (4)
13. FS6 LC (4)
14. FB1 LC (1)
15. FB2 LC (1)
16. LG1 1/4" x 2-3/16" x 4-1/2" (aircraft ply) (landing gear block)
17. LG2 LC (2) (1/4" ply)
18. H1 LC (1)
19. H2 LC (1)
20. H3 LC (2)
21. H4 LC (1) (hatch retainer)
22. CA1 LC (1)
23. CA2 LC (1)
24. CA3 LC (4)
25. T1 LC (1)
26. G1 LC (2)
27. G2 LC (12)
28. G3 LC (2)
29. TW1 LC (1) (1/4" ply)
30. CW1 LC (1)
31. CW2 LC (2)
32. CW3 LC (1)
33. CW4 LC (1)
34. 1/4" x 2" dowel (2) (hatch hold down)
35. 1/8" x 6" dowel (1) (pin sides to firewall)
36. ST1 LC (1)
37. MB1 LC (2)
38. 3/8" x 4-5/32" x 4-5/8" (1) aircraft Ply (firewall)
39. 1/4" sq. x 36" balsa (15) (fuselage stringers)
40. 1/4" sq. x 36" spruce (1) (canopy frame)
41. 1/2" x 24" tri-stock (motor box and landing gear reinforcement)
42. ABS Cowl (3-pieces)
43. ABS Hatch (1)
44. ABS Canopy (1)
45. ABS Turtledeck (1)
46. ABS Wheel Pants (4-pieces)
47. Formed Landing Gear (1)
48. WP1 LC (2)
49. WP2 LC (4

**WING**

1. Foam Cores 1-LH / 1-RH
2. 7/8" dia. x 28" Alum. Wing Spar with Fiber Tubes (1)
3. 3/8" x 7/8" x 36" (2) (leading edge)
4. 1/4" x 1" x 30" (2) (trailing edge of wing aileron inset)
5. 3/8" x 1" 30" (2) (leading edge of aileron)
6. 1/16" x 4" x 36" (16) (wing sheeting)
7. WR1 LC (2)
8. WR2 LC (2
9. 1/2" dowel x 6" (1)

10. 3/8" dowel x 6" (4)

**TAIL**

1. Foam Cores (2) elevator/stab (1) fin/rudder
2. 1/4" x 1/2" x 12" (1) (fin leading edge)
3. 1 /4" x 1-1/4" x 12" (1) (fin trailing edge)
4. 1/16" x 3" x 36" (2) (fin/rudder sheeting)
5. 1/16" x 3" x 12" (1) (fin/rudder sheeting)
6. 3/8" x 1-1/4" x 12" (1) (rudder leading edge)
7. 1/4" x 1/2" x 30" (1) (stab leading edge)
8. 1/4" x 1" x 30" (1) (stab trailing edge)
9. 3/8" x 7/8" x 30" (1) (elevator leading edge)
10. 1/16" x 4" x 30" (4) (stab/elev sheeting)
11. 1/16" x 2" x 30" (2) (stab/elev sheeting)

**HARDWARE AND MATERIAL LIST FOR EXTRA 300S, 25% SCALE**

**GENERAL**

1. 4 or 6 channel radio
2. engine - suitable size
3. Muffler - Slimline (no. 6014 Pitts Style)
4. fuel tank - 16 oz Du-Bro no. 416
5. propeller - suitable size to fit engine
6. fuel line
7. 3-1/2" spinner - Tru-Turn #TT3552B
8. covering, paint and trim - your choice
9 2-3/4" dia.- Du-Bro 275L wheels

**FUSELAGE**

1. Du-Bro bolt mounting set No. 130 (mounting engine)
2. Dave Brown glass engine mount No. 120F (1)
3. Dave Brown pushrod system (1)
4. #8-32 x 5/8" soc hd. scr. (4) (landing gear mount)
5. #8-32 blind nut (4) (landing gear mount)
6. #8/32 washer (4) (landing gear mount)
7. #6-32 x 5/8" soc. hd. screw (6) (cowl retainer, wing retainer)
8. #6 flat washer (4) (cowl retainer)
9. #6 x 1/2" Button hd. sht metal scr. (9) Du-Bro no. 530 (cowl cover and hatch)
10. #6 Al l -Threads (13) (cowl, hatch, canopy)
11 #6 x 3/4" Button Head sht mtl. screw (4) Du-Bro no. 531 (canopy retainer)

12. 5/32" x 2" axle (2) Du-Bro no. 248 (wheels)
13. 5/32" wheel collar (4) Du-Bro no. 140 (wheel retainer)
14. #4 x 3/8" soc. hd. screw (2) (wheel pant)
15. #4 lock washer (2) (wheel pant)
16. #4 blind nut (2) (wheel pant)
17. Threaded Rod (2) Du-Bro no. 144 ( rudder pushrod and tailwheel pushrod)
18. Aileron Horn Connector (1) Du-Bro no. 103 (tailwheel connector)
19. #4-40 solder link (1) Du-Bro no. 112 (tailwheel pushrod)
20. Spring Steel Kwik-link Du-Bro no.304 (tailwheel pushrod)
21. Tailwheel Assy Ohio Superstar (M)
22. #4-40 x 3/8" sht. mtl. scr. (2) (tailwheel mounting)

**WING**

1. Super Strength Servo Arm (2) - DuBro
2. #4-40 thread rod (2) - Du-Bro no. 144
3. Swivel Link Offset (2) - Rocket City no. 69C
4. #6-32 x 2" ss flt hd mach scr. (2) (aileron horn)
5. Hinge Point - Robart no. 308(10) (aileron hinge)

**TAIL**

1. Super Strength Servo Arm (3) - Du-Bro
2. #4-40 threaded rod (2) Du-Bro no. 144
3. Swivel Link Offset (3) Rocket City no. 69C
4. #6-32 x 2" SS flt. hd. mach scr. (2) (elevators)
5. #6-32 SS threaded rod #6-32 x 2-1/2" (rudder)
6. Hinge Point - Robart no. 308 (15) (elevator and rudder hinge)