

DOG FIGHTER BUILD INSTRUCTIONS

Working with Foam

Styrofoam is a very light material compared to balsa and other materials we build models with. Whenever Styrofoam is wire cut it melts the plastic leaving behind small fine threads (angel hair). This angel hair must be removed before painting or the smoothness of the paint will be compromised. The major drawback, it is very soft. When you epoxy parts of the airframe together, you must try to keep the epoxy from the exterior. If the epoxy is allowed to squeeze toward the outside, it will make a "hard" spot on the surface. When you try to sand the joint smooth or flush a high spot will appear. To beat this problem you must apply the epoxy to the inner edge of the joint. To do this I dip my finger tip in the epoxy then in a wiping motion move my finger along the inner edge of the joint. Then I normally use masking tape to hold the joint together until it cures.

Sanding Styrofoam is a little tricky; if you use sandpaper the corners can dig into the foam and trash the surface. The best thing I have found to finally sand with is a flexible sanding sponge. I buy mine at the Home Depot. It is made by Norton and comes in three grits. I use medium and fine. If you want a surface to be flat, a sanding bar with 280 grit works best. However, if you need to make or smooth a compound curve go with the sanding sponge.

Painting Styrofoam.

Always experiment on scrap first! Water based paint is the safest; including water based polyurethane. Placra Brand Perfect paint is foam safe too. Latex paint works but does not have enough pigment. (Too many coats required for our use.) Acrylic paint works best for me. I buy it at M.J. Design's. Some brand name examples are: Folkart, Delta Creamcoat, and Americana. They are available in nearly any color you can think of. The paint can be shot through an airbrush when thinned. When thinned and sprayed two ounces can cover a .25 sized airplane. If you do spray your plane, it will feel heavy until the water evaporates. So, don't worry. The cost of a 2 oz. bottle is a dollar and change. If you want to add details to the skin of your plane (rib lines, aileron lines vents etc.... Use a dull pointed object and a straight edge. I use the tip of an artist paintbrush. If it is too sharp it will dig in and skip across the surface causing a real mess. Practice on the bottom of the plane first.

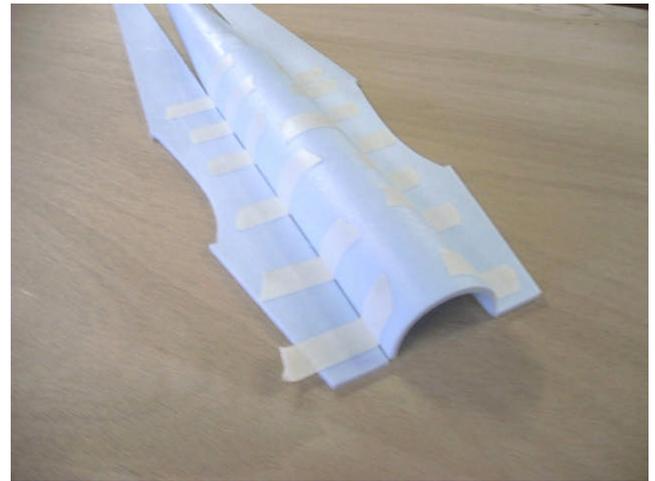
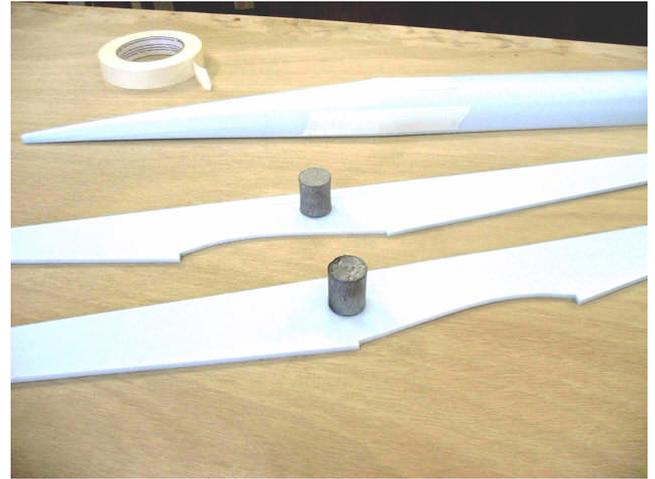
A word of cautions no smoking while working with foam, the smallest ash could cause damage to the skin of your plane. Also trimming your nails would make handling the foam safer. This brings me to removing masking tape from the model. No picking at the edges of the tape. Rub the sticky side of a fresh piece of tape on the edge of the one applied to your model and it will roll up the edge of the old piece of tape, then you can remove it

Construction

To prepare the kit for construction sand the "angel hair" off of the wings and tail feathers, with a sanding sponge or rub it off with a terry cloth rag. (Ref. Working with Foam). With the sanding bar, sand a radius around the wings and tail feathers. Do not round where the wing bonds to the wing center section or where the vertical stabilizer bonds to the fuselage.

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- Check the fit between the top forward section and the aft tapered section. A little sanding might be required to get a true centerline. When you cut Styrofoam, you relieve internal stresses in the foam. This is why some parts might have a bow in them. Light pressure on a flat surface might be required to check the fit. Apply epoxy to the inner edge of one end then
- tape them together until it cures. (See the back of the plans). Remember if epoxy squeezes out toward the outside it will make it difficult to sand. (Ref. Working with foam)
- Use a long sanding block, with 280 grit to scuff up and true up the bottom edge of the upper half. Sand at the joint only if needed.
- Next, bond the side halves together. The inside of the halves were marked before they were cut to help with alignment. Tape the “outside” of the halves together. Use the tape as a kind of hinge to force the excess epoxy to go towards the inside of the fuselage. (See the back of the plans).
- Bond the sides to the upper half of the fuselage
Note: Make sure the forward edges of the sides are flush with the forward edge of the top section. Bond the area forward of the cockpit first then the aft end. Then bond the sides together at the tail. **Note** the hinge method cannot be used for the aft end. Install the seat back at the joint where the top halves meet.
- Bond the instruments to the panel then install it 2 inches forward of the seat back.
- Poke small holes through the skin from the inside so you will know where to cut the cockpit hole.



WING

- Assemble the wings by putting the center sections flat on the table, check the wing panels fit to center joint by supporting the tips 1-1/2” from the table top. The center sections are thicker for strength. The top of the wing panels should be bonded flush with the top of the wing center section. Apply epoxy to the edges of the wing panels and use tape to hold them until it sets. Don’t worry if they droop when the

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support is removed. Now, take a wing set and cut out a notch 1 inch deep from the aft edge of the center section this will make it the top wing. **Note:** Now would be a good time to add the details to the wings like, ribs, ailerons, or a guide for the roundels (Ref. Working with Foam and the back of the plans.)



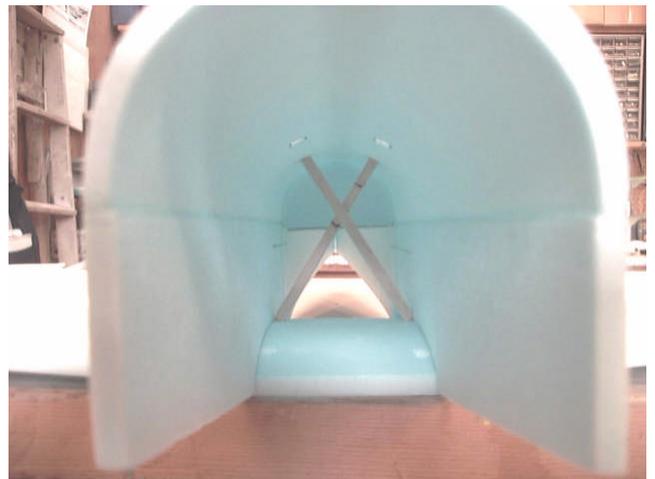
- With the bottom wing flat on the table, test the fuselage to wing fit. Then draw a centerline on the lower wing center section. Measure out from the centerline 1½ inch and draw two more lines. This is where the outer edge of the fuselage bonds to the wing. The distance from tips to tail should be equal and tips to the sides as well. Mark this location on the wing then bond the fuselage to the wing using the marks.

Cabane struts

- Use masking tape to protect the fuselage from the ink (it might bleed through when you paint.) Draw a centerline on the fuselage over the lower wing section. Where the leading edge crosses the fuselage, measure out from the center line 7/8 “ and make a mark. (A dot will do). Then measure back from the marks 2 ¼ “ and make two more marks. Using the end of the square balsa sticks with the clearance notches, push a dent into the skin of the fuselage. **See the back of the plans for the lay out..**



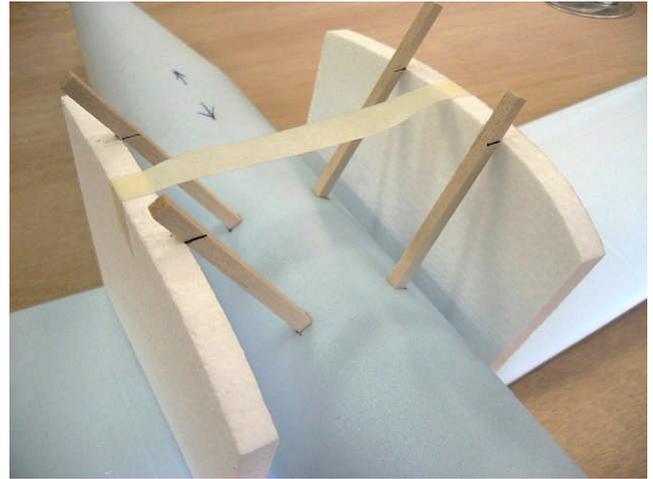
- Now using a new #11 exacto blade cut the dents out all the way through. This will allow the cabiane struts to enter the fuselage and bond to the wing center section. **(See detail # A on the plans)**



- To Bond the struts. Sharpen the tips of the struts then put them into the holes in the fuselage, point first. Push them into the wing center section half way through where the sides meet the wing. **Note:** support the wing center section when the struts are being pushed in with your finger to prevent them from going all the way through. The struts should touch where they cross at the clearance cut. Put epoxy in the holes, then on the struts. Also, epoxy where they cross.

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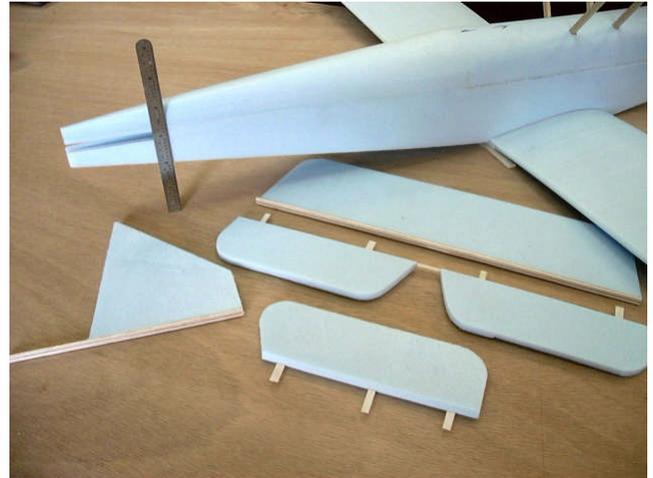
- Attach the wing jigs to the fuselage sides with tape then use a straight edge across them to mark the tops of the struts, and then cut at the marks.



Tail feathers

- Place the model's lower wing center section on a flat work surface with the leading and trailing edge touching the surface.
- Mark a line 1/2" below the fuselage side seams, parallel to the tabletop. Then make another below it 1/4".

Cut away between the marks to accept the horizontal stab.



Horizontal Stabilizer

- Cut the elevators free from the stab and make notches to fit the wood crossover dowel. Then epoxy the dowel in place. Allow a 1/2 inch gap for the rudder. Lay the elevator assembly flat on the table, check that the hinge line is straight.
- Draw a centerline and sand the corners off the leading edge of the elevators with a sanding bar, forming the "V" shape. To do this, hold them down on the edge of the table and lightly sand with a sanding bar.
- Epoxy the balsa "stabilizer spar" to the stabilizer trailing edge and draw a centerline here too.
- Using the exacto knife cut hinge slots on your centerlines.
- Dip just the tip of the hinge into epoxy and shove it into the elevator first, pull & push the hinge in and out to spread the epoxy around in the slot then wipe off any excess epoxy.
- When it sets, test fit the elevator hinges to the stabilizer before you bond it on. Remember, just the tips and wipe off excess

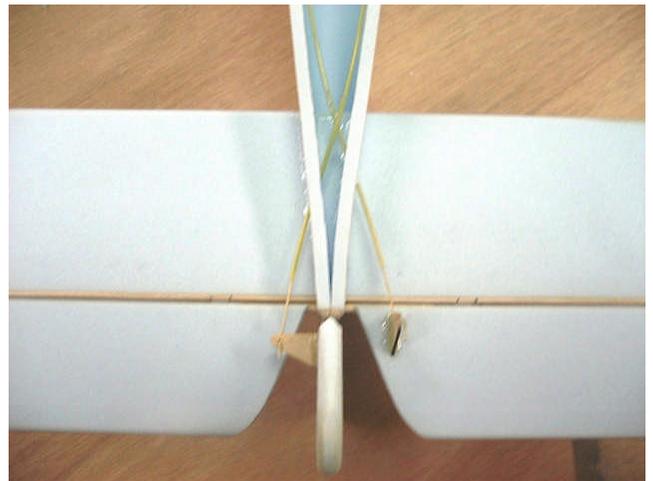


Controls

- Servos mount in the foam block shaped like the inside of the upper portion of the fuselage, with a notch cut out so the wires can feed through. Cut holes in the block to fit the servos they must fit snugly that is what holds them in. The servo arms point outboard.

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- Epoxy the servo mount block in the fuselage 1/2" from the leading edge; be careful not to trap the wires.
- Make "Z" bends in the cable for the servo arm. Slide the Sullivan tube Pn. 507 over the wire then set it aside.
- Use the "drill wire" (see the back of the plans) to bore holes in the fuselage where the cable and tube exit. From the inside, feed the tubes through the fuselage and out the exits. Attach the cable ends to the servos.
- The tubes should cross at the tail before they exit. Make two more "Z" bends in the cable 1/8" aft of the hinge lines. Slide the 3/32" ply control horns on them, then use the horns to make a dent in the control surface.
- Cut slots where the dents are then epoxy them in place. With the cable attached, the radio on and the trims set to neutral. When the epoxy sets, test the servos movement. If the cable / tube bow inside, use scrap foam to support the tube.



Motor mount:

- Place the motor mount stick into the slot in the motor mount block and drill a 1/8" hole through both parts. Install the "ply plate nut" then epoxy it to the motor mount block.
- Slide the motor on the stick then use the screw to mount the motor to the block.
- Trim the radiator from the vac-formed parts, cut the tip off the cone to make the propeller shaft exit hole. Then tape the radiator to the front of the fuselage.
- Epoxy the motor mount block to the fuselage sides. Position the block so the prop shaft protrudes approx. 3/4" (all of the threads showing) and 2 to 3 degrees of down thrust.
- Install the radio gear with double-sided tape. Place Velcro strips on the motor mount to hold the battery in place.
- Assemble the motor cooling baffle. Remove the radiator from the fuselage and cut holes in the horizontal portion of the louvers for cooling airflow. Use plastic model cement to glue the baffle to the back of the radiator.
- Sand the inside of the radiator where it bonds to the fuselage. Then epoxy it to the fuselage.
- Route the antenna wire through the fuselage. You can get away with a little zigzag routing by using tape. This will make the length of wire that hang's out the back of the plane shorter.
Do not coil or fold the antenna wire.
- Use epoxy to bond the fuselage aft bottom sheet to the fuselage. Hold it in place with tape until the epoxy cures. **Note:** Before the epoxy sets up check the fuselage for "twist": the

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horizontal stabilizer should be parallel to the lower wing. Small adjustments can be made without removing the tape.

- Now would be a good time to paint the base color of the plane, the markings can be done later.
- Cut the cockpit hole pattern from the plans; use it to mark the fuselage.
- With a new #11 exacto blade, cut along the line. A saw motion will make a clean cut. Gently sand a radius around the cockpit hole. You should Paint the cockpit area now while access is easier, (before the top wing is attached)

Upper wing:

- Sharpen a piece of piano wire to the shape a nail tip, use it to drill small holes through the cabane struts $\frac{1}{4}$ "from the top. The holes will be used to attach the flying wires
- Use the wing jig to locate the upper wing location, center it, and then push down on the upper wing center section to make the dents.
- Use a pin to poke holes in and around the dents, this will help the bond. Apply a drop of epoxy to the spots you just poked at and return the wing to its location. A little weight on top might be a good idea for clamp pressure.

Wing struts:

- Move the wing jigs outboard 10" and tape them into position. Support the wing tips as you did before. Mark the locations of the wing struts $1\frac{1}{2}$ " from wing center joint, $\frac{3}{4}$ " and 4 " from leading edge. (See the back of the plans for the lay out). The top dimensions are the same as the bottom.
- Use the $\frac{3}{32}$ x $\frac{3}{8}$ balsa to make the dents in the upper wing then cut them out. Now sharpen the strut tips to the shape of a chisel then push them through the upper wing. Support the lower wing with your finger and push the sharpened end into the wing approxmently half way through.
- Mark the strut where it pokes out of the upper wing then cut it.
- Put epoxy in the lower holes and install the struts. To bond the upper struts push some epoxy into the space between the strut and the wing with your finger then wipe any excess epoxy.



Flying Wires

- Remove, the wing jigs then use the sharpened piano wire drill holes in the base and the tops of the struts.
- Use the exato blade to cut slits at the point where the lower wing center section and fuselage meet, parallel to the wing struts.
- Dip the $\frac{1}{16}$ " ply anchors in epoxy and push them into the slits.

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- Cut the provided string into four equal lengths. Dip one end of each string into CA, this will make the string like a needle and ease threading.
- Thread the four strings through the cabane struts and tie them off.
- Thread the string through the wing struts. In the following sequence: From the FWD cabane strut to the lower forward wing strut to the upper AFT wing strut to the lower AFT flying wire anchor. Next: From the AFT cabane strut to the lower AFT wing strut to the FWD upper wing strut to the forward flying wire anchor.
- Pull the strings tight at the flying wire anchors. Then tack them down with CA at the anchor. **Note:** A drop of CA on a toothpick is all you need. Adjust any wing warp you might have introduced then tack down the strings at the rest of the struts.
- Finally, Loop the string through the anchors once and tack them down and trim off the excess.



Landing gear:

- Place the airplane on its back. Use the dihedral blocks to support the top wing center section.
- Epoxy the angle blocks to the fuselage sides just forward of the lower wing leading edge.
- Layout the landing gear struts over the diagram on the back of the plans & use CA to bond them (make a left and right set)
- Drill a pilot hole for the axle then soak the end with CA to harden the wood. Make a mark on the forward strut 3" from the axle hole.
- With the mark at the lower edge of the fuselage and against the landing gear block, rotate the gear strut to make a dent in the lower wing center section. Poke holes for strength around the dent then epoxy the strut into place. Use your fingers for clamp pressure.
- Thread the axle through the struts & use it to align the last strut position.
- Center the axle on the struts then CA it to the struts.
- Dent the tail of the fuselage with the tail skid stick then cut out the dent. Epoxy the tail skid fin and stick in place.
- Double check your servos and make adjustments as needed.
- Cut the forward fuselage bottom skin to fit the fuselage and bond in place. **Note:** A clearance cut might be needed to clear the pinion gear. If access is needed later, a razor cut can be made to the panels then epoxied back. Make the cuts at an angle as if you would for a pumpkin lid.



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→ Epoxy the cylinder heads and the exhaust pipes on then paint your details.

Paint

I used water based acrylic paint bought at MJ Designs. They have nearly any color you could want for around a buck. If you thin it, around 50% you can spray it on. On the other hand, you can thin it 20% and brush it on. Then spread it with a soft foam rubber pad. (Don't worry about the weight of the paint, when it dries the plane will be light again.) Details should be applied straight from the bottle with a brush. To paint the vac-formed parts use enamel primer **BEFORE** the parts are on the plane this will give the water based paint something to stick to. An alternative is to use fine sandpaper to scuff up the surface.



Repair

Blue foam breaks clean. Apply epoxy to the break then hold it together with tape. I have seen an SE-5 that was attacked by a 3 year old fly again! The plane you see on the box had the tips broke off after a Lite Stick attack. As far, as gouges and dents, fill them with lightweight filler and paint over it.

Flying

The model will fly on a 6-cell pack, a seven cell 250 MAH works best indoors. Outside I suggest using a 350 MAH pack; the extra weight keeps the wind from kicking the plane around. At full power the plane will lift off within three feet .So for the first flight go $\frac{3}{4}$ power until you get the feel for the controls. This plane recovers from stalls with only two-foot of altitude lost. If you test fly it outside; pick a time with **no wind** the wing loading is very light. Land with a little power, dead sticks are a little hard on the wheels. Loops are easy; it's the rolls that require altitude and skill.