# Grumman Albatross

*Written by Keith Sparks*
*Build this popular flying boat*

## Specifications

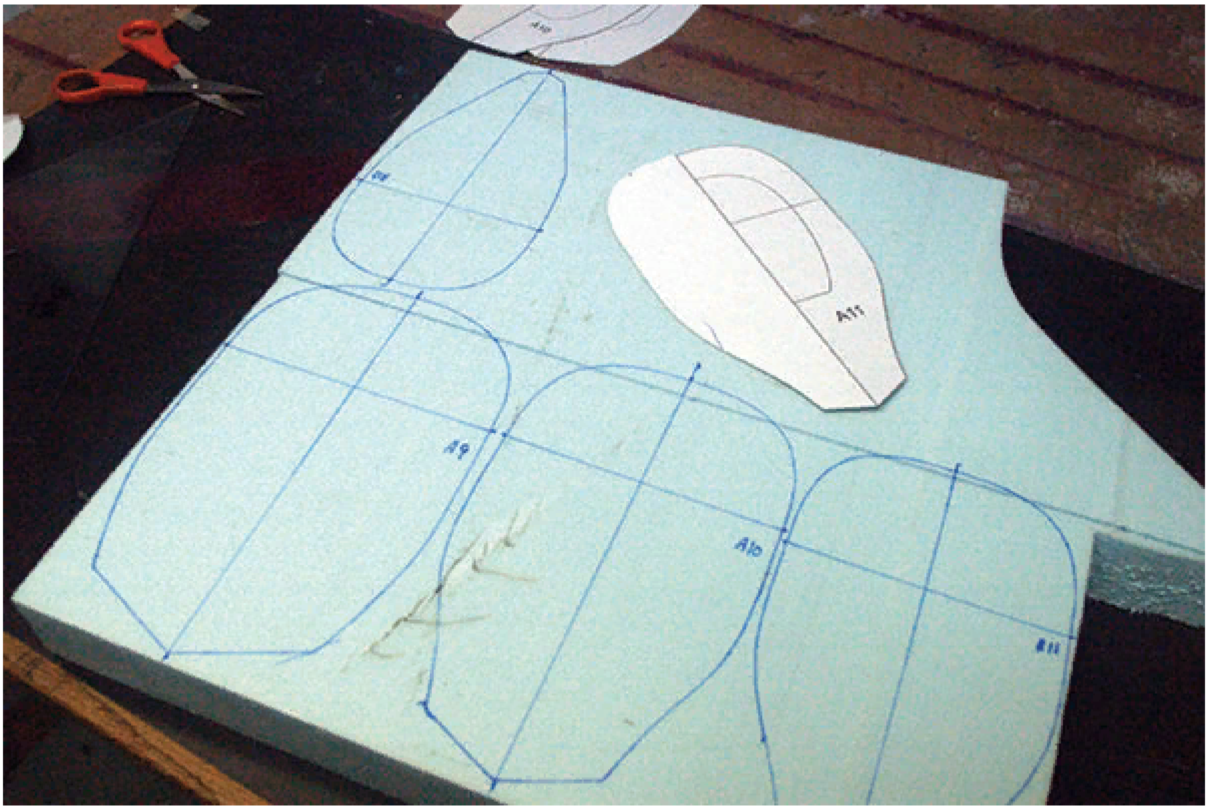
Construction: Extruded foam/fiberglass composite
Wingspan: 76 inches
Wing area: 667.5 square inches
Length: 49 inches
Weight: 6 pounds
ESC: 35 to 40 amps
Radio: Five channels required
Motors: Two E-flite Power 15 950 Kv
Propeller: APC 8 x 8 to 10 x 10
Battery: Three-cell 3,700 to 5,000 mAh
Watts: 619

## Construction

Anyone who has attended a float-fly would agree that splash-and-gos might be the main reason to take our equipment to the lake. Flying boats are right at home and forgiving in this flight mode, and that is why they are my first choice for a floatplane.

Many modelers are opposed to Styrofoam construction, but the material is inexpensive, easy to work with, and floats as well as it flies. This design takes advantage of all of these things in a scale package: the Grumman Albatross.

Construction starts with the fuselage, where sectional construction is employed. The fuselage section patterns are bonded to card stock then folded and cut to make a complete pattern. The patterns are used to mark 11/2-inch thick Styrofoam that is available from home improvement stores. Be sure to mark each segment with the centerline, waterline, part number, and the middle portion that will later be removed.



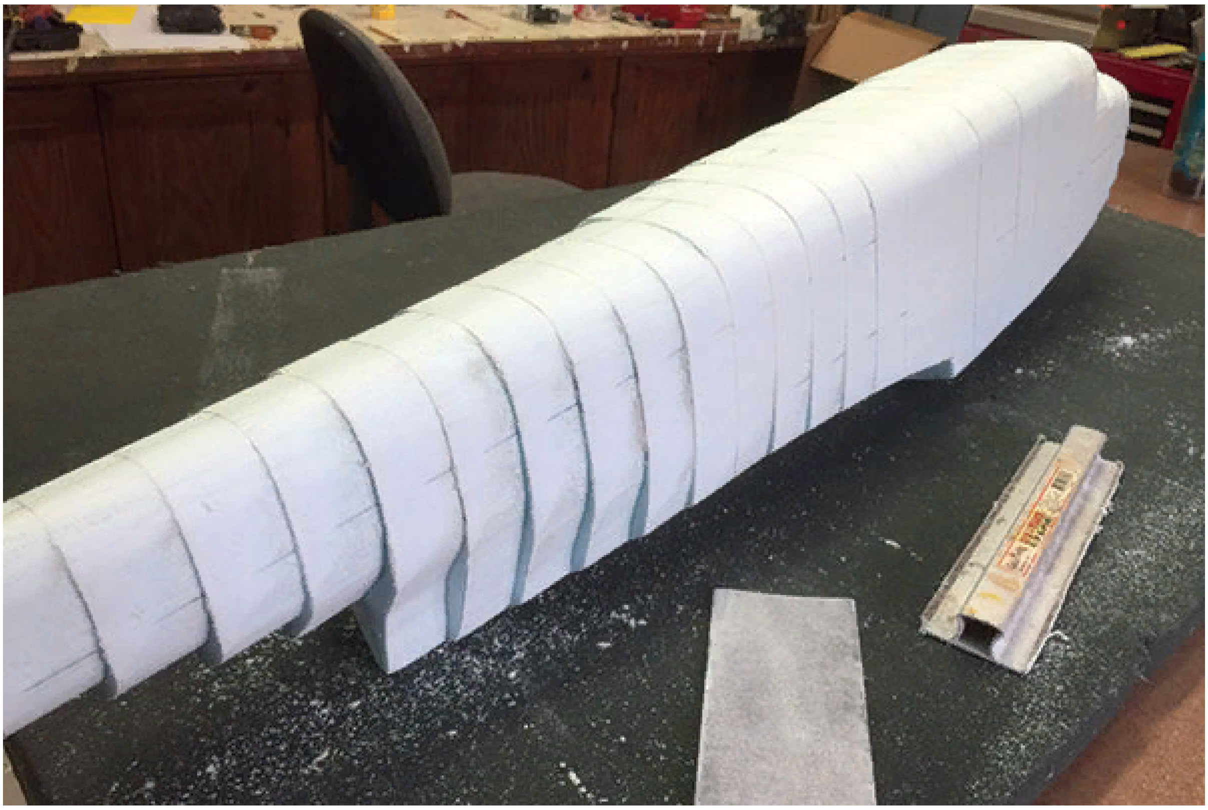

**The fuselage section patterns are cut from the plans and used to mark a 1.5-inch thick sheet. Extruded sheet foam is available at most home improvement stores. Using a scroll saw is the best method to cut it.**

A temporary bond holds the sections together for shaping. One drop of epoxy will make a bond the size of a dime, so four to six drops per section are all that is needed. I used weights to apply clamp pressure while I aligned the centerlines and waterlines, and then let the tack bonds set up. On the bonds that cannot be clamped with weights, masking tape is used, under tension, to hold the sections together.

**The sections are tack-bonded together to prepare the fuselage for shape sanding. It is best to only manage a few bonds at one time to be sure the centerlines and waterlines stay aligned.**

Now that the sections are together, the sanding starts. I used 90-grit sandpaper to remove the corners. Use a petting motion and sand in one direction. Use light pressure and allow the sandpaper to do the work. Clearing the debris often helps the sandpaper remove material. When the fuselage shape is getting close, switch to 120-grit sandpaper then finish with 180-grit sandpaper.

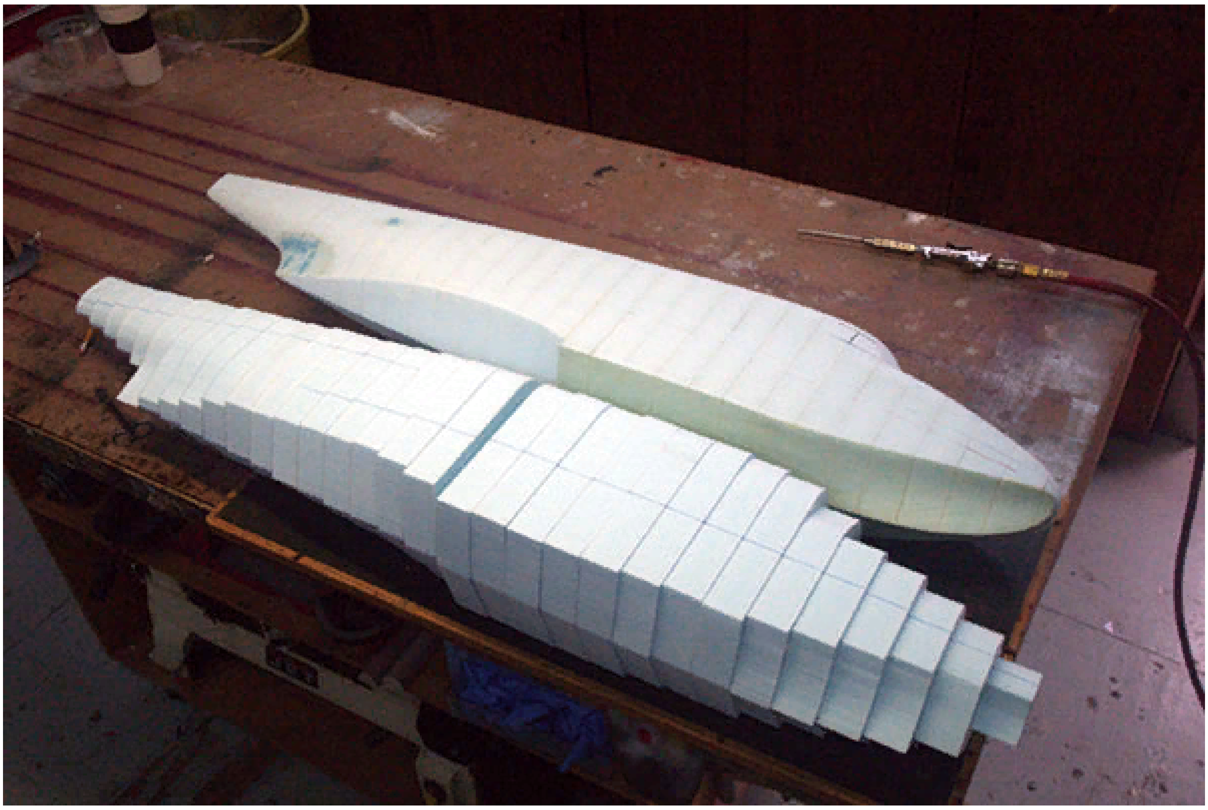
Before the fuselage is taken apart for hollowing out, the centerlines and waterlines should be redrawn to ease reassembly. To disassemble the fuselage, push a fine string in between the sections like dental floss, bring the ends together, and pull in opposite directions to upset the bond. Don't try to pull the sections apart by hand because your grip points will dent the foam.



**Using a foam rubber pad as a work surface helps grip the fuselage and prevent damage as you sand. Start with 90-grit sandpaper and go to a finer grit as you get to the final shape.**

To hollow the fuselage, remove the foam from the center of the segments. A scroll saw is the best tool to use for the job because you can drill holes in the center of the segments and cut the material free without compromising the outer skin. However, cutting several sections at the same time with a hot wire saves time and makes a smoother interior.

To assemble the sections, simply stack them with weight applied while the epoxy sets up. There are a few tricks though. Apply only enough epoxy to make the bond surface glossy. This will reduce squeezing epoxy out between the sections. Do not apply epoxy to the outer edge of the sections; epoxy near the surface will complicate future sanding.



**Before and after: This method greatly reduces the time required to shape the fuselage and increases accuracy. Because you only sand off the corners of the sections, it is surprisingly quick.**

While the epoxy sets up, closely watch your alignment marks. The epoxy initially acts like grease and will allow the sections to drift. Three strips of masking tape on the sides will prevent this, but the bond should be monitored.

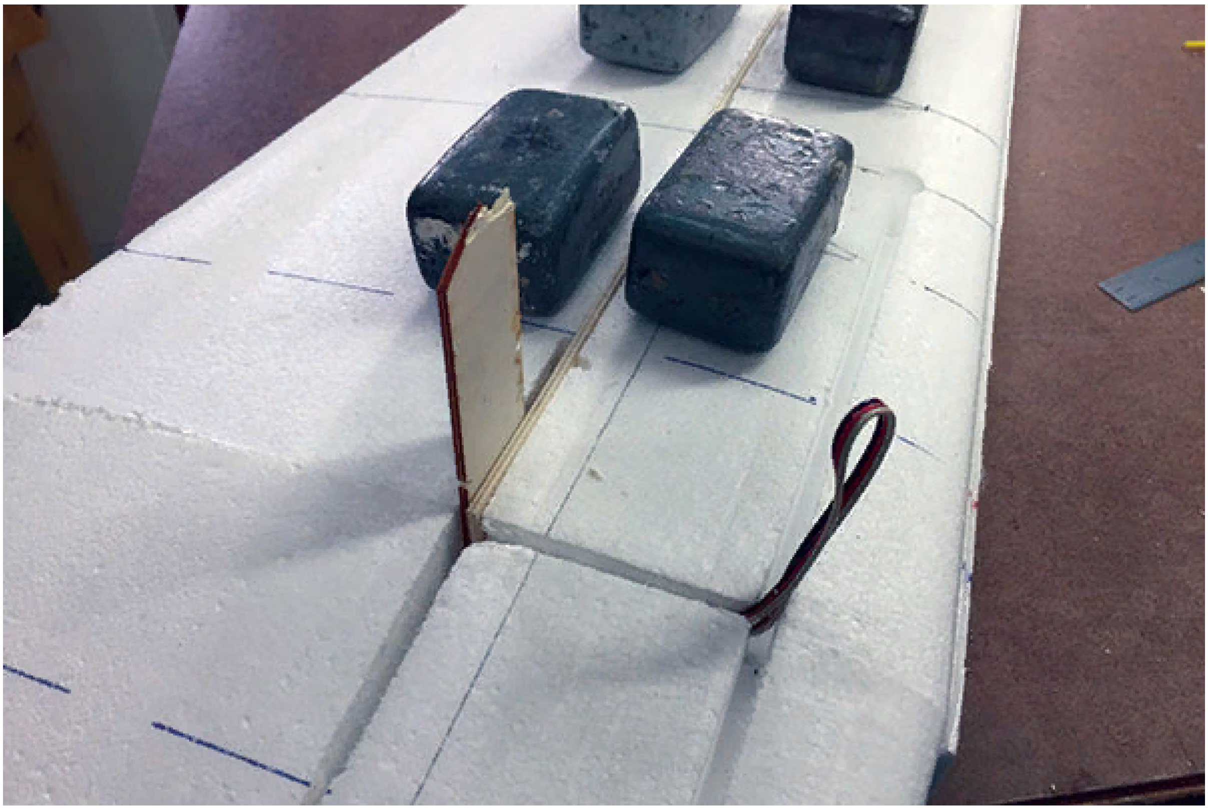
When the stacking is done, the last two pieces are clamped with masking tape. A long strip of tape is attached to one side of the bond and stretched before attaching the other end to apply the pressure. Apply four strips, align your marks, and then rub down the middle portion of the strips.

When the pressure is relieved in the foam block, it causes the sections to slightly change their shape. Sanding the fuselage one last time is necessary for a smooth surface. A sanding grit of 180 is all that is needed because the change has never been more than 1/16 inch.

# Wing

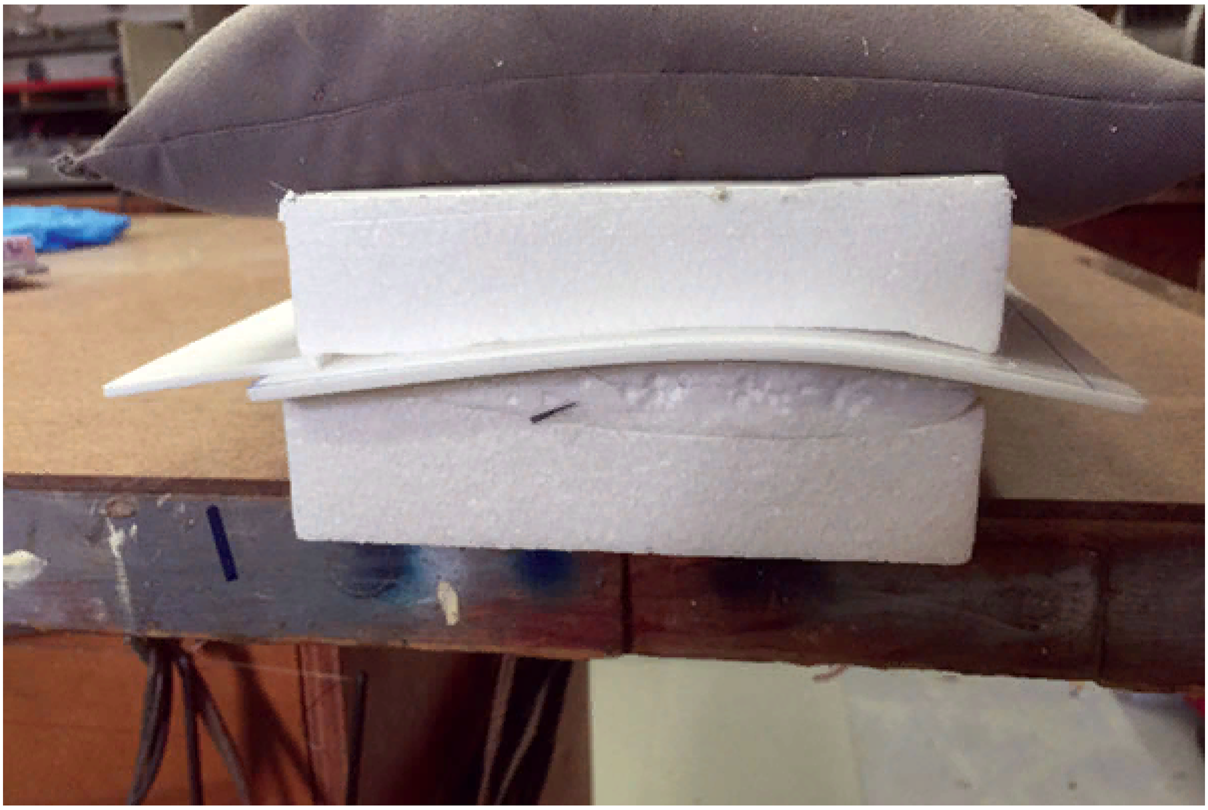
The wing core patterns were used to hot wire cut two wing panels from white beaded foam blocks. The scrap portion of the foam block is called the wing bed and will be used to bond the extruded foam sheeting to the wing core. This wing construction system exploits the qualities of both foam types.

The lightweight beaded foam core has a rough surface and tends to soak up finishing resin. By covering the core with extruded foam sheets, you have created a resin barrier and a smooth surface with which to work.



**After the wing cores are joined and the top sheeting has been installed, channels are cut in the foam to install the wiring and the main spar.**

The wing cores are block sanded to remove any imperfections and the panels are bonded at the root with the top of the wing lying flat on the work surface. This sets the dihedral. A 1/8-inch wide, 1-inch deep, and 2-foot long groove is cut in the core. Wires for the aileron servos and motor controls are pushed into the groove and the plywood spar is pushed into the groove.

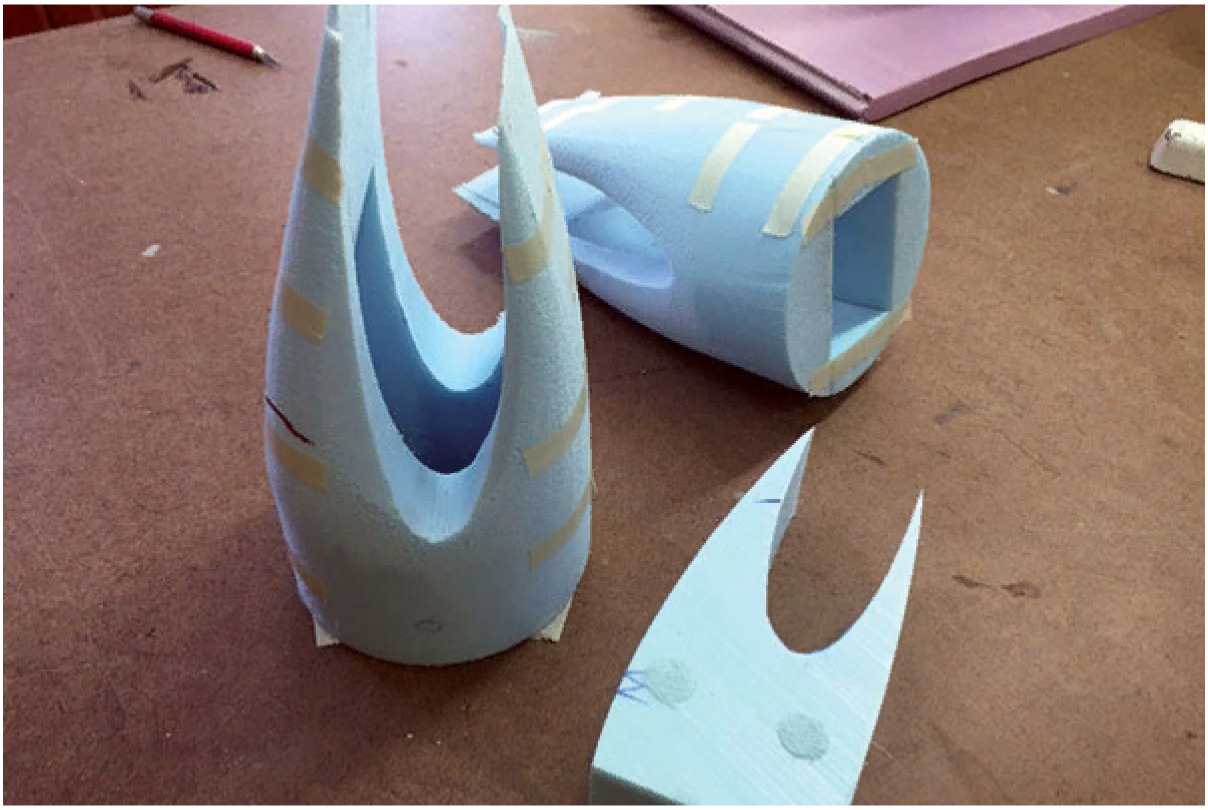


**Gorilla Glue is used to bond the foam sheeting to the foam core. Sandbags and the foam bed are used to apply pressure evenly for a complete bond. The drying time is overnight.**

Gorilla Glue is applied to the 3mm foam sheeting and placed in the wing bed. The wing core is placed on the sheeting and weights are used to force the sheeting to conform to the curve of the core. This step is repeated four times, giving the glue several hours to completely set up.

## Nacelle

The nacelles are made in three pieces: inner, middle, and outer. One of each is “threaded” on the wing from the wingtip inward until the middle panel is centered on the motor position. The three pieces are tack-bonded together in this position on the wing then removed for sanding. To get started shaping them, attach a 4-inch wood disk centered on the face of the nacelle and sand the corners off at a 90° angle to the wood disk. Blend the round shape into the tapered ends of the nacelle then disassemble the nacelle.

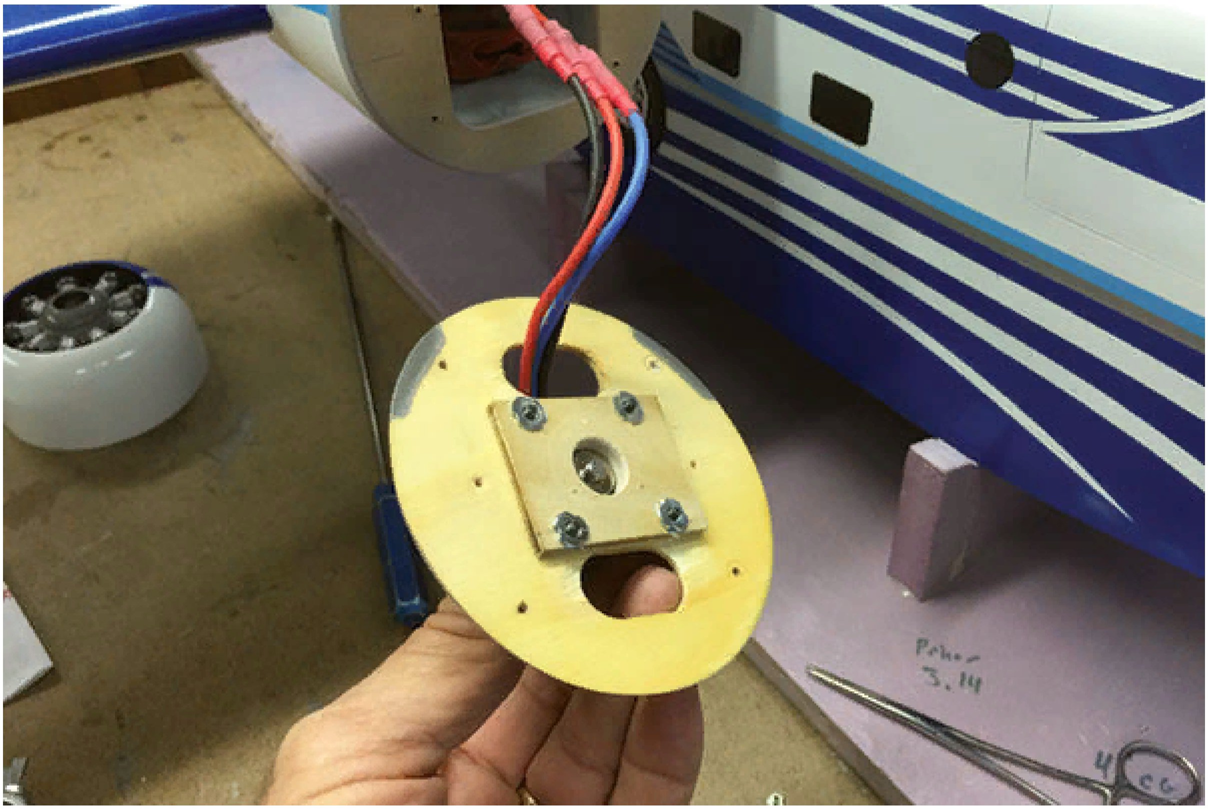


**The nacelles are made from three pieces of sheet foam using the patterns from the plans. They are tack-bonded together, sanded to the round shape, then disassembled to remove the center portion to house the ESC.**

Cut a 1/2-inch strip from the top and bottom of the middle panel and bond them to the inner and outer panels to form a hollow nacelle.

# Motor Mounts

The motor mounts are composed of three 4-inch diameter plywood disks. One is bonded to the nacelles' foam face with the nacelles' fiberglass application ensuring a good attachment. The next disk doubles as the motor mount and an access plate to the ESC compartment. The last disk acts as the cowl mounting ring and a material doubler for the motor mount.



**The firewall is made up of three light plywood parts that provide motor and cowl support as well as access for ESC servicing. Assembly is done with internal hex-head wood screws through the cowl.**

# Tail Feathers

I used a hot wire to cut the fin and rudder because of the thickness of the root. The scrap portion (bed) was used to hold the panel level while the stabilizer hole was cut.

The stabilizer and elevator combination has a thinner profile so a pair of sanding patterns and a sanding bar are all I needed to form the panels. After the panels were sanded smooth, material was removed and replaced with balsa strips to make up the hinge line.

**The horizontal stabilizer is shaped using sanding guards at the root and tip because the surface is so thin. The hinge line and edges have balsa bonded to them for protection and additional strength before the 1/2-ounce fiberglass cloth is applied.**

Balsa strips were added to the edges to provide dent protection and a little added strength. The stabilizer panels were joined with the wingtips, supported 11/4 inch from the work surface.

## Wing Attachment

To cut the wing saddle, I placed the fuselage on its back on the work surface and aligned the saddle pattern with the F4 and F3 seam. The sides were marked and the top was cut free from the fuselage and saved to make the wing-to-fuselage fairing.

At this point, a stand that will hold the fuselage level is needed. The top surface of the fuselage is our datum or reference point of 0°. Make this stand durable because it will be used during construction, storage, and transport to protect the hull.

Sand the wing saddle smooth and remove material a little at a time until the wing angle is 3° nose up while the model is in the stand. An incidence meter makes the job easier. Add the plywood parts to the fuselage and check that the angle does not change as each piece is added.

## Fin

Support the fuselage with the wing attached so that the wing angle is at 1° nose up. Tape the fin firmly to the fuselage and draw a line on both sides, 2 inches from the fin. This line should be 2° up from the datum. Use the stabilizer root pattern to remove the material from the fin. Making use of the foam bed will ensure that the cut is square to the work surface. Use tape for clamp pressure and bond the fin to the fuselage, ensuring that it is centered and 90° to the work surface.

To install the stabilizer, remove the rudder to make the fin flexible enough to open the leading edge. Epoxy was applied to the joint and stretched tape provides the clamp pressure. While the epoxy was setting up, I double-checked that the surface was parallel to the wing.

To complete the fin, a scrap piece of foam was cut to fit the top of the fuselage and front profile of the fin. The shape of the fin was transferred to the scrap foam block then sanded to a taper and bonded in place.

## Fiberglass

It is best to cover the foam parts with one ply of 1/2-ounce fiberglass cloth as they are completed for dent protection during assembly. In the end, this model has a base ply of 1/2-ounce cloth, one ply of 3/4-ounce cloth, and a final ply of 1/2-ounce cloth to ease the fiberglass weave filling step. Naturally you will want a little more on the belly, so I went with three-ply fiberglass cloth during the 3/4-ounce step for a tough hull.

To apply the epoxy finishing resin, I prefer using an acid brush and spreading it with a playing card. After the fiberglass is coated and has soaked up the resin, I use another playing card to squeegee off any excess resin. This last step is the key to a lightweight finish.

**Most rattle can-type paints will do fine on the fiberglass and there are plenty of color schemes from which to choose for the Albatross. Choose light colors to keep the skin temperature down when the model is exposed to the sun.**

After the last ply of fiberglass cloth has been applied, the squeegee step is repeated to fill in the weave pattern in the fiberglass cloth. Lightly wet sanding between weave fill coats will produce a smooth finish that is ready for primer.

From this point you are working with a fiberglass-covered model, so your favorite type of paint is compatible with the surface.

# Flying

The Albatross has a trainerlike configuration and flew like a trainer after I moved the center of gravity to the forward limit on the plans. However, water handling was slightly problematic because the model has no water rudder. It gets on step fast enough, but only likes to turn left.

This problem has three solutions. I went with coupling the rudder to the motor speed controllers. This works well after you figure out how to program the transmitter.

Another solution is employing counter-rotating propellers to cancel the torque. The E-flite motors I used have voltage options allowing the model to be flown on three- or four-cell LiPo batteries. Running a higher voltage will allow you to turn smaller propellers, reducing the torque as well. Employing any solutions or combinations of the above will make the Albatross fun on the water.