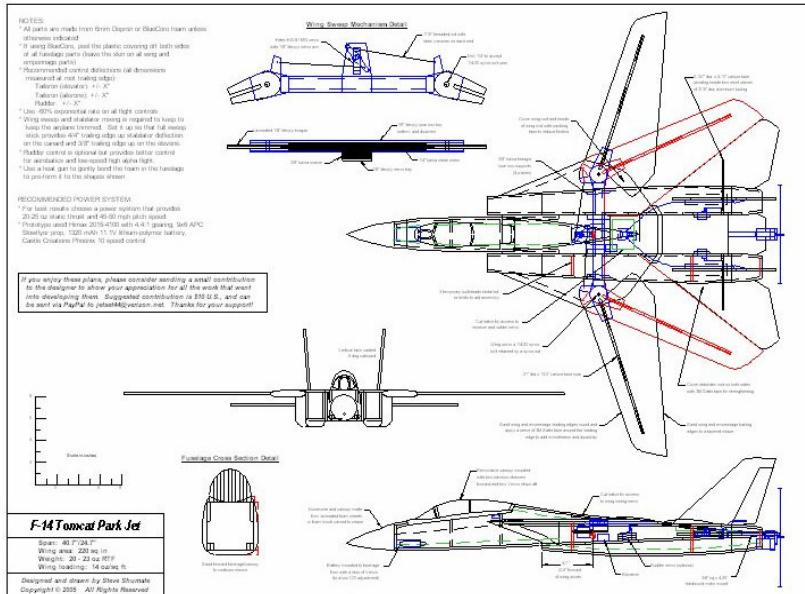
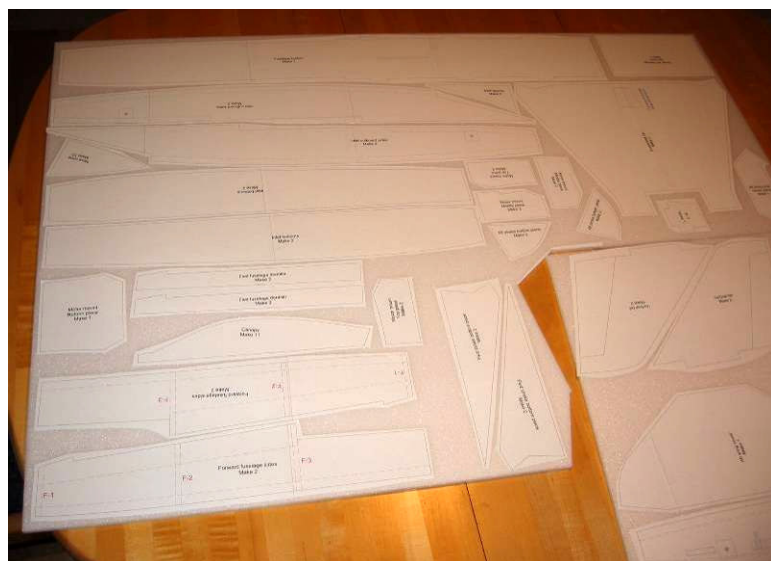


# Construction Guide for the F-14 Park Jet

## By Steve Shumate

**PLEASE NOTE: If you enjoy the F-14 plans and this construction guide, please consider sending a small contribution to the designer to show your appreciation for all the work that went into developing them. Suggested contribution is \$10 USD, and can be sent via PayPal to [jetset44@verizon.net](mailto:jetset44@verizon.net). Thanks for your support!**





This model was designed to be built from either BlueCore fan-fold foam or 6 mm Depron foam. If using BlueCore, note you'll need to peel the film backing off the fuselage exterior parts to allow sanding the fuselage corners to shape. Leave the film on the wing and empennage parts since it adds strength, durability, and smoothness.

Note this model is best built using the following types of adhesives:

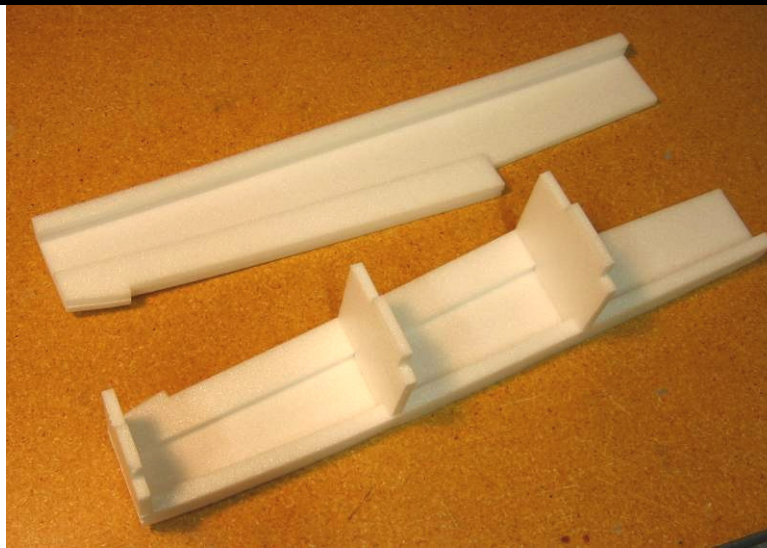
- Epoxy (both 5 minute and 30 minute)
- Odorless CA (with accelerator)
- Contact glue such as UHU Creativ for Styrofoam
- 3M 77 spray adhesive

ProBond can also be used in place of epoxy. It is lighter than epoxy but takes much longer to cure (overnight). I have personally found UHU Creativ for Styrofoam (picture at left) to be the best glue for the majority of assembly, since it's easy to use, dries fast (less than 10 minutes), and is quite strong.

Begin by cutting out all of the paper parts templates with scissors, trimming them to within approximately 1/8" of the lines. Then test fit all of the templates onto the foam sheet, trying to minimize wasted foam as much as possible. Once you're satisfied with the arrangement, remove each template individually and spray the back of the template LIGHTLY with 3M 77 spray adhesive. Then replace the template onto the same spot on the foam sheet. Repeat for every template.

After all the templates are tacked onto the foam, cut out all the pieces by cutting on the lines with a SHARP hobby knife. When done, peel the paper templates off of each piece and discard.

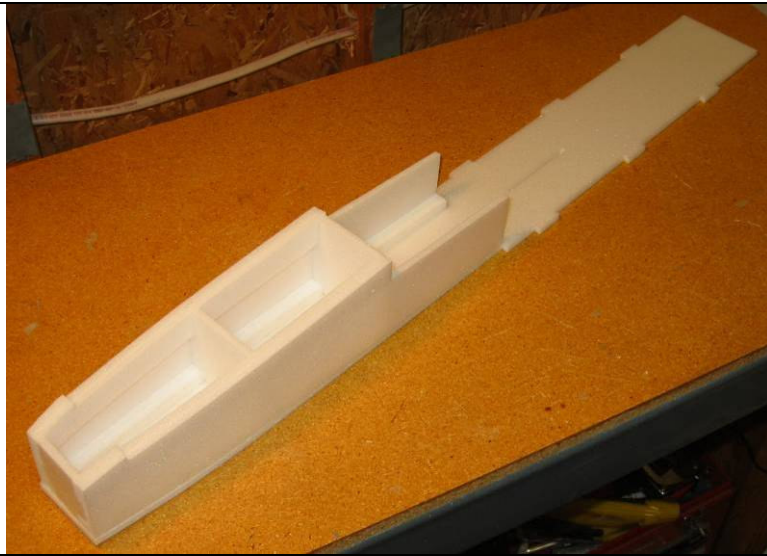




1. Begin assembly with the forward fuselage. Lay the two fuselage sides down flat on the work bench and glue the foam doublers to the locations shown on the parts templates. Be sure to make two mirror image parts—a left side and a right side.

Use a heat gun to gently heat the foam and form the curves in these pieces. Hold each piece up next to the piece it mates to to judge the curvature.

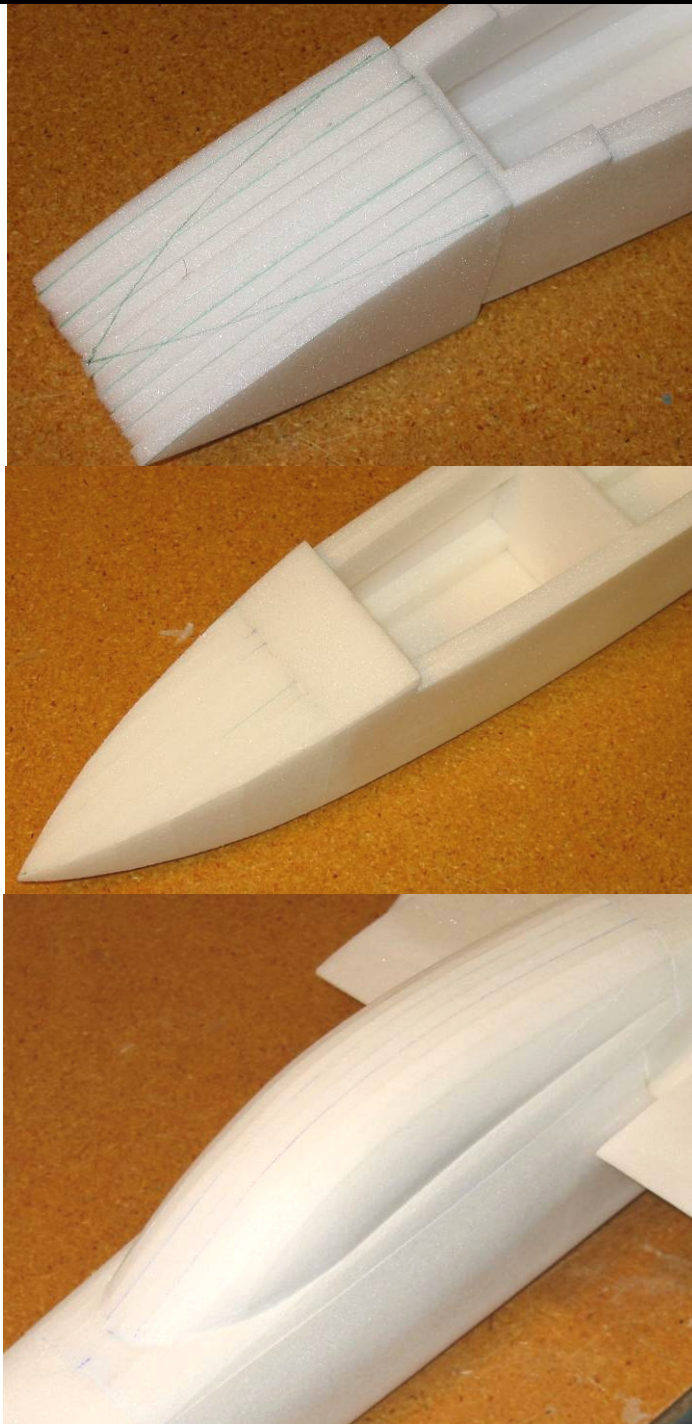
After the glue has dried, glue the three fuselage bulkheads to one of the fuselage sides at the locations shown, making sure they are perpendicular.



2. Next glue the two fuselage sides together. Set the fuselage sides upright and flat on the workbench, apply glue to the edge of the bulkheads, and push the sides together.

After the glue has dried, glue this assembly to the fuselage bottom piece as shown.

Glue the two forward fuselage top pieces in (forward of the canopy).



3. Laminate the nose cone pieces together using 3M 77 spray adhesive. Then glue the assembled nosecone block to the forward fuselage as shown (5 minute epoxy recommended).

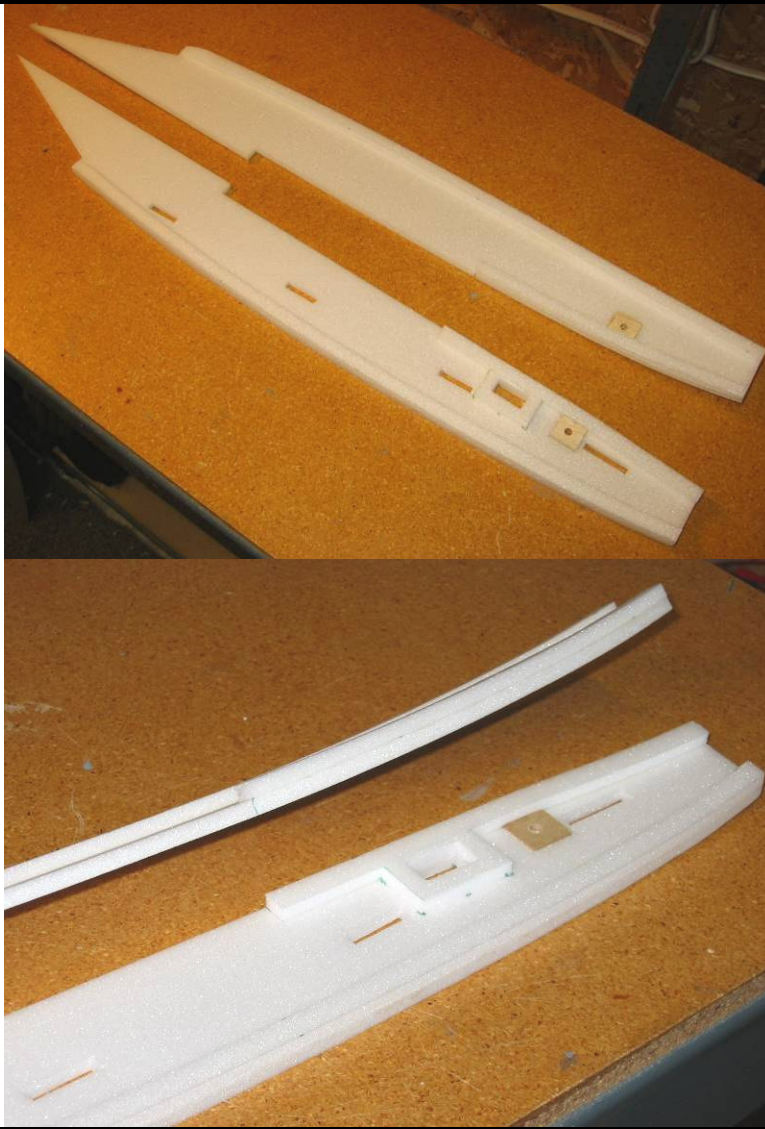
Once the glue has dried, carve the nose cone to shape. Start by tracing the top view template on the top of the block and cutting the block to that outline. Begin with coarse sandpaper (60 grit) to rough out the basic shape, then move to progressively finer sandpaper (first 150, then 220 grit) to do the final shaping.

Make the canopy using the same procedure. Note the canopy has two smaller sill pieces that glue on to each side of the canopy to form the lower sill.


**4. Begin assembly of the inlets. Be sure to make two mirror-image inlets!**

First glue the small plywood stabilizer support squares to each side in the locations shown on the plans, and then drill the 3/16" holes for the stab pivots. Then glue the foam support strips as shown to both the inboard and outboard inlet sides. Glue the taileron servo doubler to the inboard inlet side.

Use a heat gun to gently form the required curves in these pieces. Hold each piece next to the inlet bottom piece to judge the curvature required.

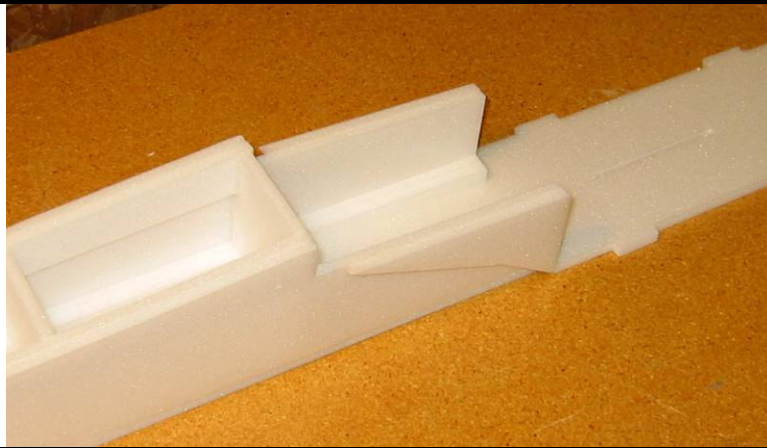




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5. Tack glue the three temporary inlet bulkheads to one side (these will be removed later), and then tack glue the two inlet sides together.

Next glue the inlet bottom piece on. To make sure the inlets are assembled perfectly square, hook the sides over a bench as shown and hold the inlets flat against the bench as the glue dries.

After the glue has dried, sand the corners of the inlets to a well-rounded shape.



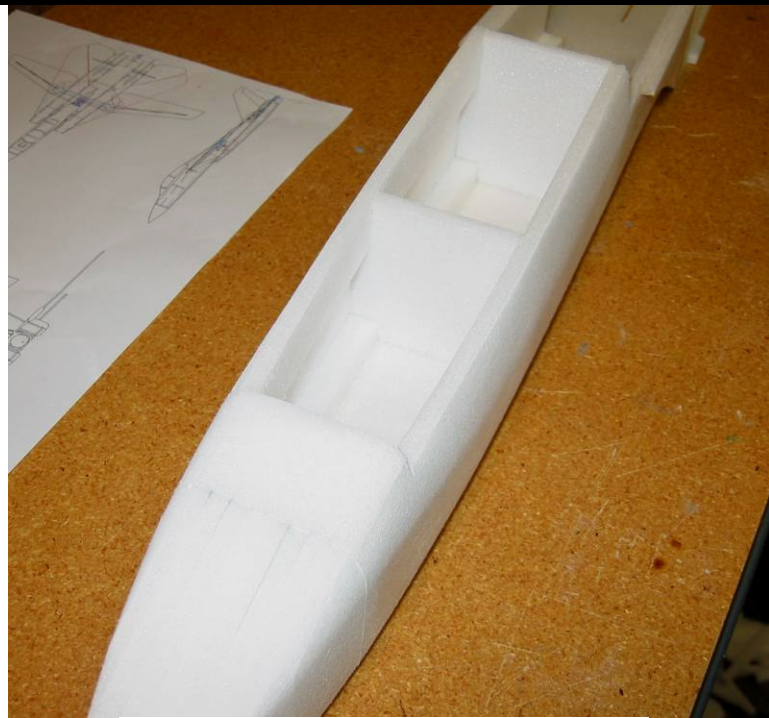
6. Glue the inlet diverters to the fuselage sides. Note the bottom of the diverter butts up against the step in the fuselage bottom piece.



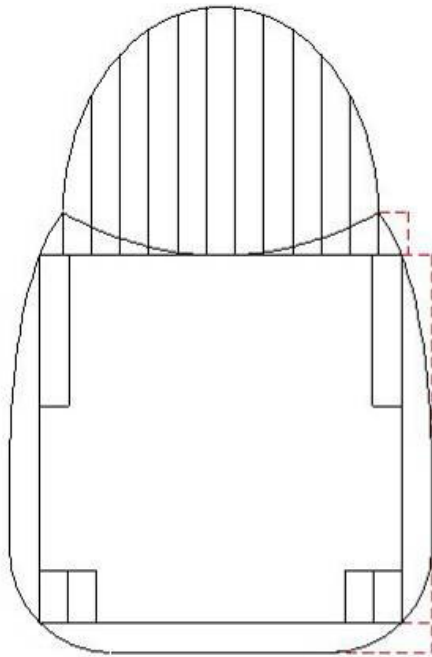
7. Laminate the five motor mount pieces together using 3M 77. Note the tabbed piece goes in the middle. Then sand the assembly to a tapered shape as shown.

Glue in the hardwood motor mount using 5 minute epoxy.

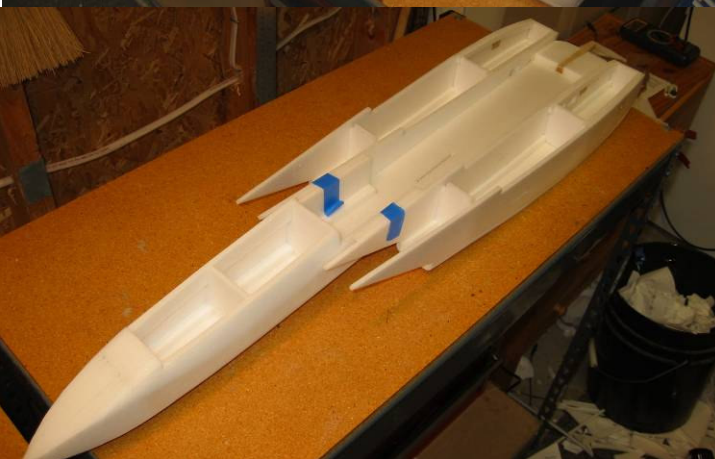
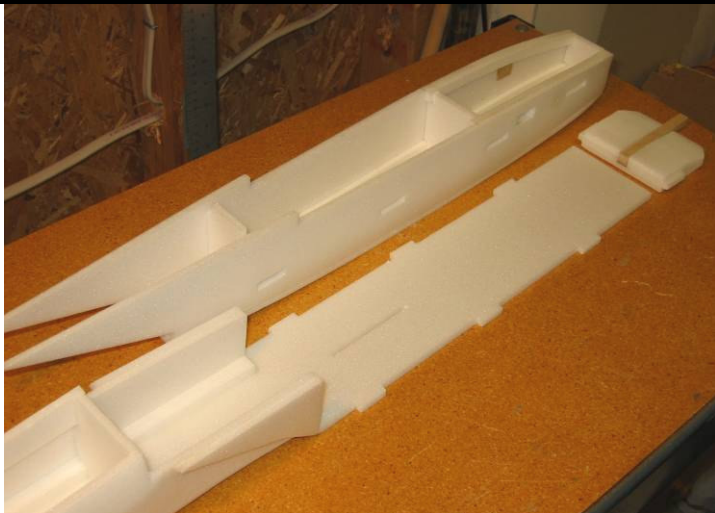




8. Sand the forward fuselage to the contours shown. It's important to do this now before you glue the inlets to the side of the fuselage, since the inlets will block access to the aft part of the fuselage. Sand the bottom edges to a circular shape, and then sand the top edges down to the feathered shape shown on the diagram at left. Note how the tops of the fuselage sides blend into the canopy sill.

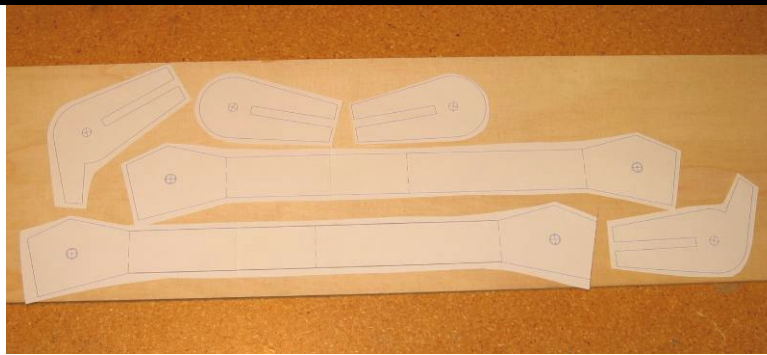






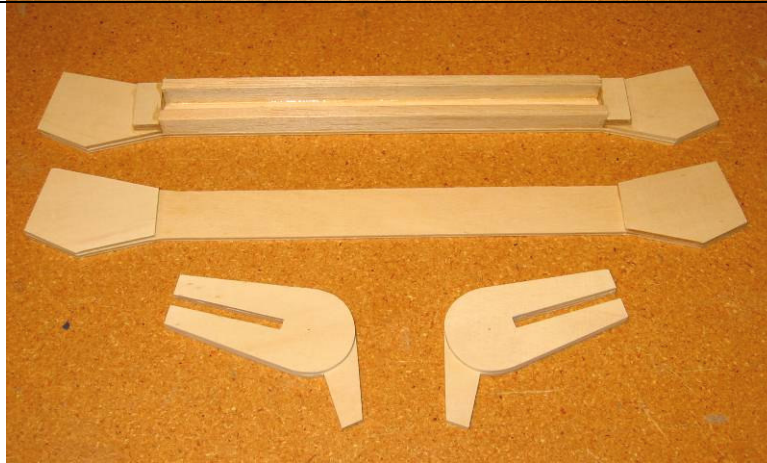
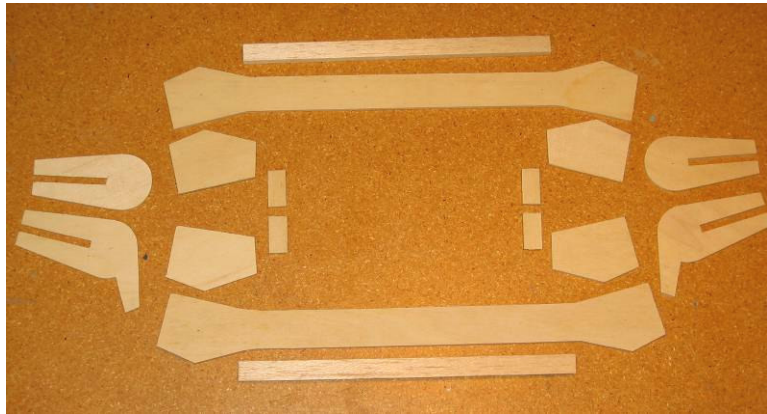
9. Next glue the inlets to each side of the fuselage. Note that the tabs on the fuselage bottom piece slide into corresponding slots in the inlet sides, which automatically ensures proper alignment. But you'll need to make sure the inboard forward top edges of the inlets are flush with the top of the aft fuselage (the area held together with blue tape in the bottom picture at left). Note that the motor mount also has tabs and slots to ensure proper alignment as well. 15 minute epoxy is highly recommended for this step, both for strength and to give you time to get everything aligned before the glue sets. Set the fuselage upside down on the workbench (hooked over an edge with the inlet tops sitting flat against the bench) as the glue cures to ensure this assembly is perfectly flat on top. This is important because the wing spar box will span across the top and the wings will fold up on top as well.

After the glue has cured, remove all of the temporary bulkheads inside the inlets.



**10.** Now we'll build the wing sweep mechanism. Begin by cutting out all the plywood parts using a similar procedure as the foam parts—just tack glue the paper templates to the wood using 3M 77 spray and then cut the parts out with a sharp hobby knife (that's one of the beauties of lite-ply—it can be cut quickly with a knife!).

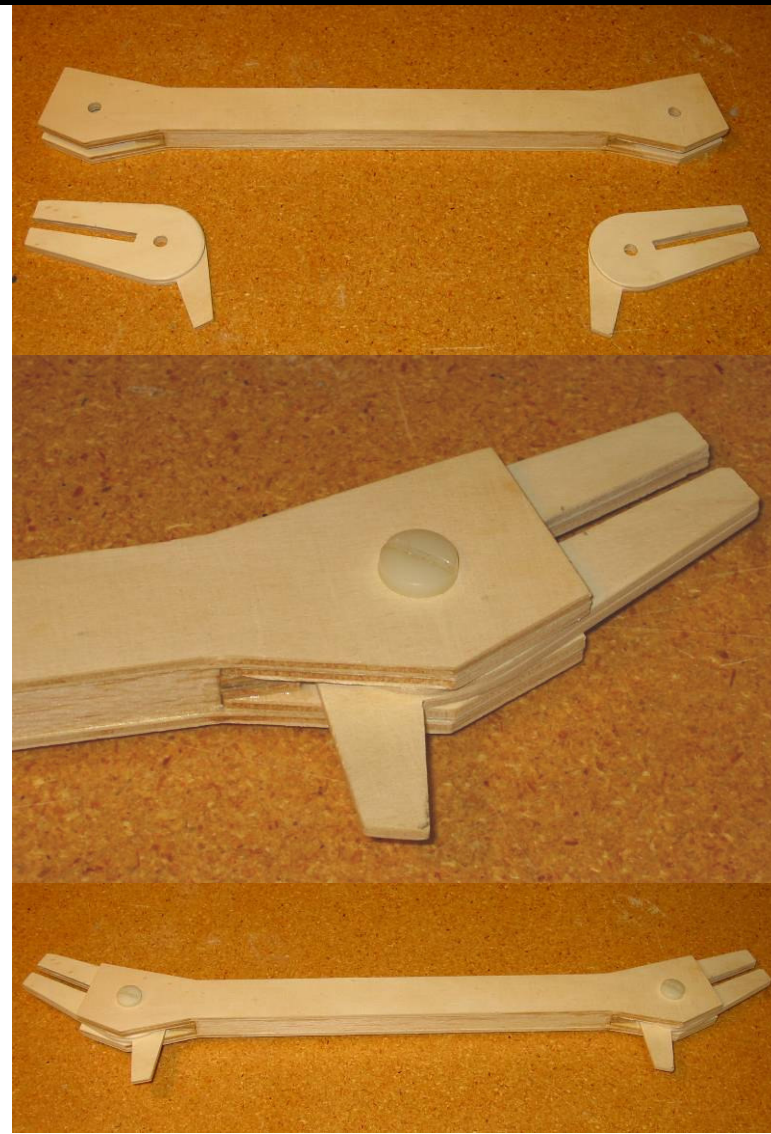
When done, you should have all of the parts shown in the bottom picture at left.



**11.** Glue the doublers to both ends of the spar box top and bottom pieces. Laminate the two spacer pieces and glue them in place on top of the doublers on one side. Then glue the balsa shear webs in place on the same side. Medium viscosity CA is recommended for all of these joints.

Next laminate the two swing arm pieces together with CA. Be sure to make two mirror-image parts—the piece with the control arm goes on bottom for each side.



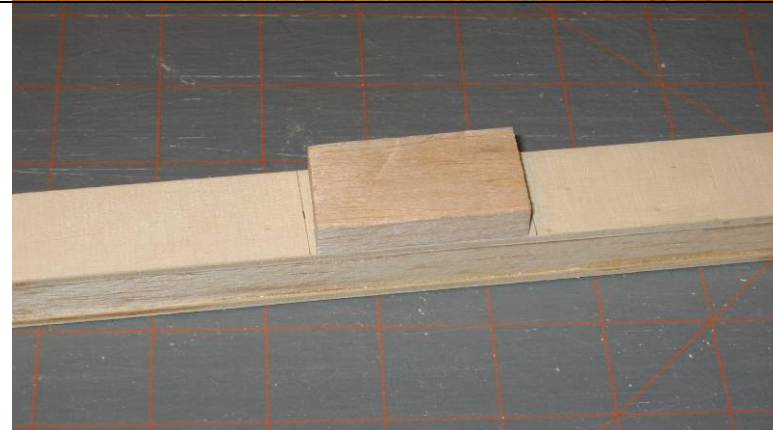
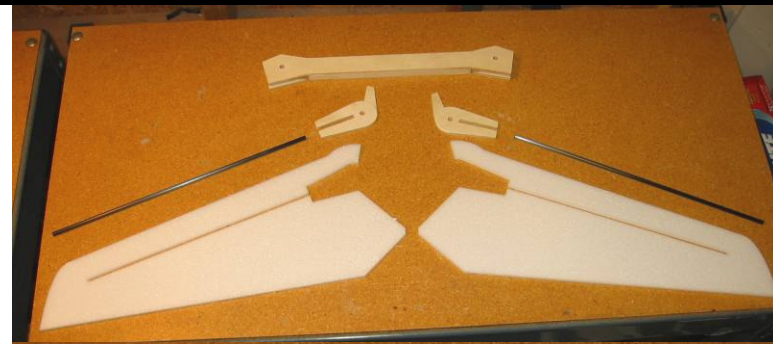


**12.** Test fit the top and bottom spar box pieces together. Sand the balsa shear webs as required until you get a perfect fit. Then glue the top and bottom pieces together with CA.

Now drill the four  $\frac{1}{4}$ " holes for the nylon bolt wing pins—one in each end of the spar box and one in each swing arm. Use a drill press if at all possible to ensure the holes are perfectly perpendicular!

Test fit the swing arms and nylon bolts in place, and check to see if they rotate smoothly. You want them to fit tightly but still rotate smoothly. Sand the swing arms as required to thin them down until they turn smoothly. Note that you can also adjust the tension of the swing arms by tightening the nylon nut and bolt, so it's OK if the swing arms end up a little loose.





**13.** Cut the carbon tube wing spars to length and test fit the swing arms and spars into the wing, trimming as required. Then glue the swing arms and spars in place using epoxy (note that the side with the control arm goes down on the swing arms). Place wax paper and heavy books on top of the wings as the epoxy cures to ensure everything stays perfectly flat. After the glue cures, put a strip of 3M Satin tape over the top and bottom of the spar to help hide the joint and provide a smooth wing surface.

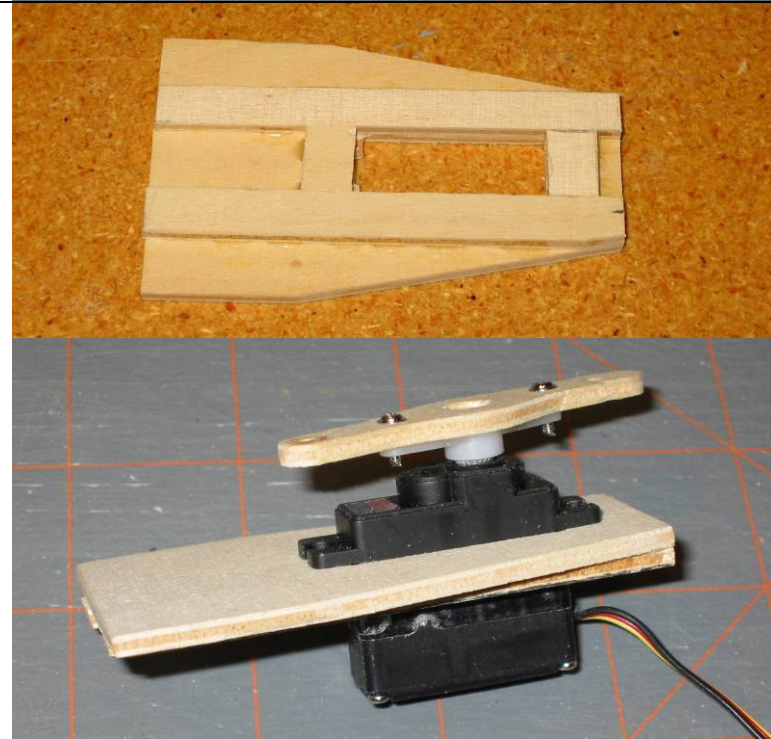
Now sand the wing to shape. Sand the leading edge to a well-rounded shape and sand the trailing edge down to a tapered shape from the top. This will result in a thin flat-bottom airfoil. Put a strip of Satin tape over the leading edge to provide durability and smoothness.

**14.** Glue the 3/8" thick balsa spacer block in the bottom center of the wing swing box. However, check the fit of your servo first to see if this thickness puts the servo arm at the same height as the control arms on the wing swing arms. You may need to use a thicker or thinner spacer depending on your servo. 3/8" is what worked for the HS-81MG servo used in the prototype.



**15.** Make the 1/8" lite-ply servo arm, and then attach a nylon servo arm with two screws as shown. You may need to experiment to find the exact hole locations that result in both wings swinging identically forward to back—and those locations will probably NOT be symmetrical. I found that the left wing needs a little longer moment arm than the right wing to swing equally. If one wing swings more than the other, simply increase the moment arm on that side. The locations shown on the plans are what worked (after much experimenting) with the HS-81MG servo used in the prototype.

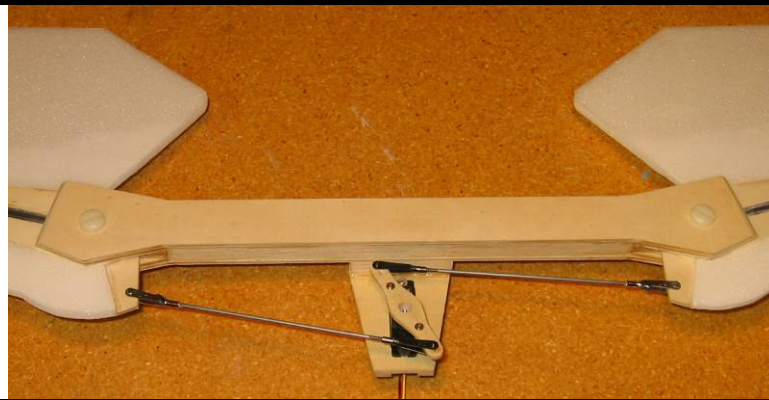
Also note that if this horn seems weak to you (only .25" wide), that's by design! This servo arm is intended to be the weak link in the wing swing mechanism. That way, if you catch a wing on landing, this horn will break before anything else in the system breaks. This is good because this horn is easy and quick to replace via the hatch in the top of the fuselage. This design has already paid off for me—I had a crash landing in one of the early flights and this arm broke just as intended, preventing any further damage to the wing or swing mechanism!



**16.** Glue 1/8" lite-ply strengtheners to the bottom of the servo tray as shown. Then check the fit of the servo and trim as required. When done, the assembly should look like the picture on bottom.

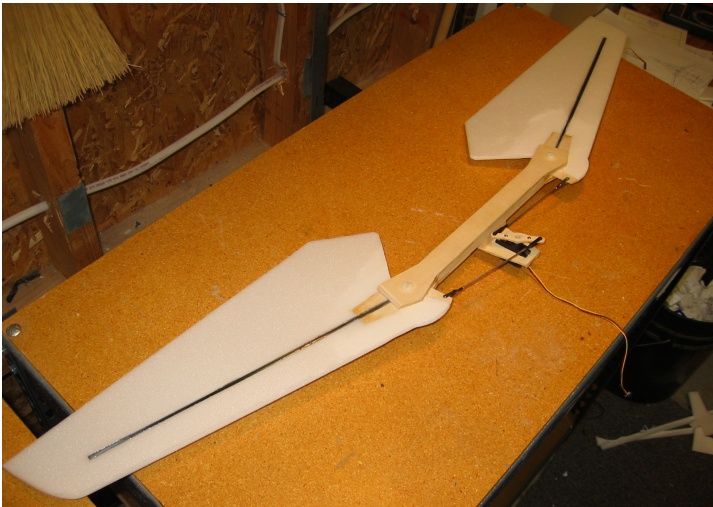
I used a Hitec HS-81 MG servo on the prototype, which works OK but is definitely strains in this application. I think it works well enough that a larger (and thus heavier) servo isn't required, but if you choose to do so there is room for a larger servo. The most important thing is to use a METAL geared servo (a nylon geared servo is very likely to strip).





**17.** Glue the servo tray on the bottom of the spacer.

Make the pushrods using 1/16" threaded rods with steel clevises on each side. I found that the Great Planes small steel clevises happened to work best, providing a perfect fit with the 1/8" lite-ply control arms. Dubro clevises didn't fit nearly as well...



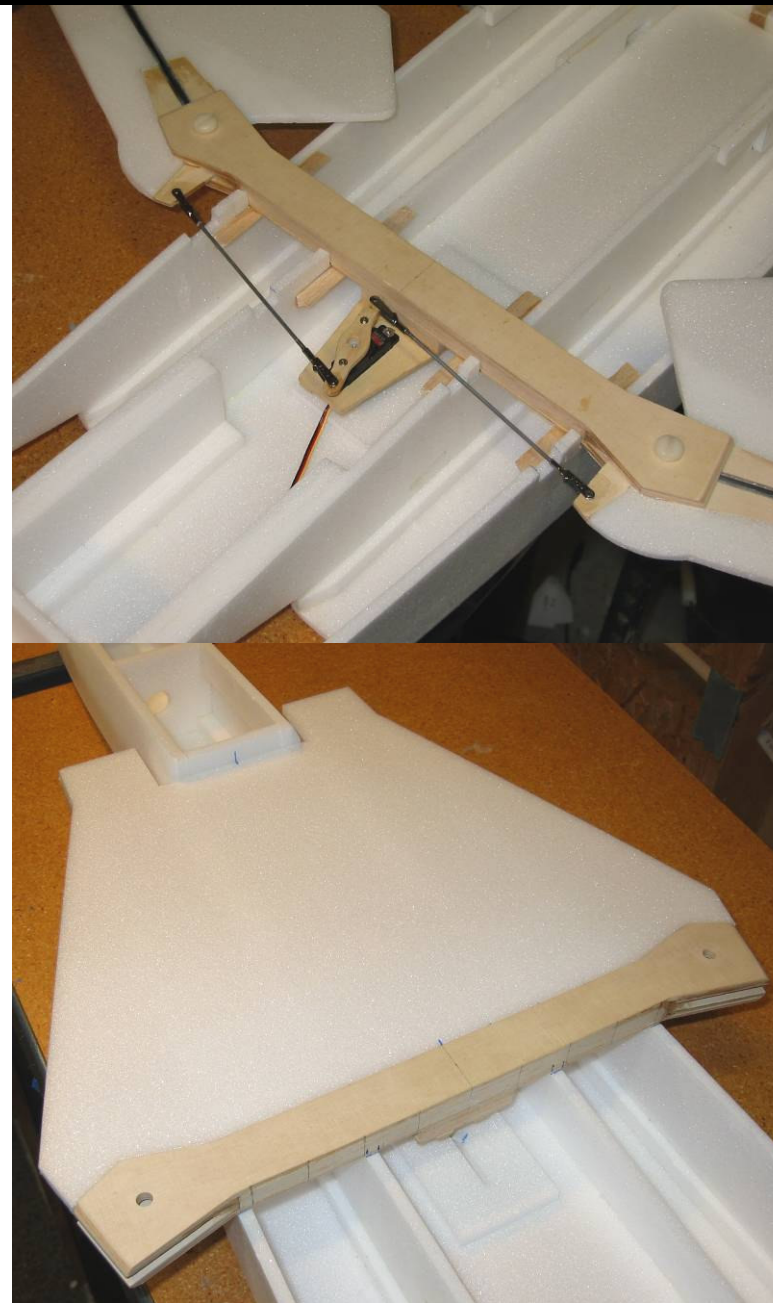
**18.** Now plug the servo into your receiver and test the wing swing mechanism, adjusting it as required until it works perfectly. You want both wings to swing easily and also swing the same amount. If one wing swings more than the other, adjust the control throws on the servo control arm. If the wings tend to bind, sand the swing arms down in thickness. Use the buzzing of the servo to tell you where the problems are—it'll buzz heavily if it encounters something it doesn't like!

For reference, there are mechanical stops on both ends of the wing swing travel. The step in the wing trailing edges should just touch the back of the wing swing spar box when the wings are swept fully aft. And the control arms on the wing swing arms should hit the forward side of the spacer inside the spar box when the wings are fully forward. Use those extremes to gauge how much swing is required.



Note that the a key feature of this design is that it is independent from the rest of the airframe. Thus, everything can be tested and adjusted to work perfectly BEFORE you install it.



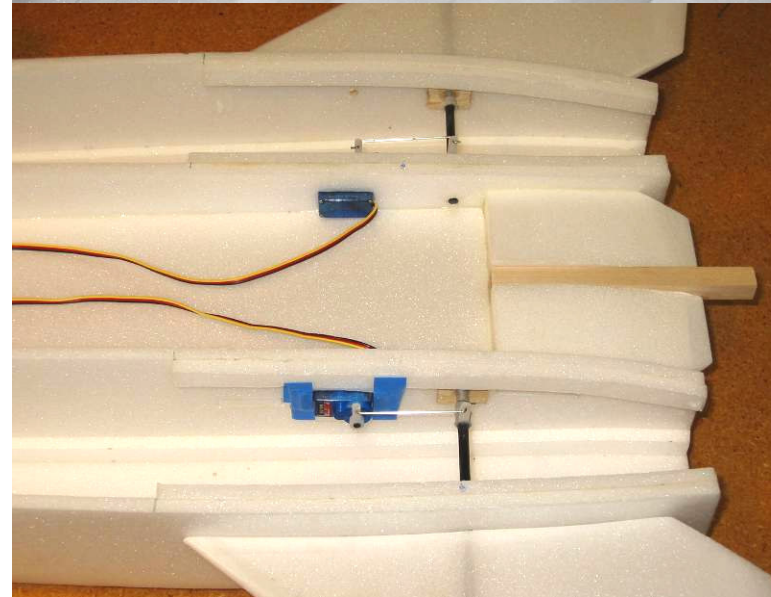


**19.** Test fit the wing swing box onto the fuselage. The forward side of the spar box butts up against the step in the inlet tops. Cut clearance holes as shown for the wing pushrods on the top of each inlet side (4 total). Be sure to make those holes wide enough to clear the pushrods throughout the entire swing of the wings.

Next glue in the four segments of 1/4" balsa triangle that fit underneath the spar box. These should be flush with tops of the inlets.

Use this forward wing strake piece as a guide to help you glue the spar box in with perfect alignment. First test fit the wing strake piece to ensure it fits well and trim as required. Then draw centerlines on everything (strake, fuselage, spar box) to help align everything. After you're confident everything fits well and is aligned, glue in the spar box and strake together using epoxy.

Note that the wings are easily removable on this model, even after it's finished. To remove the wing, just pull out the nylon bolts at the wing pivot and unsnap the clevis on the servo arm (using needle-nose pliers through the access hatch on top). Then slide the wing out, being careful to pull the pushrods carefully through the clearance holes. Reverse this procedure to put the wing back on, being careful to guide the wing pushrods back through the clearance holes. Note there's no need to ever take the clevis off the wing control arm—use the clevis at the servo instead.



**20.** Next install the tailerons. Each taileron has a .157" diameter carbon spar that pivots inside two small pieces of 3/16" diameter aluminum, which are supported by two small squares of 1/64" ply glued to the foam inside the inlets.

Begin by sanding the tailerons to shape. Sand the leading edges to a well-rounded shape and the trailing edges to a tapered shape. Put a strip of 3M Satin tape on the leading edges to provide durability and smoothness. Also put a few layers of Satin tape on the forward root of the tailerons to increase strength.

Cut the carbon spars and aluminum tubes to length. Glue the aluminum tubes into the plywood squares in the inlets using epoxy. Make sure to put the carbon rods in the bearings while the epoxy cures to ensure everything is aligned. Then glue the spars into the tailerons using epoxy.

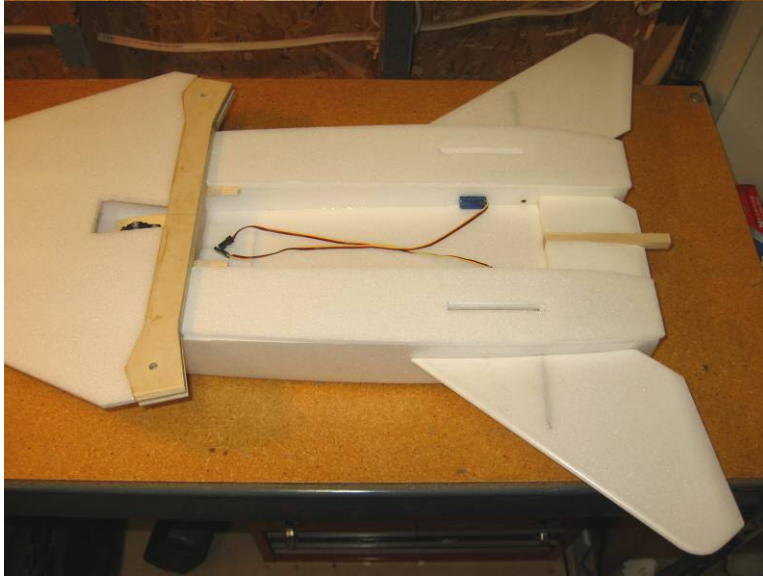
After the glue is cured, slide the carbon rods through the aluminum bearings and slide the end stops and control horns onto each rod (but don't glue them yet). I used spare servo horns for both the end stops and taileron control horns (just snip off the arms and drill them out to slide onto the carbon rod).

Install the servo and make a pushrod using 1/32" music wire (Z-bends are recommended on each end). Set the length of the pushrod so that the servo arm and taileron control arm are perfectly vertical. I simply used tape to hold the servos in place, combined with the friction from a tight-fitting hole in the foam.

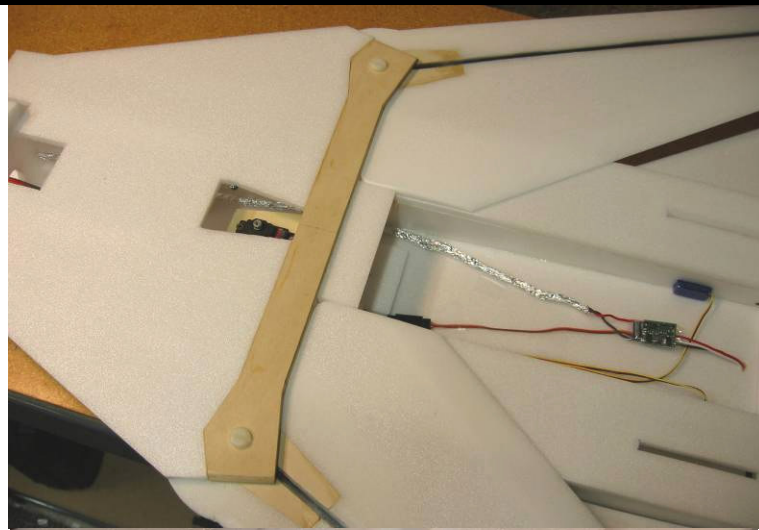
Adjust as required until everything is aligned—the control arms are vertical, the tailerons are level, and the end stops fit snugly against the inlet sides. Then put a few drops of CA on the end stops and taileron control horns to secure them in place.

**21.** Glue the vertical tail support doublers to the inside of each inlet top piece, making left and right versions. Then cut the slot for the vertical tails at a roughly 5 degree cant angle (canted outboard). Use a heat gun to form the small curve in the aft end for the exhaust nozzle.

Glue the inlet top pieces onto the inlets. Note that the forward edge of these pieces butts up against the rear edge of the wing spar box.







**22.** Install the speed control and battery extension wiring. Note that the battery extension wiring should be twisted and then wrapped with aluminum foil to reduce RF interference. In the photo here, the speed control is installed inside the airplane. However, I later learned (the hard way) that the speed control must be installed OUTSIDE the airplane to provide cooling and prevent shutdown due to overheating. So cut a hole in the bottom of the fuselage and route the wiring so that the speed control is located on the bottom outside of the airplane (see bottom picture).

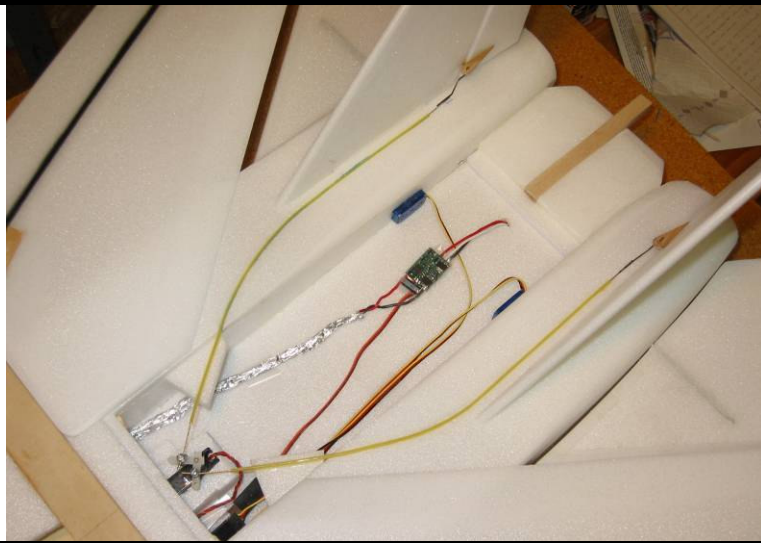
Laminate the 2 parts for the wing cover center support and glue in place on the back of the wing spar box (shown in the top picture).



**23.** Sand the vertical tails to shape, giving the leading edges a round shape and the trailing edges a tapered shape.

If you're installing rudders, cut those out and hinge them with Satin tape.

Glue the tails in place using epoxy, canting them outboard at a 5 degree angle.

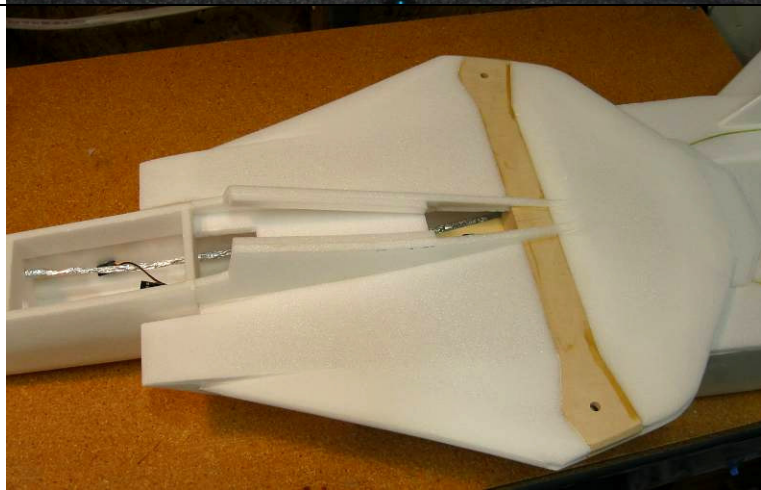


**24.** If you're installing rudders on this model, install the control runs now. I used Sullivan light flexible cable pushrods, with 1/32" music wire soldered on the rudder end and Dubro micro EZ connectors on the servo end. Note the two small pieces of scrap foam that support the cables near the servo.

Rudders are nice to have and are useful during aerobatics and very low speed maneuvering. But they are not required for this model to fly well.



**25.** Install the center aft fuselage top piece using epoxy.



**26.** Now install all the remaining wing strake pieces, including the aft upper wing cover (2 pieces) and the forward and aft lower strake pieces.

Note that the forward lower wing strake pieces may need to be notched inside a little to clear the wing swing pushrods.


Install the turtledeck sides and top. Note that the turtledeck sides are glued on at a roughly 15 degree angle (canted inboard) to give them that characteristic F-14 shape.

**27.** Sand the wing strake and turtledeck to shape as shown.

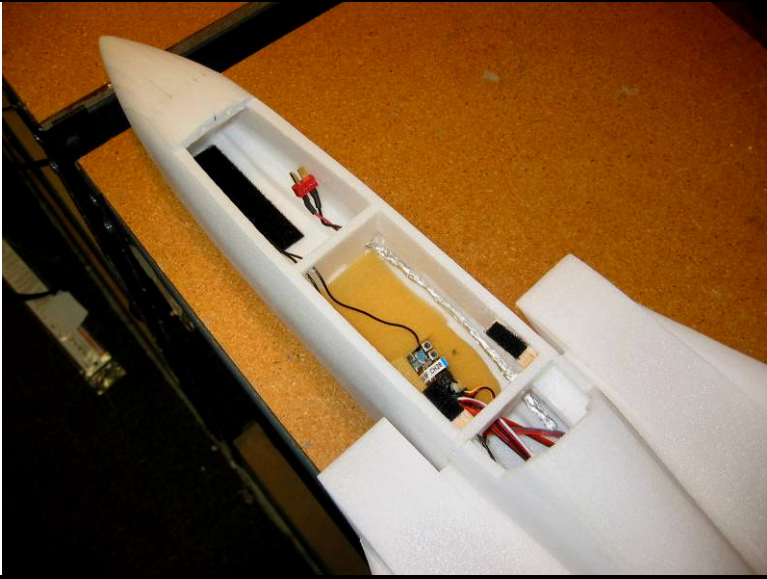
To reduce the friction of the wing swing mechanism, place a single layer of packing tape on the insides of the wing slot (top only) and on the top and bottom of the wing root (but only where it contacts the wing slot). Bare foam and plywood joints may swing freely on the bench, but once the wing gets deflected with 1g flight loads these joints need packing tape to keep the friction down.







**28.** Cut an access hole for the wing swing servo as shown. Also cut the access hole for the receiver (not shown here) and install the receiver.



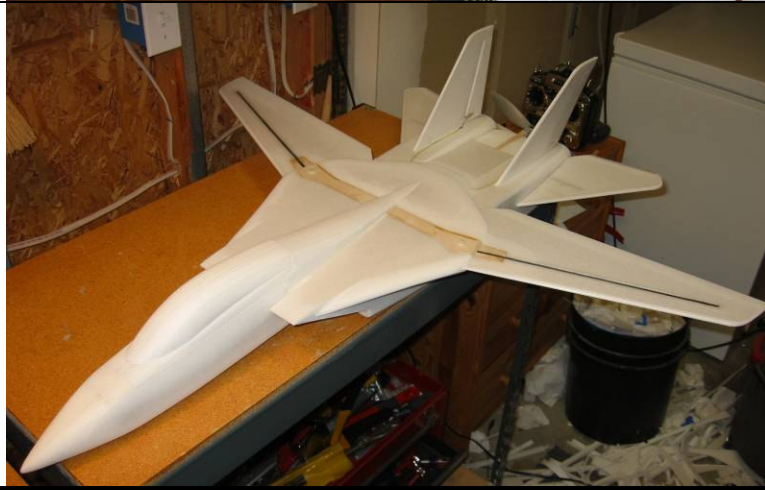
**29.** The canopy is removable to allow easy access to the battery compartment. It is held in place with two bamboo skewers forward (toothpicks or carbon rod could also be used) that slide into matching holes in the forward bulkhead, and two small strips of Velcro aft that are mounted to short pieces of 1/4" balsa triangle stock.

Cut two 2" lengths of bamboo and sharpen both ends. Stick the bamboo into the foam at the front of the canopy so that only 1/2" protrudes and glue into place.

After the glue dries, push the canopy onto the airplane so that the protruding ends poke holes into the forward bulkhead. Then glue the Velcro mounts to the fuselage sides as shown on the plans and attach the matching Velcro pieces to the mounts and to the canopy.



**30.** Install the motor and plug it into the speed control leads.



**31. CONGRATULATIONS!** Your model is now complete.

The model can be painted using standard acrylic craft paint (available at most craft stores), applied with either a brush or airbrush. Remember to wipe the foam with rubbing alcohol before painting to remove any grease or dirt. Rough areas such as the canopy and nosecone can be filled with standard wall spackling compound thinned with water, which fills the holes and can be sanded to a very smooth finish (with minimal weight gain).

I hope you enjoy this model as much as I have!

## Additional Photos

Here are some additional photos of the prototype F-14 Tomcat Park Jet for reference

