



Formation Flyer

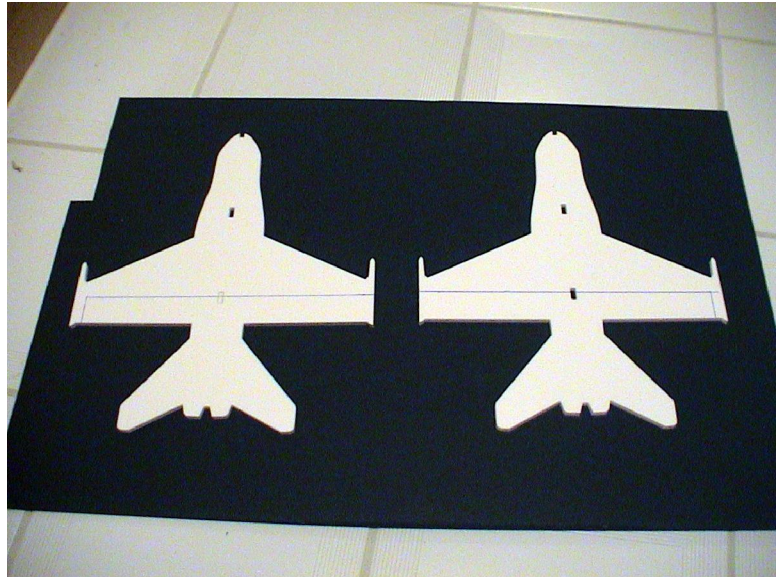
By Michael Blott

This project was on my things to do list for quite awhile. As I mentally built it in my head, I ran into problems that always prompted me to place it back on the back burner. Ken Willard built something similar back in the 70's using the sweep of the wings to allow fiberglass and wooden rods to connect the planes. Being in a Navy town I wanted to use the latest plane the Blue Angels currently used. The F – 18 Hornet. This jet did not have the degree of wing sweep that would allow the construction that Mr. Willard used. Finally an epiphany struck me of a construction method that would be simple and perhaps stronger than what had been done before. Before I go further I will tell you that one of the prime goals I have in designing/building a new plane is to keep it as simple as possible.

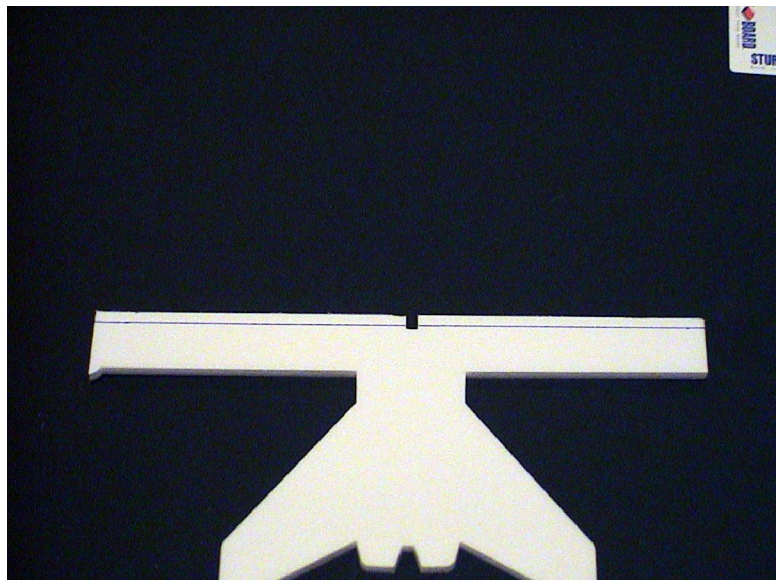
I decided on a size that would fit the trunk of my car. 6 mm Depron allows simple construction (this important as we are building four little planes) and would match the 6 mm carbon / aluminum shafts. (arrow shafts) The hollow tubes allow the attachment of the outboard planes to the lead plane and provide attachment points for the landing gear. You will note that the tailplane does not have any tubes in the structure. The Depron alone is strong enough.

**READ THROUGH THE
CONSTRUCTION NOTES AND
FAMILARIZE YOURSELF WITH
THE PLANS COMPLETELY
BEFORE STARTING.**

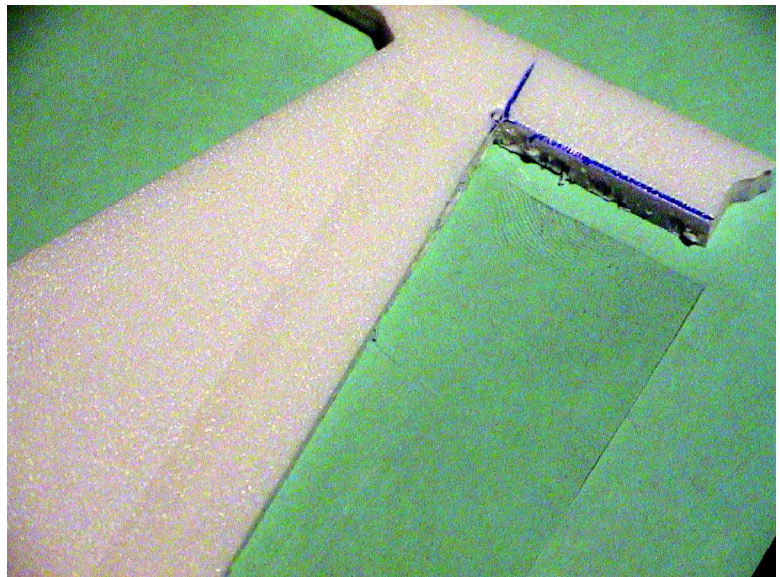
You can sand the leading edges to make it more aerodynamic if you wish. I did not find it necessary.



Cut out the ailerons and the tubing slot

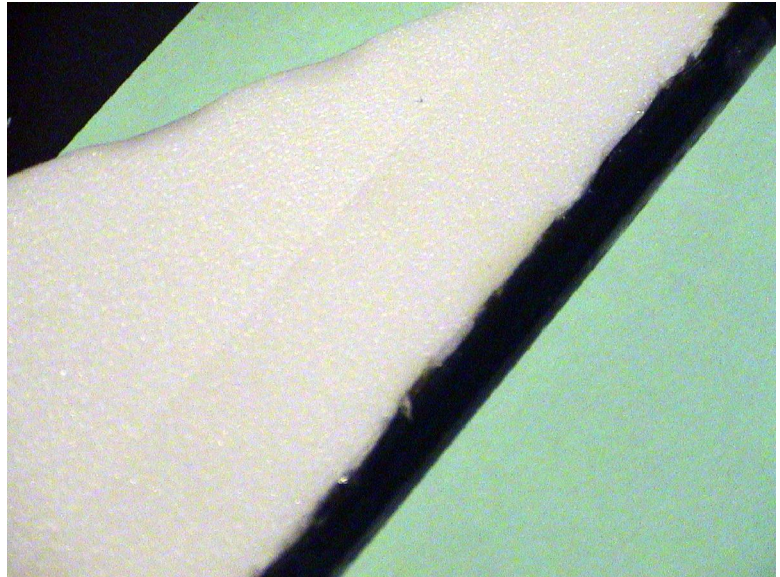


Lay the wing on a piece of tape the length of the wing span.

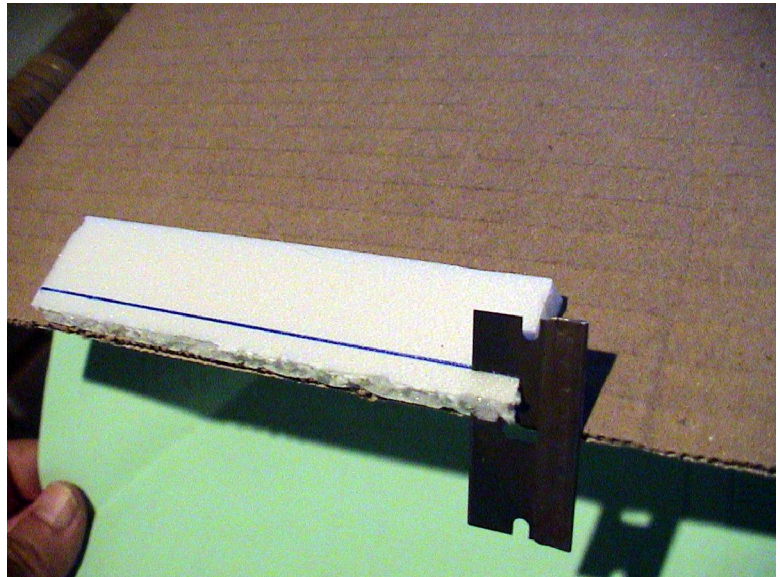


Lay the tubing in place, add epoxy or polyurethane glue (my favorite) and wrap the tape over the tubing. This provides a nice attachment of the tubing to the wing and is barely noticeable when painted.

Do the same with the lead wing along the trailing edge of the wing.



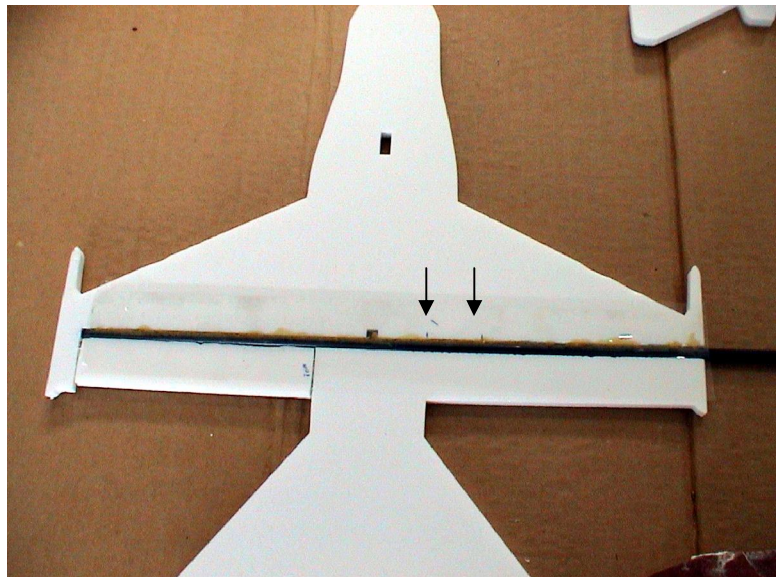
Bevel the leading edge of the ailerons.



Tape hinge in place on the outboard planes.

Drill the 1/16" landing gear holes through the rod. (arrows)

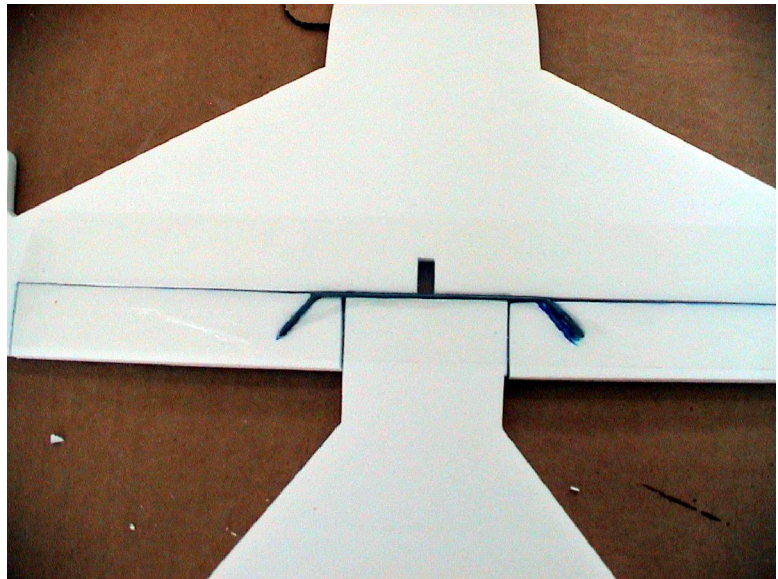
Use the wire landing gear as a spacing guide.



Do the same with the ailerons of the tail plane that will be used as the elevator. Link the two ailerons with 1/16" wire.

Press a groove into the foam in the area between the "ailerons" to allow proper alignment and movement of the elevator.

Press grooves into the elevator halves to accept the wire.



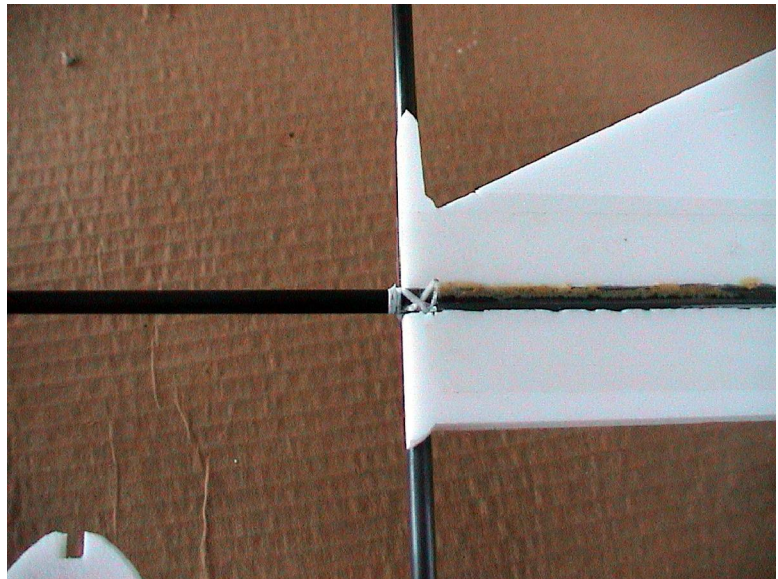
Lay the lead and tail wings on the fore and aft shafts.



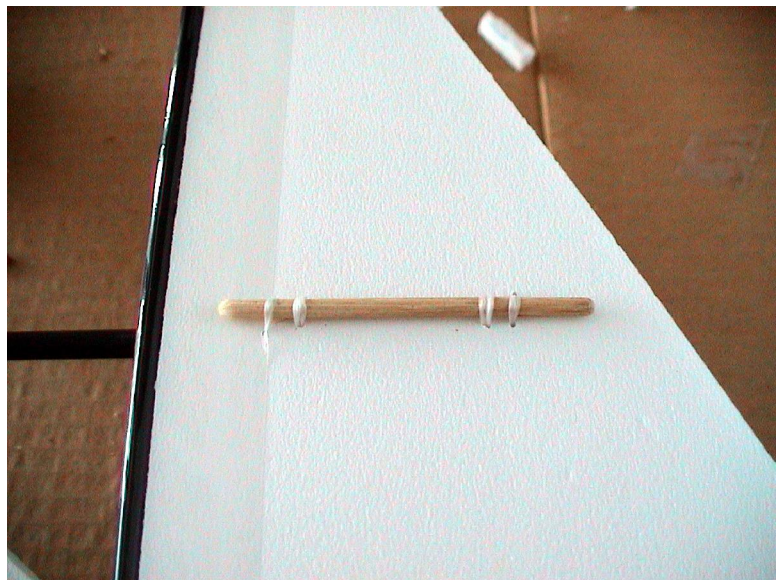
Piece of foam helps align the side planes keeping them square to the fore and aft shafts.



Lay the joined outboard wings on the fore to aft shafts. The inside wing tips should lay on the fore to aft shafts. This helps align the wings to the shafts. Glue the wings to the shafts with foam safe glue and lash the wings to the shafts with unwaxed dental floss..

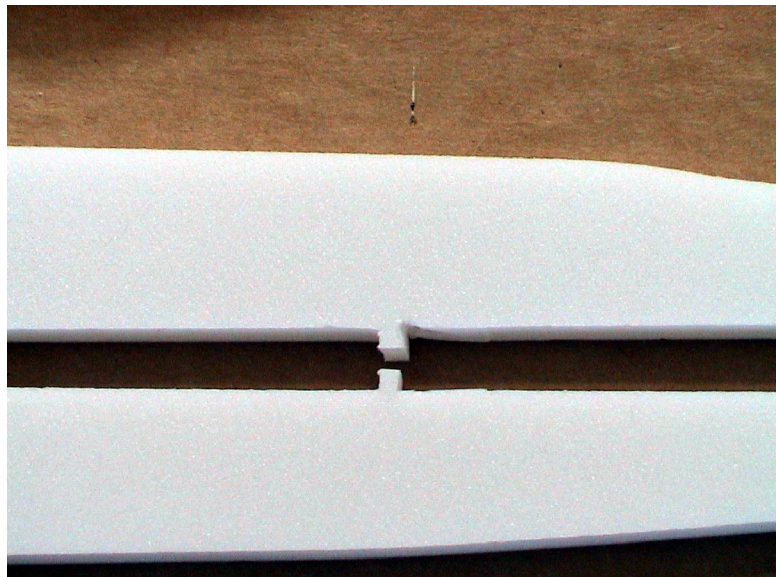


Bamboo sticks help the floss from pulling through the Depron and simulate the wing hinge point on the fullscale.

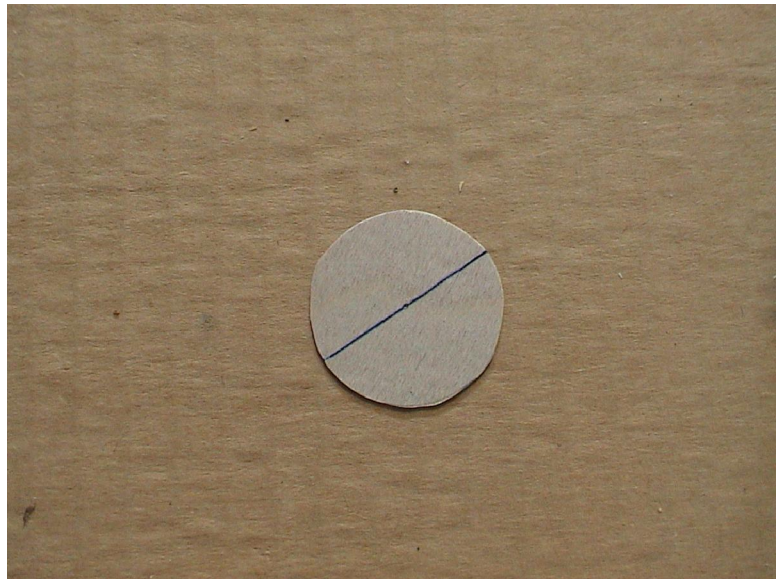


Slide the fuselages into place allowing the alignment tabs to secure the position.

Glue in place. Trim the alignment tabs if they hit the arrow shaft.



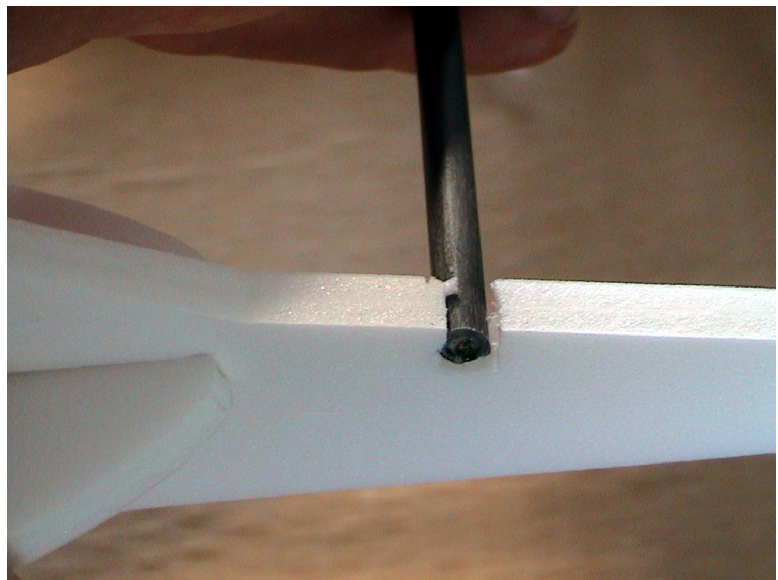
Attach the 1/64" plywood guards onto the noses of the outboard planes. Drill a hole through them into the tubing of the lead plane. The tubing has been previously filled (plugged) with epoxy or polyurethane that has cured and drilled.



Notch the side plane fuselages to accept the lead plane rod.

Secure the outboard planes to the lead plane shaft with a screw.

Trim upper portion of circle off.
(see pictures below)



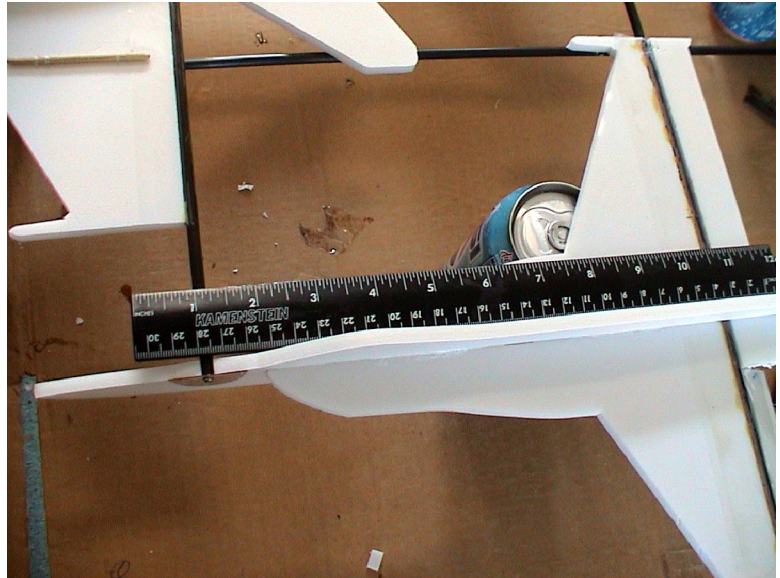
I found it convenient to support the assembled structure on soda cans.

Yardstick aligns the fore and aft planes at the same level.

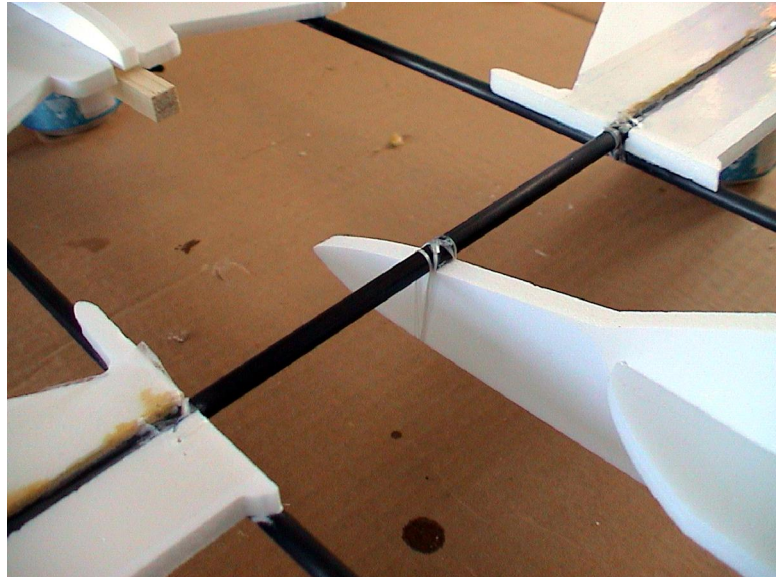


Screw the reinforcement tabs to the lead plane rod. Make sure all the wings are in alignment before gluing the reinforcement tabs.

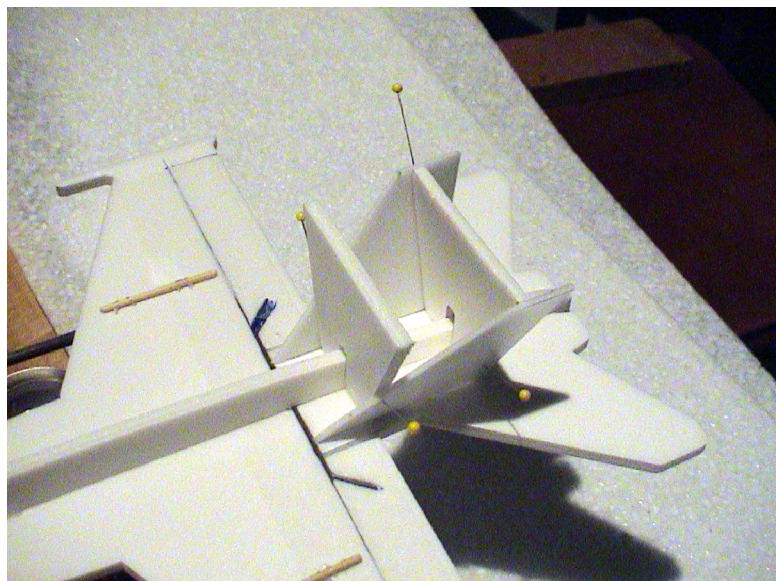
Ruler aligns the wing to the same level as the rods.



Lash the shaft to the nose of the tailplane with floss.



Attach the tail fins, using the alignment jig, with foam safe glue.

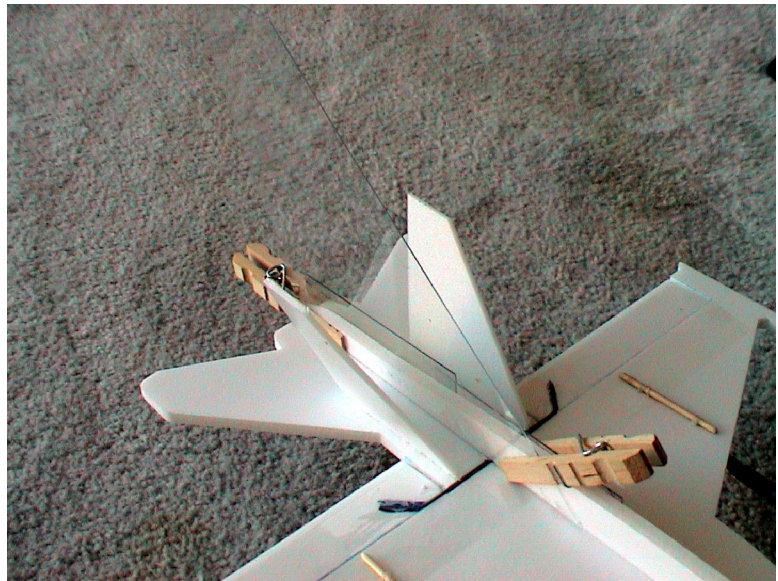


The Lexan fin is needed to counter all the side area ahead of the center of gravity.

Canopy glue helps stick the smooth Lexan to the Depron.

Attach the Lexan fin after the model is painted.

In my model, The large fin can not be seen from several yards away.

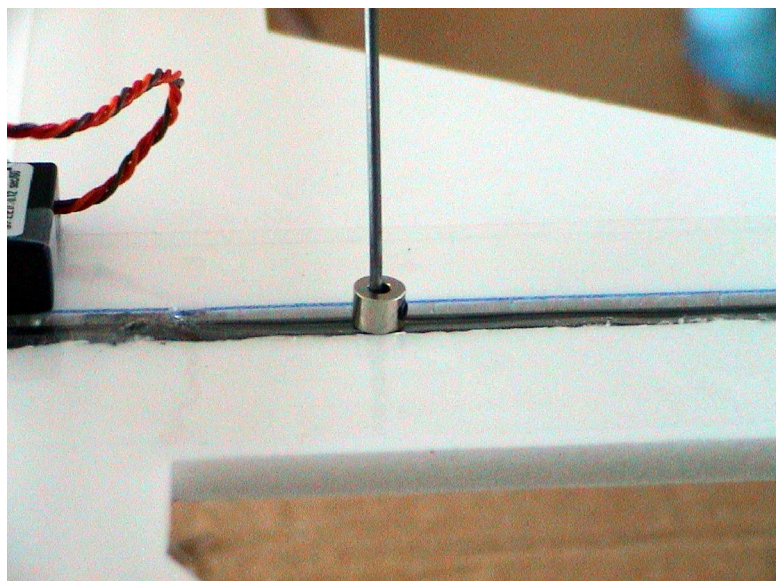


Push landing gear strut through from the top of the 29" rod holes that have been drilled according to the plans and retain with a collar below the wing. The wheel is held on with a collar using the set screw as the axel. Match the horizontal bend to the holes drilled into the shaft.

(one inch between bends)
File a flat spot on the wire for the wheel axel screw.

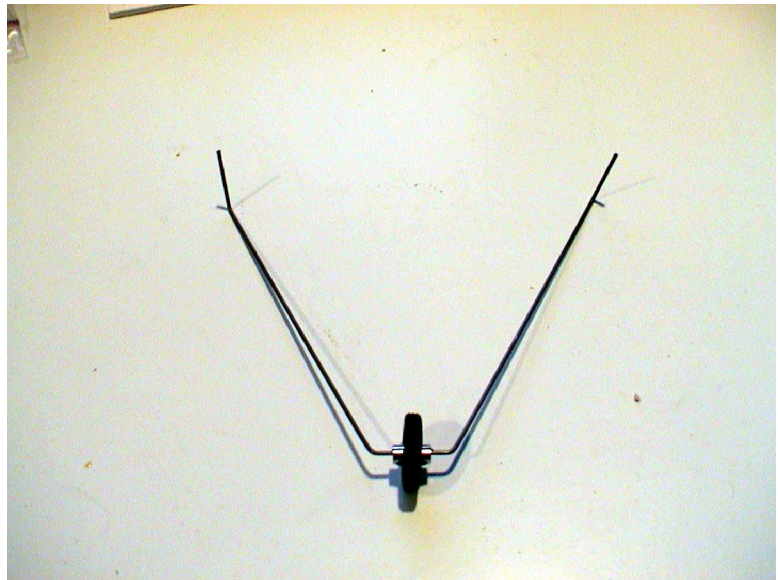


The wheel position should be approximately 15° behind the Center of Gravity. (see plans)
Too far back and you will have a hard time rotating for take off.

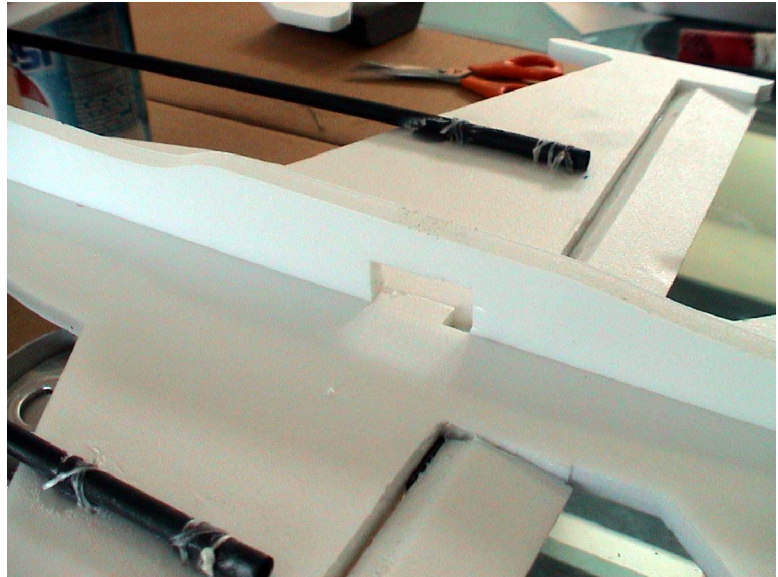


Nosewheel is centered with wheel collars.
Modify the length of the landing gear to suit your flying field.

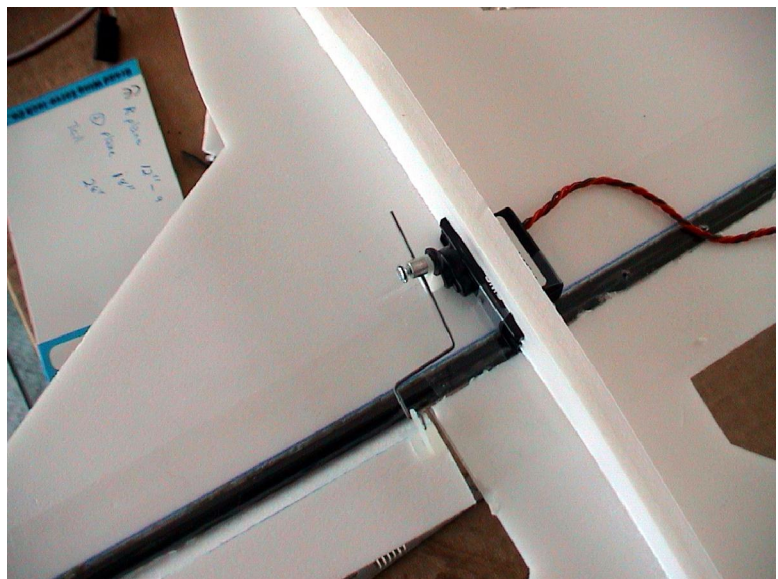
Wires are inserted into the leadplane's rods with a dab of epoxy.



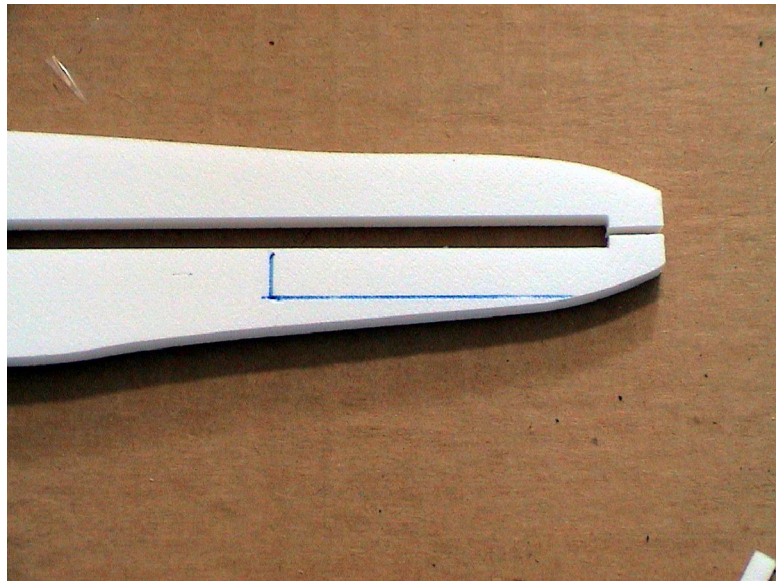
Servos are glued into cutout in the fuselage of the outboard planes and the tailplane.



Use the bent control rods to connect to the control horn.
Insert control horn at the edge of the bevel



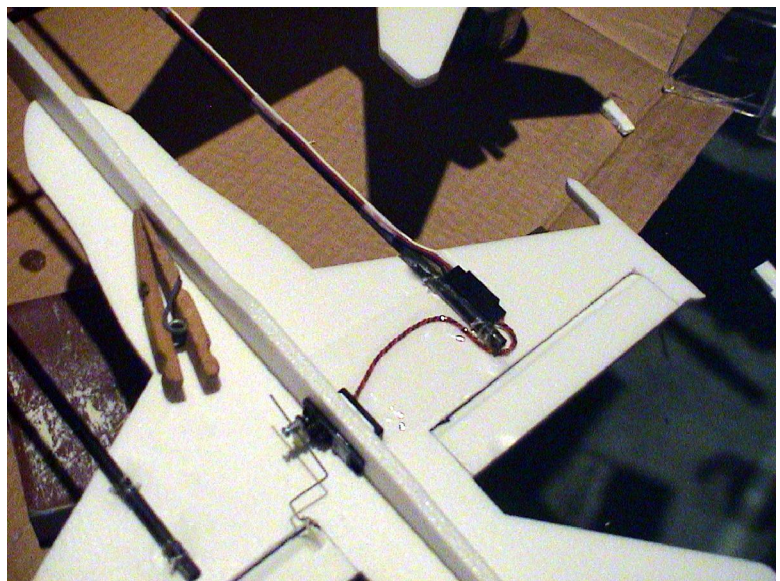
Cut away the rear bottom fuselage of the lead plane to mount the motor mount stick with glue.



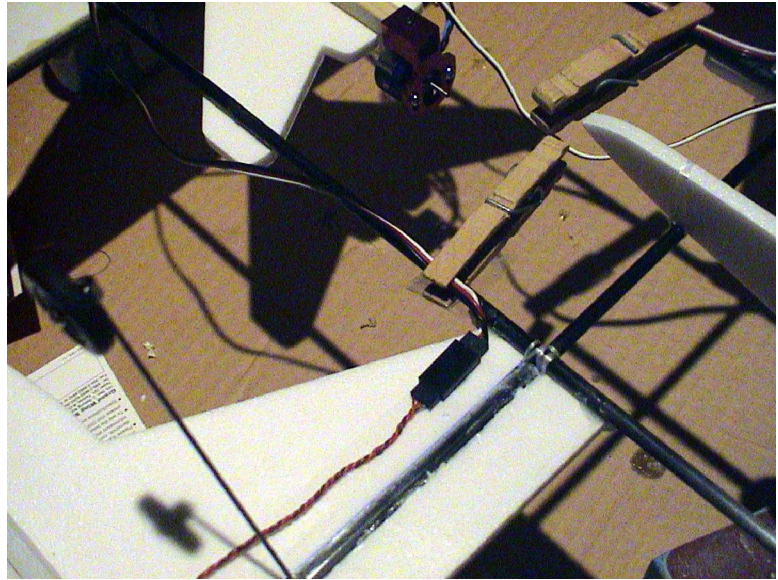
Glue stick and place weight on it while it cures.



Tape servo wires down.



Use clothespin to hold wire while taping.



Paint with a foam safe paint. Paints designed for plastic models works well.

Flying

Point the plane into the wind, give it full power and rotate for take off at about 50 feet. The large vertical fin causes the plane to weather vane into the wind. Cross wind take offs are impossible.

The plane is remarkably stable. There is no pitch sensitivity and rolls are smooth and predictable. There must be a Delta wing effect as there is no dihedral. The control surfaces are ample for scale like flight. You may wish to link the ailerons of the outboard wings together like the elevator to get more response. The plane has a pretty fast sink rate with power off. 25-50% power on landings will get you down safely. Be prepared for the gathering of friends and onlookers. You have an unusual plane that attracts attention.

Parts used

6 mm Depron foamboard
6 mm carbon / aluminum tubing two 23" one 29" one 17 3/4"
1/64" plywood
foam safe glue
unwaxed dental floss
bamboo sticks
1/16" wire
5" x 1/2" mounting stick
Stick motor mount
300DF Aurora brushless motor
5 x 4.5 Gunther prop
Phoenix 10 brushless controller
GWS 6 channel Receiver OR four channel with "Y" extension

Fullymax 1050 mAh LiPoly 3 cell battery
Two 12" servo extensions
One 24" servo extensions
One 4" servo extension
Three GWS pico servos
Three GWS SCW-254/13 wheels (one inch)

Formation Flyer

Wing span 30 inches (12 inches each)
Length 39 inches (17 1/4 inch each)
Weight 10 oz dry
Throttle / Aileron / Elevator
Aurora 300DF brushless motor
Gunther 5 x 4.5 prop
1050 mAh LiPoly 3 cell battery

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