

Funfly "Electromaniac"

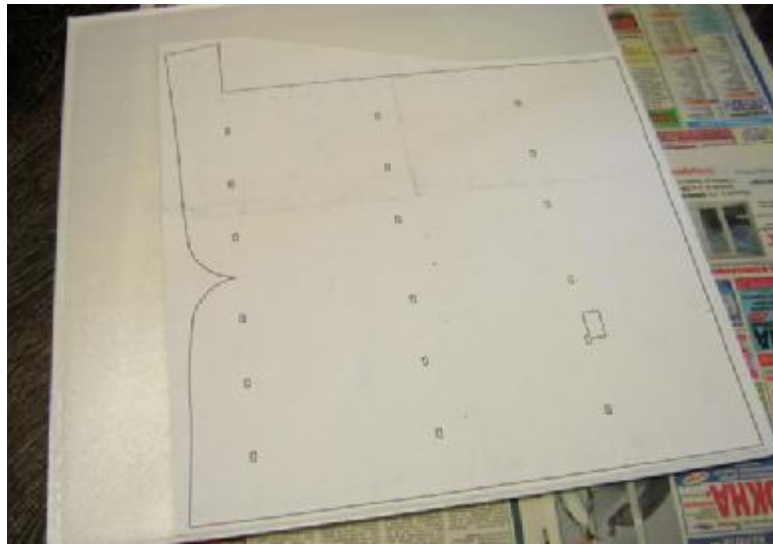
31.5" (800mm) wing span

Assembly manual.



I will begin with a description of the wing assembly, as this is the most technologically complicated part. It is important to determine in which direction depron sheet bends better - rib cuts must be placed along this direction.

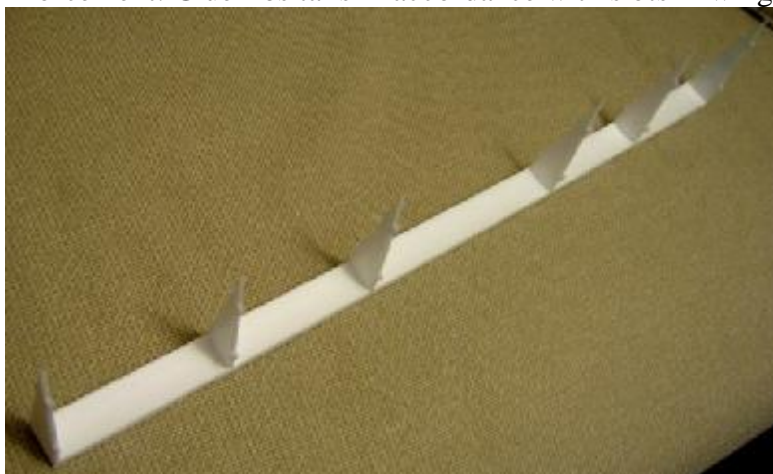
Glue printed drawing to the depron sheet with paper glue stick. So it can be then easily torn off.



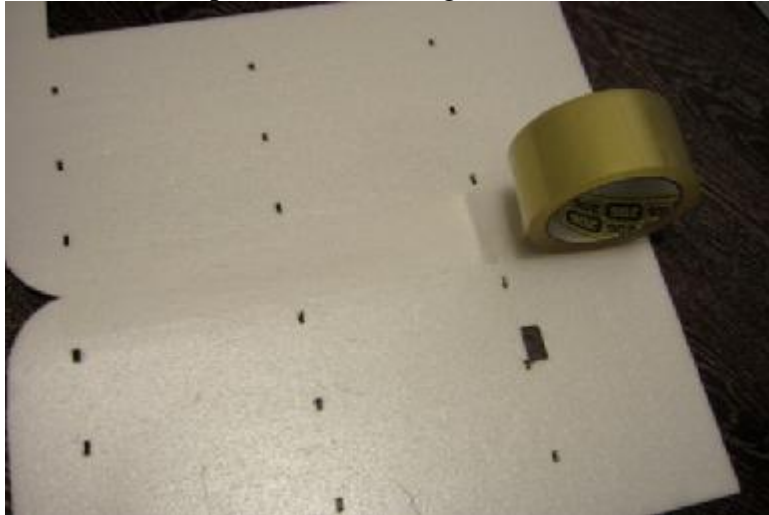
Cut depron through the paper. Use a steel ruler on straight sections, cut curves - by hand. It's important to use sharp blades and if required change the blades often, otherwise you may tear depron. When you cut a hole for the servo, verify its size.



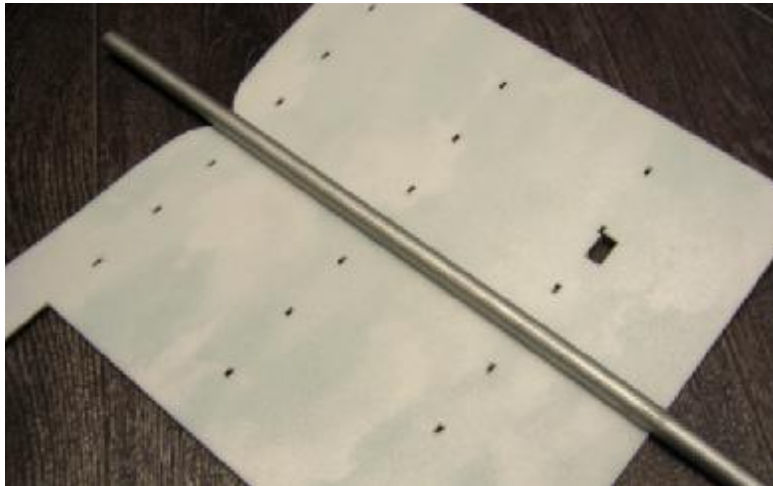
Cut the ribs and spar. I do spar out of the dense ceiling moldings. In this case the wing doesn't need any reinforcement. You can glue the spar of two sheets of depron, or use a thicker material, but then you have to use additional carbon-fiber rods at the top and bottom of the spar for reinforcement. Glue ribs tails in accordance with slots in wings shells.



While the inner parts of the wing are drying, continue with the wing shells. Before you do the folding, you must stick a strip of adhesive tape to the outside of the wing shell. This will prevent the destruction of depron while bending.



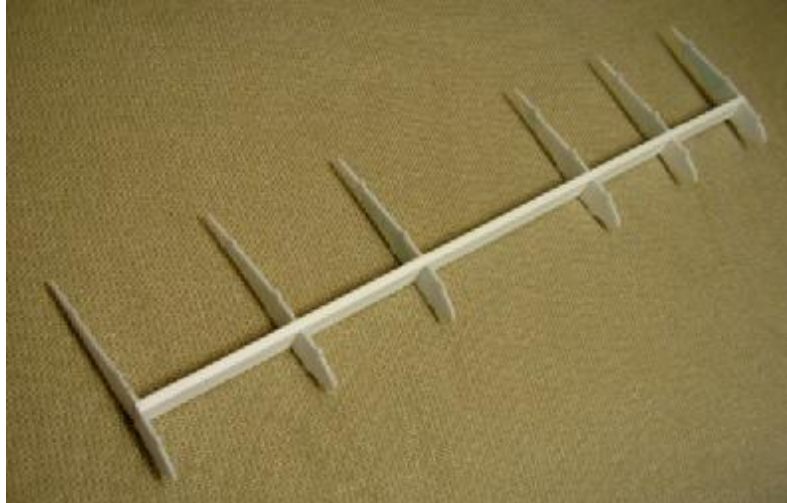
Flip the pattern and roll the place of bending with the tube. Then, holding the tube, gently begin to bend.



Bend the leading edge with fingers so that the depron shell will keep the shape of the ribs. Then you will get the wing with the right profile shape and without sags between ribs.



Glue ribs noses to the spar.



Now the time to sand down the edge of the wing shell. On the edge for mounting aileron use a blade to cut 45 bevel. Another edge must be sanded so that it almost goes down to nothing and length of sanded region must be 7-10mm.



In one go glue the ribs and spar to one side of the wing shell. And while the glue is fresh glue another side and wrap the wing shell. Then you have to hold the wing for some time to let it dry.



Glue the other part of wing shell.



Cut the edges on wing tips at 30-45 degrees. Glue the edge and fix it with the adhesive tape to make it stick together.



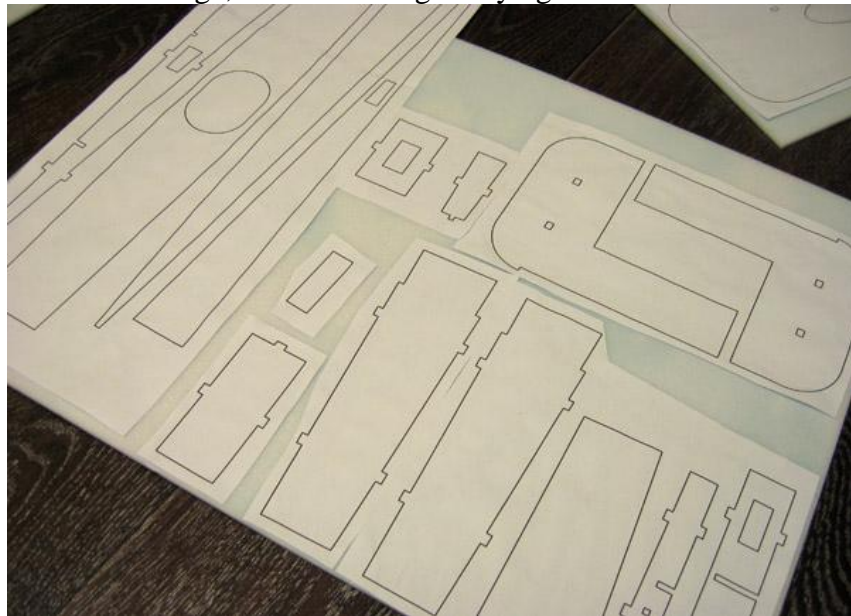
After drying of the glue you can remove the tape.



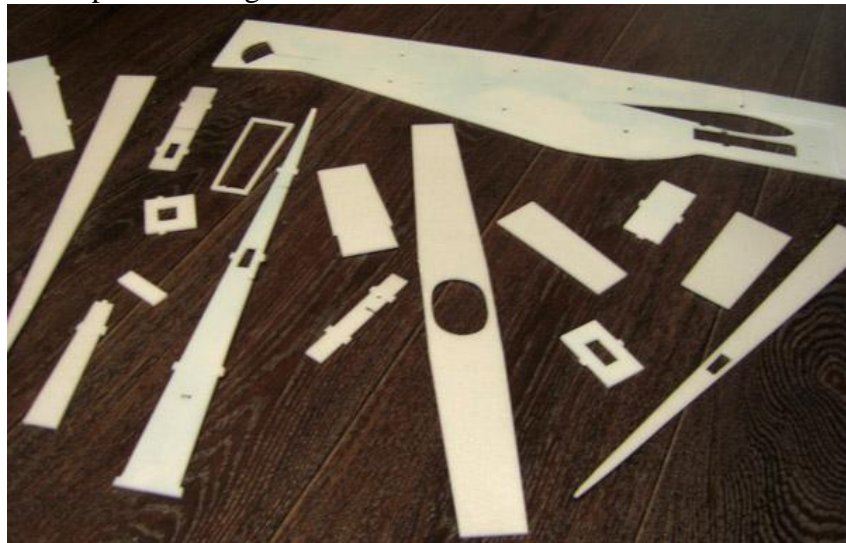
Put the wing under the load so spar and trailing edge stick along the entire length, and the wing had no twist.



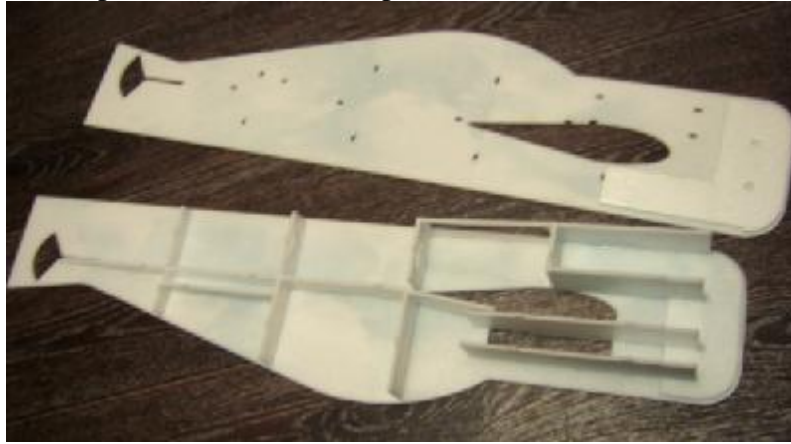
Let's make the fuselage, while the wing is drying.



For parts like cowl and top side of the fuse, it is important to place them and cut in the way of the easiest depron bending.



Glue all the parts according to drawing. First, glue pads of engine motor frame to the fuselage halves, then glue the central stringer, and then all the fuselage formers and stringers. Wait until everything is dry. Note that, only the frame is glued under the wing. Hatch for electronics will hold in place with adhesive tape.



Glue in the plywood motor frame, the fin and glue the fuselage halves together. Place the fuselage under the load, make sure the halves did not shift.



While fuselage and wing are drying, let's make the horizontal stabilizer and the control surfaces. If you want to build a light aircraft, the stabilizer should be single-layered (3mm thick). If you want the aircraft to be under 370 gr., control surfaces can be dual-layered (6mm thick). Thicker stabilizers will allow greater precision in all maneuvers. (The photo shows double control surfaces and stabilizer). The ailerons can also be dual-layered, but the control is less affected.



Let's go back to the wing. If you have placed the pressure on the wing as shown on the photo above, after drying, wing tips should fold down.



This can be easily fixed with adhesive tape and an iron. The trick is to select the temperature, so the scotch-tape can stretch and Depron does not melt.



Tape used for holding wing tips together must be removed. Carefully apply a new layer of scotch-tape. Iron where it is necessary to shrink the tape for the wing tip to become flat. After this operation do not remove the scotch-tape.

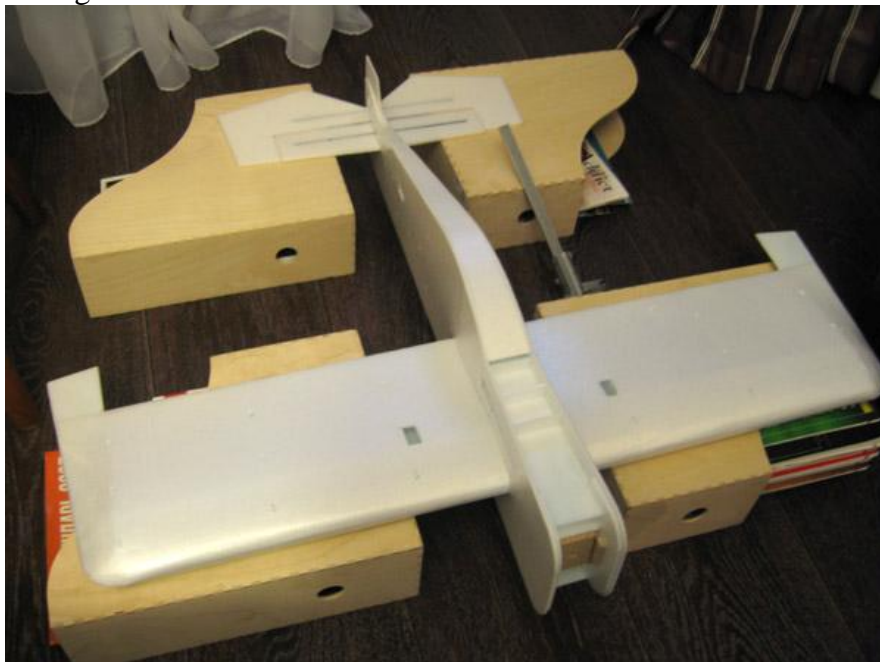


55-60gr. is normal weight for the wings assembly.

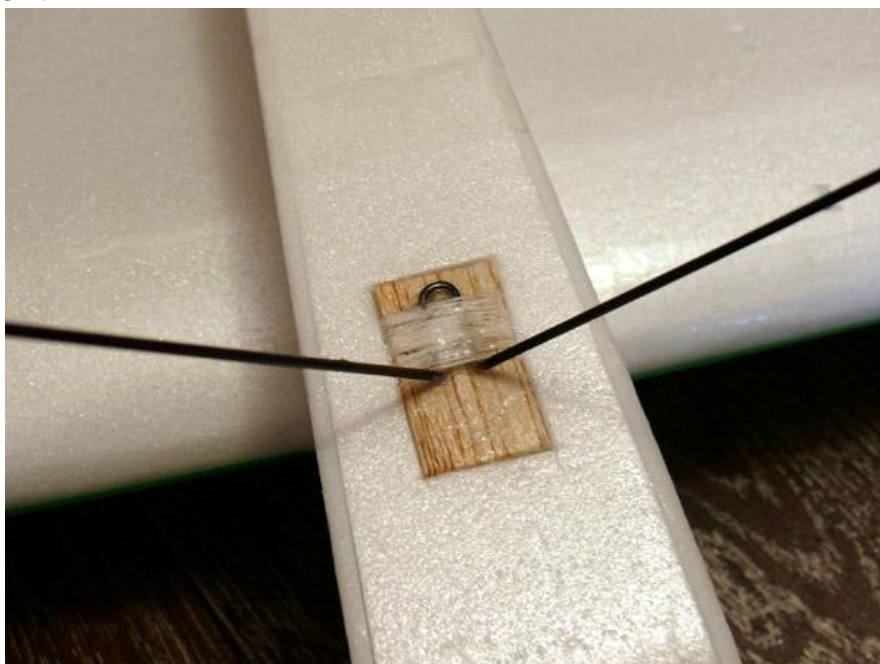


Glue the top, the bottom and the cowl to the fuselage.

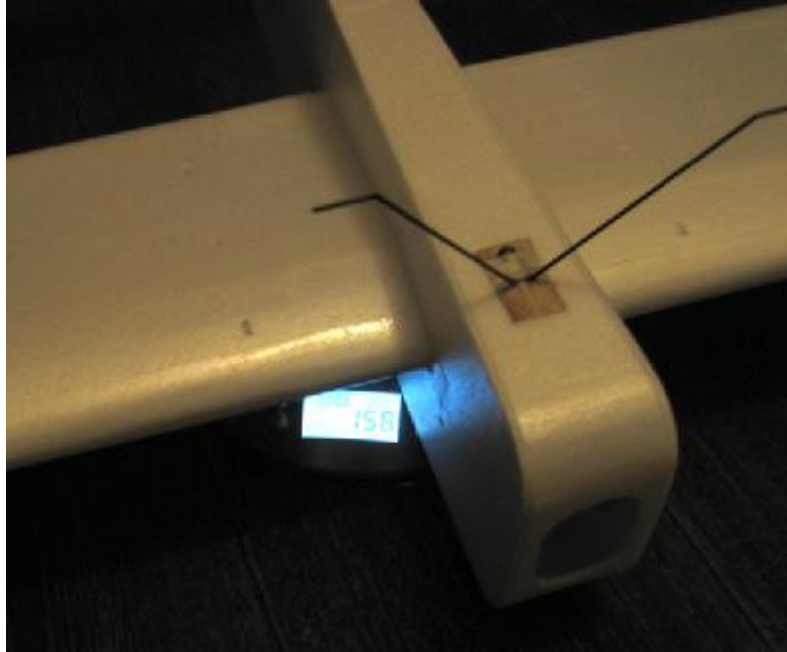
Glue horizontal stabilizer and the wing to the fuselage. In order for all the parts to be on the same plane, you can make some sort of building berth out of books. Before gluing make sure that the wing is perpendicular to the fuselage. Otherwise you'll need to use your knife to make things match.



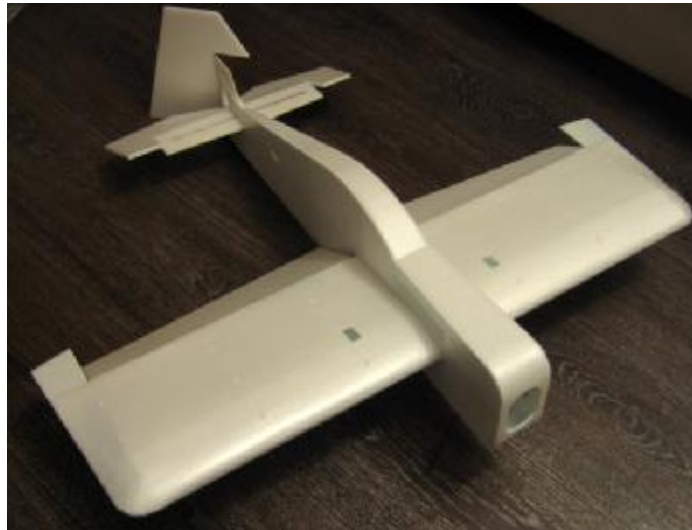
Make undercarriage support from balsa wood. Glue undercarriage with the help of threads and CA.



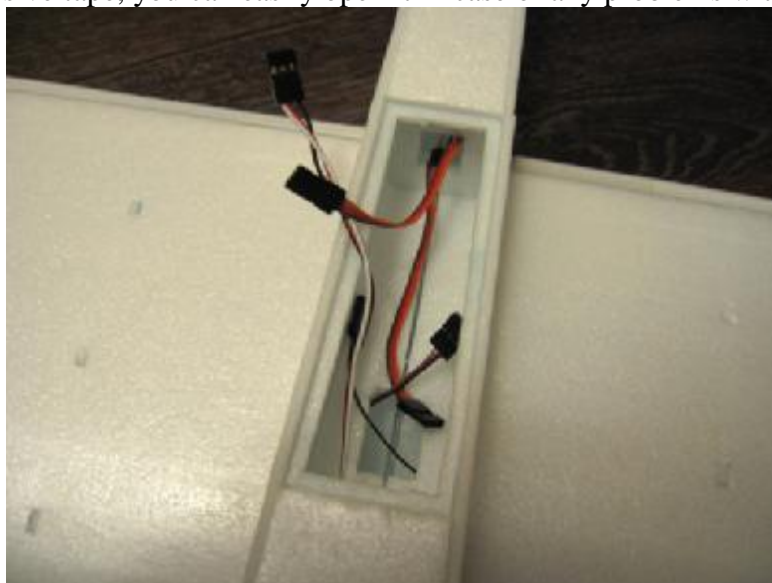
Weight of fuselage should be 155-165gr with double-layer control surfaces.



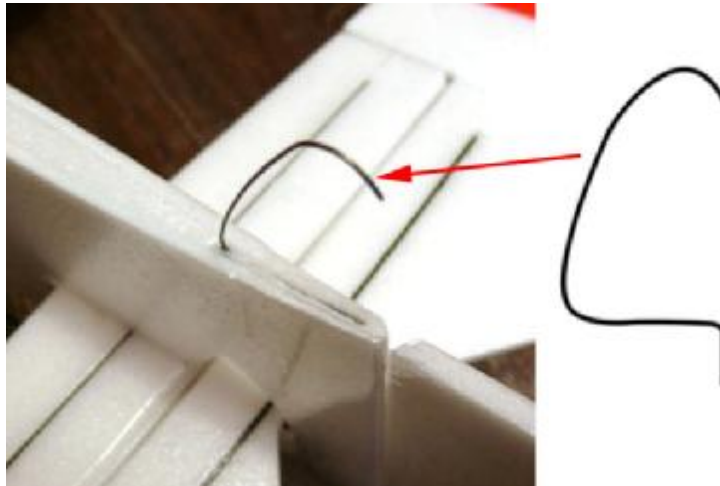
Control surfaces hold in place with adhesive tape. One large strip of tape on the top, 3 small peaces on the bottom.



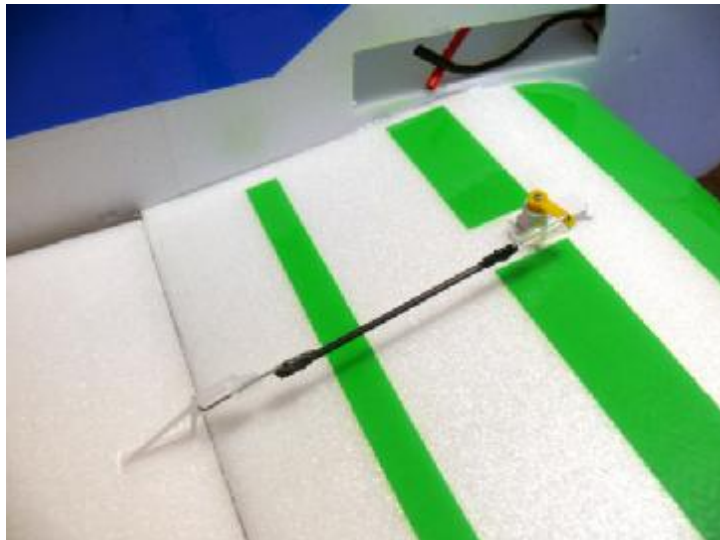
Glue all servos in their places and output all the wires through the hatch at the bottom (you will need servo extensions, approximately 100mm for tail servos). Glue receiver with Velcro double-sided tape to the bottom of the wing and connect all the wires. Close hatch and glue it with adhesive tape, you can easily open it in case of any problems with electronics.



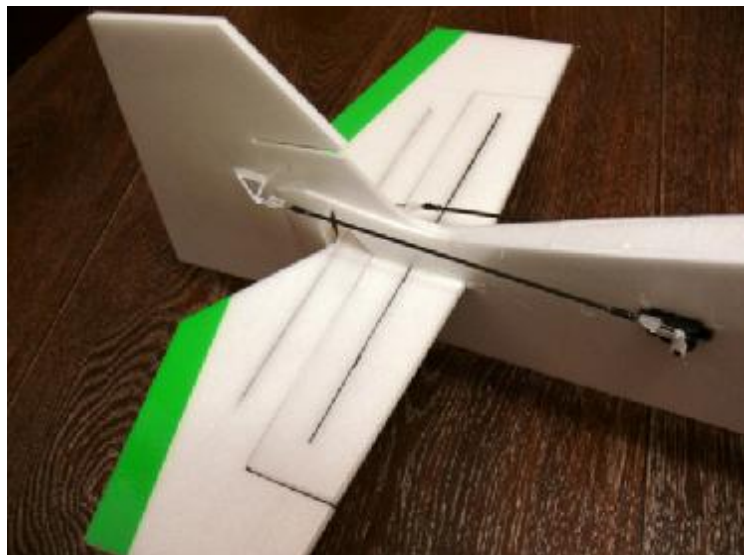
Make a slot at the tail of the fuse and glue in a wire formed as shown on the photo. Glue it with CA and apply CA accelerator fast so that depron would not melt, or use 5min epoxy.



Control horns must have 11mm between control surface and the hole where pushrod is connected. All the control horns are situated on the side opposite to the slot. Otherwise the leverage will increase to the thickness of the control surfaces.



I'm using 2mm carbon fiber rods with end hooks made of paper clips. I'm fixing them with CA and threads.



That's all, you have assembled it! Paste colored tape or paint the airplane as you wish.

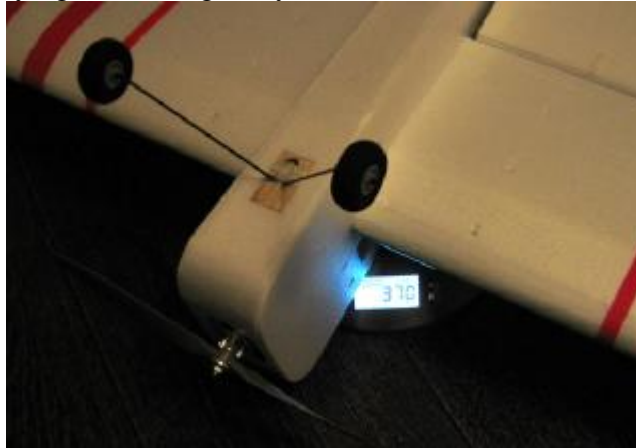
Recommended setup:

- Engine: Turnigy 2209 or similar
- Prop: APC 10x3.8
- ESC: 18A,
- Battery: Turnigy NanoTech 850mAh 3S,
- Servos: HXT500, or similar in weight

With this setup, fully assembled aircraft with dual-layer control surfaces will weight around 370g.

For more precise control, I recommend to replace the servos with digital ones, for example PowerHD DS65HB, or better analog.

Recommended position of center of gravity is 80mm from the leading edge of the wing. For 3D flying center of gravity can be shifted down to 100 mm.



You can build a very light aircraft with incredibly low wing loading - 15g/dm². Firstly, you have to use single-layer control surfaces, and secondly, use the following equipment: Engine: 2205 or 20-30gr. bell engine up to 1500kv. ESC: 12A, propeller – 8x3.8, 9x4E, battery - 500-850mAh 3S, servos - Micro, 5g (for example digital BlueArrow D05010MG). In this case, you can build an aircraft weighing 300-320g. But it will only fly in a dead calm or indoors. Small load on the wing will let you to fly in a very small area.

You can find additional information on the build here:

<http://www.rcgroups.com/forums/showthread.php?t=1552162>

Good luck and see you on the flying field!

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