

## **Yak 54 3D/aerobatic EPP model**

### Building instructions

Please refer to the Diagram sheet

#### **Diagrams A, B**

Press 2 carbon strips (3x0,5x800 mm) into the grooves in the sides of the fuselage central part (the „backbone“). Position the backbone on your workbench on its side, gently press if necessary and make sure that the sides are perfectly straight. Apply thin CA glue over the carbon strips and saw off their overhanging ends.

#### **Diagram C**

Use thin or medium CA to attach the wing halves to the backbone. Note the little tabs that should help you position the wing halves correctly. (put some down pressure on the thickest part of the root of the wing first to set the wing at 0° incidence). **Caution!** The backbone should be in inverted position, i.e. the elevator cutout facing down and the wings should be attached with their bottom side up! If you get this wrong, your elevator will not fit into the fuselage correctly.

#### **Diagram D**

Locate two carbon rods of 1.5 mm diameter. Use sharp hobby knife to cut shallow (3-5mm) slits into the upper and lower surface of the wing as indicated. Press the two carbon rods into the slits. Make sure that the wing is perfectly straight (press gently down on the workbench) and apply thin CA glue over the carbon strips.

#### **Diagram E**

Cut shallow slits into the elevator upper and lower surface as indicated. Press in two 120 mm carbon strips. Make sure that the elevator is straight and apply thin CA glue over the carbon strips.

#### **Diagram F**

Glue (using thin or medium CA) the canopy (made of black EPP) into place. Use sharp hobby knife to separate the fuselage upper and lower parts, cutting through the center of the little tabs.

#### **Diagram G**

Put the backbone on your workbench in inverted position (the stabilizer cutout is again facing down). See the slot in the lower fuselage part to position the landing gear mount correctly on the backbone. Use thin CA to glue the mount to the backbone.

#### **Diagram H**

Connect the lower fuselage part to the backbone using thin or medium CA or contact glue. Install the stab/elevator into the assembly using thin or medium CA (check its proper alignment first).

#### **Diagram I**

Drill holes into the landing gear as indicated.

#### **Diagram J**

Use the two little screws to secure the landing gear to the backbone mount. Assemble the landing gear as indicated. Gluing the EPP wheel pants to their mounting tabs is the last step of the LG assembly.

#### **Diagram K**

Now is the convenient time to install aileron servos. Cut appropriate slots into the wing lower surface using sharp hobby knife. Make the slot somewhat smaller, for a tight fit. Use hot glue or thick CA to install the servos. Cut into the ailerons and press in the aileron control horns. Make sure your servos are centered (with zero trim). Use the included pushrods, the Z-bend goes into the control horn. You may use your favourite method to connect the pushrods to the servo arms. Making another Z-bend is the easy solution, in such case make sure that the aileron is in neutral position and glue the control horn into the aileron as the last step. In any case, make sure that the hole in the control horn is approximately above the hinge center line.

#### **Diagram L**

Cut into the rear bottom part of the fuselage and install the tailskid using thin CA, as indicated. Attach the upper fuselage part to the backbone using thin or medium CA.

#### **Diagram M**

Cut appropriate slits into the fuselage rear part and the rudder, as indicated. Install the rudder using the two plastic hinges. Make sure that the rudder throws are sufficient and apply some thin CA glue into the hinges.

#### **Diagram N**

Assemble the motor mount as indicated. Use thin or medium CA glue or epoxy and make sure that all is glued well.

#### **Diagram O**

Locate one toothpick. Cut it in half. Use thin or medium CA to glue the motor mount into the fuselage front. Use the toothpick halves to pin the motor mount into the upper and lower fuselage part; glue with thin CA.

Now is a good time to install your outrunner type electric motor (one type that fits well is the Hyperion 2213 series or similar).

#### **No Diagram**

Locate rectangular piece of flat EPP foam. Use thin CA to glue its shorter sides together – you will get nice cylindrical motor cowl. Pull the cowl over the motor mount and fuselage front as far as possible – no need for glue as the cowl holds in place quite well just by friction.

#### **Diagram P**

Install rudder and elevator control horns as indicated. Use sharp hobby knife to cut the appropriate slits and (thin CA) glue the control horns into place.

#### **Diagram Q**

Note the recommended servo locations. The elevator servo is in the side wall of the backbone, right below the carbon strip. Use sharp hobby knife to create the necessary slots. Use thick CA or hot glue to install the servos. Make sure that there is a place for the receiver within the reach of all servo cables (so that no extension cables are needed).

#### **Diagram R**

If you like the idea of pull pull cables (we do), do as follows:

On the side of the control horn, tie the line to the outer hole. Use small drop of CA to secure the knot and prevent the (rather sharp edged) control horn from cutting through the line.

Locate the extension servo arms and (CA) glue the small white „beads“ coaxially with the outer hole of the extension servo arm. Drill through the outer hole using a 1,5 mm bit. Apply M2 screw cutting tap to the hole. CA glue the extension arms to your original servo arms and secure with few threads of the kevlar line and a drop of CA glue. Finally, thread in the included plastic M2 screw and use it to pinch the line in the right position and with moderate tension. The line should lead around the outside of the screw below the servo arm first – please refer to the diagram.

Or you can use your own preferred method to attach the cable to the servo.

#### **Final setup and flying**

We expect that you know how to connect the receiver to the ESC and to the servos, the ESC to the motor etc. If not, please refer to the respective instructions or better ask some more experienced friend.

#### **Control throws**

For “hardcore 3D” flying, use the full range allowed mechanically. For aileron, measure the max down throw and set the up throw to equal amount.

For first flights and for less confident pilots, we recommend setting the throws to 60 - 75% of the maximum amount. If possible, use also exponentials of 30 to 50%.

For first flights, your C of G should be 0 to 5 mm behind the tab in the wing root. Attach your battery to the plane using adhesive velcro tape for the first flights, to be able to adjust the CG easily. Set control throws at 60% of max and 30% of exponential on all controls (if your radio permits). Check all systems and go fly. To trim the plane correctly, the weather should not be too windy.. First, trim all controls coarsely to make the plane appear to fly straight. You should need about the same amount of elevator for both inverted and normal flight. You may try vertical power off dive to trim the neutral elevator.

Your aileron trim should be the same in normal flight and inverted. If it is not, you may have a lateral balance issue. Try to move the battery pack sideways (say to the opposite side of the fuselage), if you can, to fix this problem.

After this, you should play with the thrust line to setup for clean and effortless hover without any tendency to “pull out” to any side. This may take a while and require quite a few tests. The thrust line can be changed by inserting thin washers on the screws holding the motor, between the motor mount and the motor.

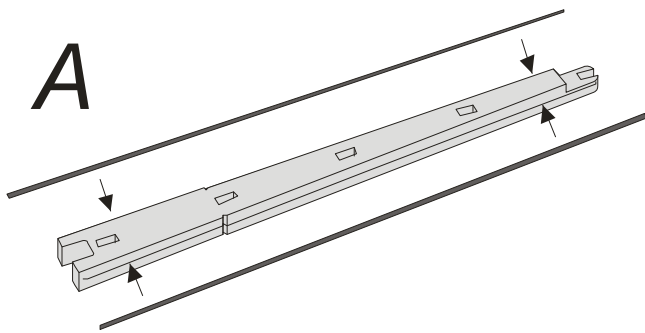
Next thing, the center of gravity. We prefer the plane to fly almost “hands off”, just the slightest bit of elevator needed for level flight. Move the C of G vertically (by moving the battery pack) to get a perfect knife edge without any tendency to roll.

For clean rolls, without any coupling to yaw, you may want to play with aileron differential (different up and down deflection of ailerons).

**Have fun! Your RC Factory team.**

Technical specs:

Wingspan	1020 mm
Length	980 mm
AUW	380 – 460g
Motor	120 – 150W outrunner type (Hyperion 2213/20, Axi 2212/26, HCS 150W etc)
Servos	4pcs of 9 – 12g servos of good quality
Battery	Lithium Polymer 650 – 1200 mAh 3s



carbon 3x0.5x800 mm

bottom side of wing facing up!

elevator cut out down!

