Zlín Z-37A Čmelák ("Bumblebee”) 850 mm

Assembly Instructions and recommended equipment of the RC model

Technical information:

Wingspan:	850 mm
Overall Length:	610 mm
Flying weight:	~380 g
RC Functions:	Rudder, elevator, ailerons, motor, (optional flaps)

Recommended equipment:

Brushless motor:	Emax CF 2812 or Turnigy D2822/14 - 1450kv	1 pc
Electronic Speed Controller (ESC):	Brushless 12-15 A	1 pc
Propeller:	GWS 8x4 + prop adaptor	1 pc
Servos:	Micro 5-6 gram	4 pc (+1 optional for flaps)
Battery:	3S Li-Pol 800 - 1000 mAh	
Receiver:	4-6 channels	

Parts included in the set:

Fuselage parts	2 pc
Center section of the wing	1 pc
Outer Wing parts (left hand + right hand)	2 pc
Engine cowling	1 pc
Engine shutter – 3D printed part	1 pc
Tail group (empennage)	2 pc
Main Landing gear wire (ø 2 mm)	1 pc
Main Landing gear wheels	2 pc
Tail Landing gear wheel	1 pc
Steel wire for pushrods (ø 1 mm)	1 pc
Pushrod tube (Plastic, inner ø 1 mm)	1 pc
Foil for windshield	1 pc
Sticker for the windshield	1 pc
Rear windows	2 pc
Plastic tubes for landing gear	6 pc
Aluminum tubes for landing gear	2 pc

Set of Fiberglass parts (motor bulkhead, control horns, hinge levers etc.)

Parts needed for the finishing of the model:

Carbon Strip (stringer) 3x0,5 mm	2 pc
Pushrod connectors (linkage stoppers)	4 pc

Adhesives:

- Cyanoacrylate (CA) glue (super glue) thin + medium
- Activator (Kicker) for Cyanoacrylate glue
- Polyurethane (PU) glue (e.g. Ponal PUR glue in bottle or UHU PU MAX in bottle or Purex Rapid)

Tools needed to assemble the model:

A sharp knife or scalpel, pins, drywall sanding mesh, steel ruler, soldering iron, paint (water based, synthetic or color spray cans: **Montana**, DupliColor, PrismaColor…) and common model building tools.

All parts are glued with super glue (CA), unless stated otherwise.

Before starting the assembly, read carefully the Assembly Instructions!

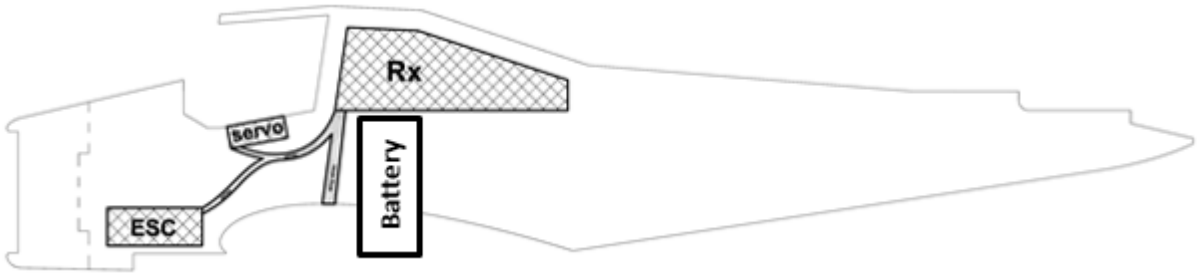
Assembly procedure:

All larger EPP (Expanded Poly-Propylene) parts are to be glued by the following procedure:

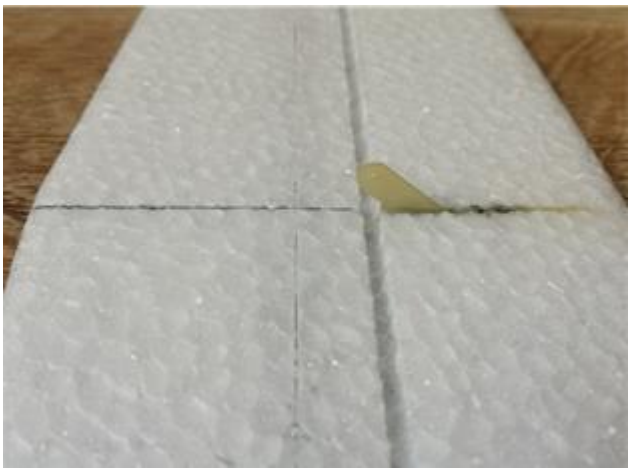
Apply the PU glue to one of the surfaces to be joined and only in the center of the part - approx. 8-10 mm from the outside perimeter of the part shall not be covered with the PU glue to avoid the PU glue foaming out of the surface and making the joint less attractive. Then put both glued parts together, align them and fix together with pins. When both surfaces match each other, apply thin CA glue to the whole outside perimeter of the joint and use CA activator. The CA glue prevents the PU glue to foam out of the joint.

Fuselage:

The electronic parts shall be placed according the picture. The receiver behind the cockpit, the motor Electronic Speed Controller (ESC) between the wing and the engine cowling and the servos for the rudder and elevator in the cockpit. The opening for the battery shall be made after the whole model is finished to maintain the correct position of the Center of Gravity (CG).

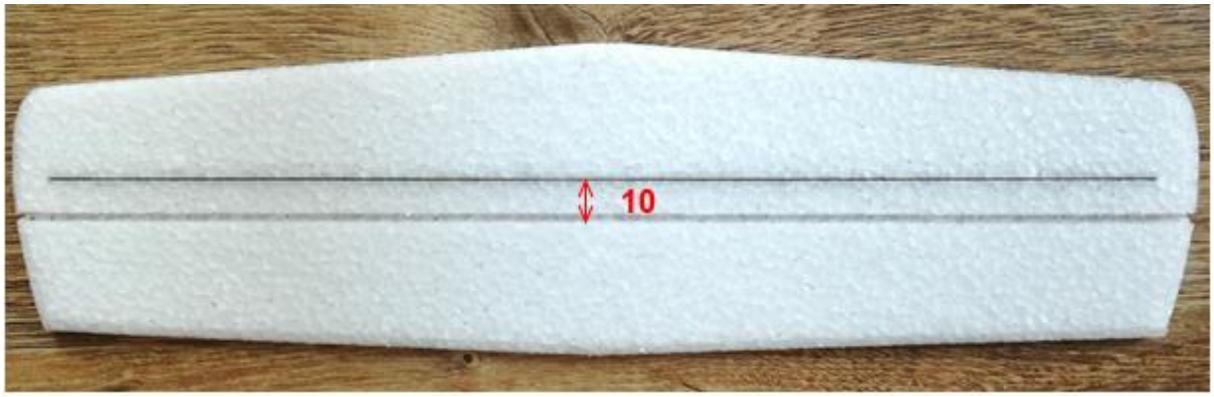


Draw a center line on the horizontal stabilizer. Cut a piece of the carbon strip (stringer) 3x0,5 mm to the length of approx. 280 mm.

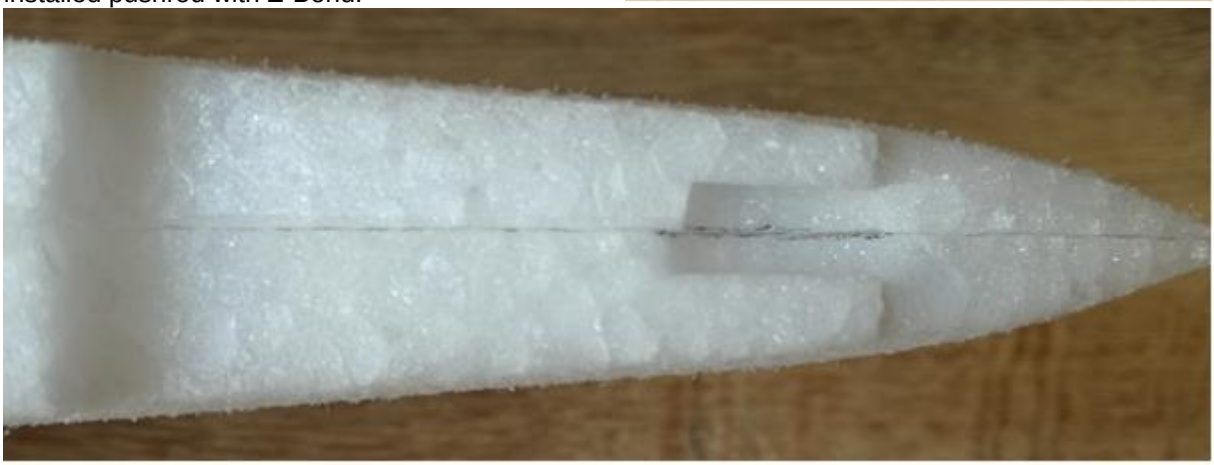


Cut a slot into the center of the elevator on the bottom side for the fiberglass control horn and glue it in place using thin CA.

Cut a slot for the carbon strip into the horizontal stabilizer, approx. 10 mm parallel to the elevator “hinge” (using a sharp knife), press the carbon strip in the slot on an even surface and check, if the horizontal stabilizer is straight and glue the carbon strip using thin CA.



Place the horizontal stabilizer on one part of the fuselage (with the control horn in the elevator facing the inside of the fuselage) and mark the position where the control horn will move during elevator operation (with enough space around the control horn).
Do the same also on the other part of the fuselage.
Cut the space for the control horn using a sharp knife of hot soldering iron in both fuselage parts.
The control horn must move freely with the installed pushrod with Z-Bend.



Right-side part of the fuselage:

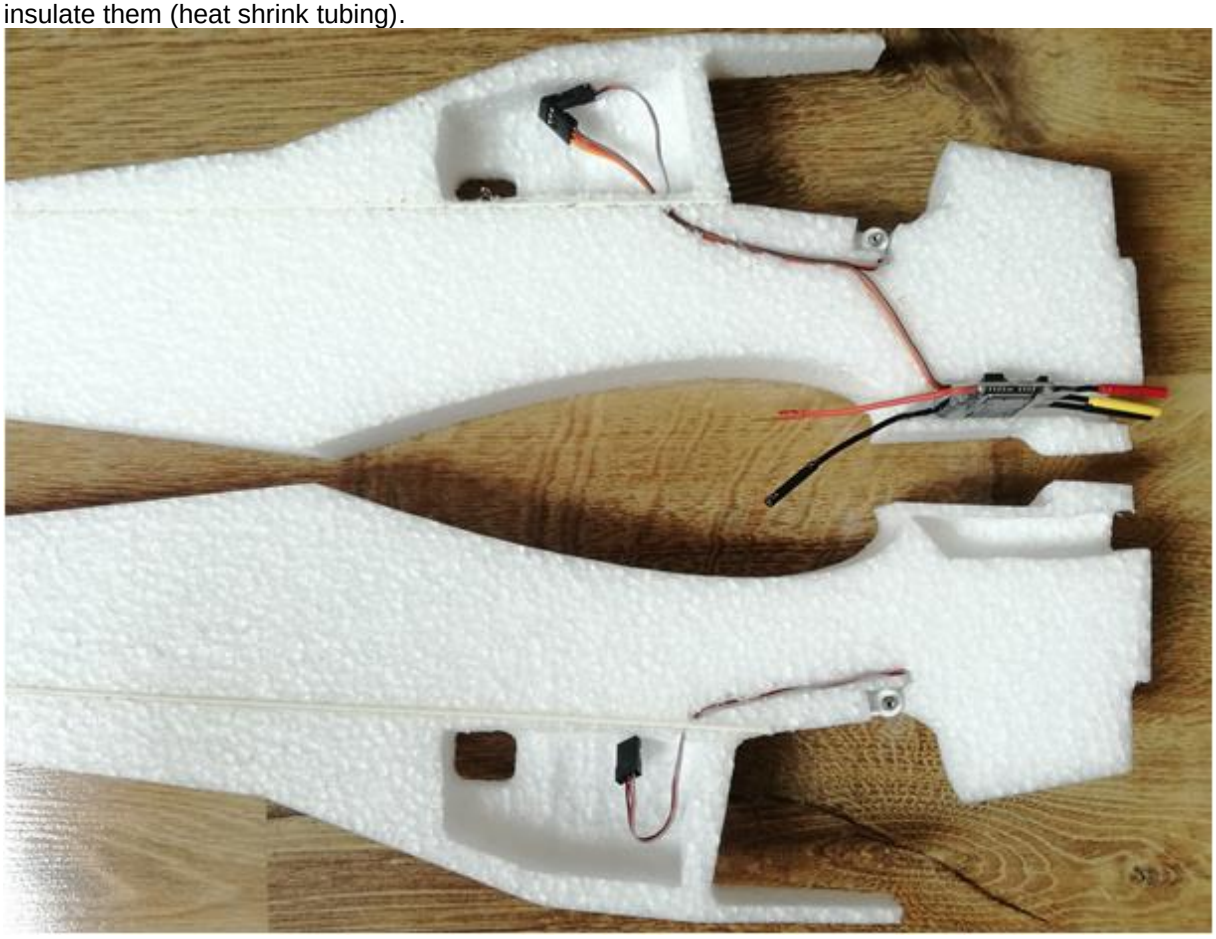
Create a Z-Bend on one end of the steel wire ø 1 mm for the elevator and push it through the plastic pushrod tube.
Insert the Z-Bend in the control horn from the right side (seen in direction off light) and place it together with the horizontal stabilizer on the right-side part of the fuselage. The pushrod tube hast to run from the elevator control horn all the way to the cockpit, where the elevator servo will be placed. Choose an appropriate position of the servo according to its size and the size of its lever. Guide the pushrod tube with the pushrod to the servo lever in the easiest way, without unnecessary bends.

Prepare an opening for the servo that is 1 mm smaller from all sides than the servo. This gives the servo a tight fit. The servo should be cut so deeply that it is flush with the surface of the cockpit. The servo is glued in after centering the lever and painting the model. Prepare a groove for the servo cable towards the receiver cavity.
Prepare a groove for the pushrod tube inside the fuselage and press in the pushrod tube.
Remove the wire from the elevator control horn, leave it in the fuselage and cut the wire (with reserve) on the side of the cockpit so that a Z-bend to the servo lever is possible later. Alternatively, a variable linkage connection (Pushrod connector - linkage stopper) can be used. Also shorten the pushrod tube.

Left side part of the fuselage + vertical stabilizer:

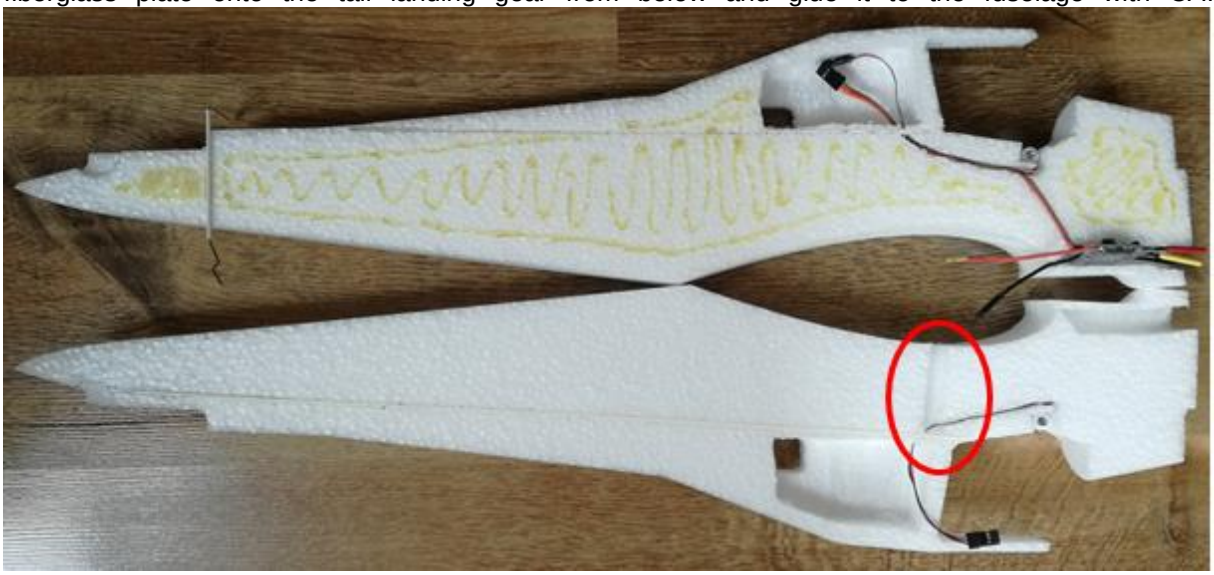
Place the left-side fuselage part (with the inside facing down) and the vertical stabilizer on a flat surface. Pierce the ø 1 mm steel wire, at an angle as in the figure, to the inside of the fuselage and further back into the cockpit. Slide the pushrod tube onto the wire and pull it through the fuselage. The rest of the tube is to cut into the left side part of the fuselage in the same way as in the right side. Cut in the rudder servo, in the same way as the elevator servo, in the right-side part of the fuselage.
Prepare a Z-Bend on the wire again and insert it in the longer control horn, which will later be glued to the rudder from below (the tail landing gear wire needs to be glued between the rudder and the control horn).

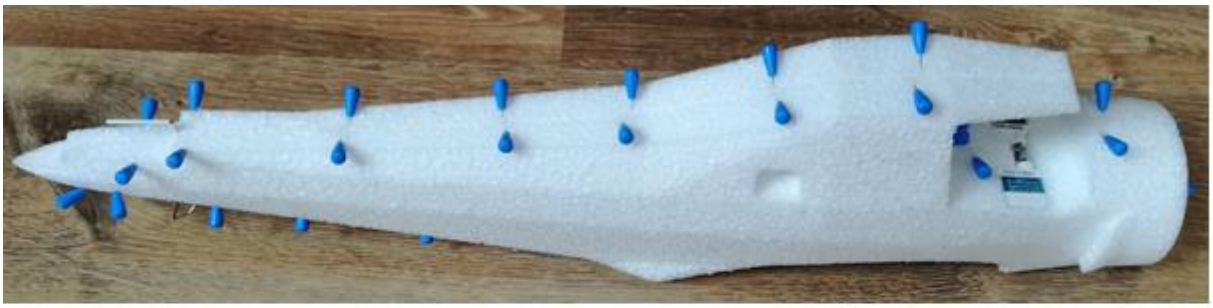
Now prepare the cavity for the receiver in both fuselage parts behind the cockpit. It is best to use a transformer soldering gun with a long wire. Leave a wall between the receiver cavity and the cockpit, it will be cut out after the fuselage is glued together and then put back in place.
Prepare a cavity for the motor ESC in the front lower part of the fuselage in the same way, the wires must reach to the motor. Route the cable to the receiver and attach connectors to the cables and insulate them (heat shrink tubing).

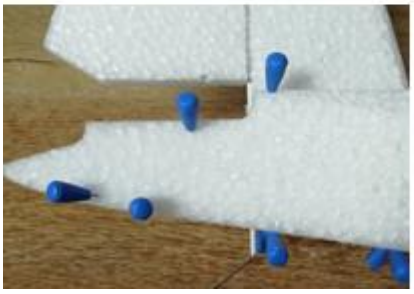


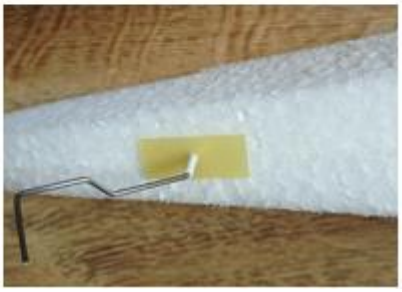
Bend the tail landing gear from the ø 1 mm steel wire according to the drawing at the end of this manual, slide a piece of the pushrod tube on it before the upper part of the landing gear is bent. Turn the left-side part of the fuselage upside down, add the vertical stabilizer with rudder to it, and create a groove for the plastic tube as on the figure. Align the tail landing gear wire to the rudder and fuselage and glue the plastic tube into the fuselage so that the wire is the same height as the bottom side of the rudder. The wire must not be glued. To better bond the wire to the EPP, slide another piece of plastic tube onto the wire and cut it into the rudder even with its bottom surface.

Prepare one more channel in the right-side fuselage part for the servo cables that go from the wing to the receiver, see picture.
Glue both fuselage parts together using the procedure described above (PU glue + CA). Slide the fiberglass plate onto the tail landing gear from below and glue it to the fuselage with CA.



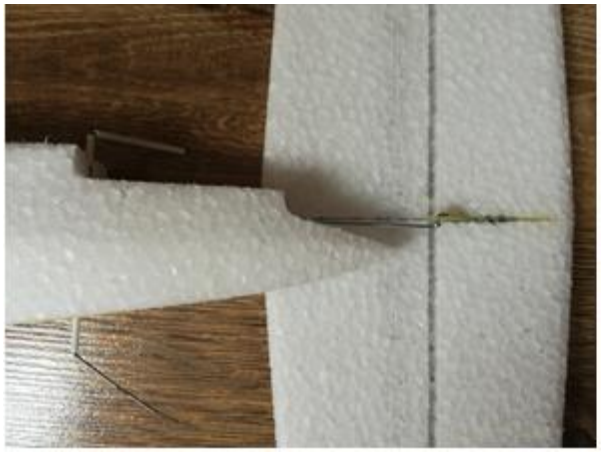




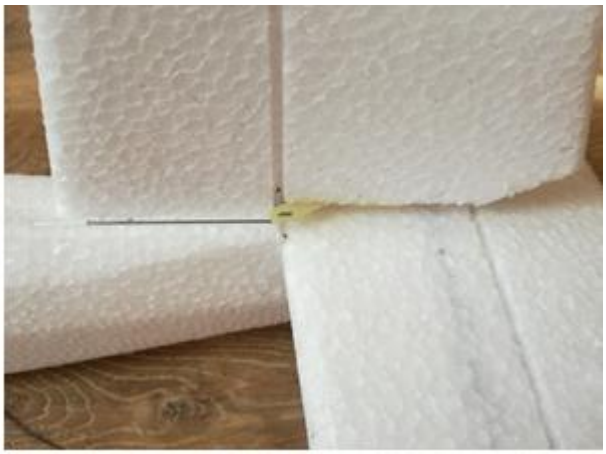


Insert the control horn in the elevator onto the pushrod Z-Bend and place the horizontal stabilizer on the fuselage according the center line.

Check if the elevator can move freely and glue it perpendicular in both directions to the fuselage. Glue it again with PU glue + CA.

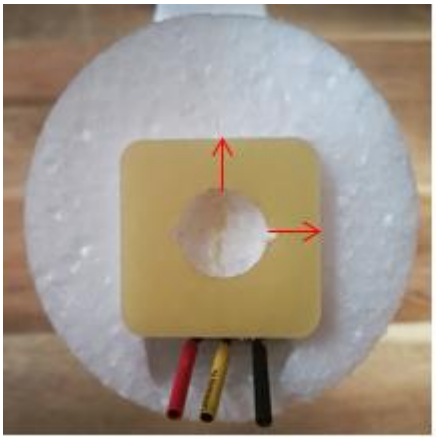


Glue the vertical stabilizer after the glue on the horizontal stabilizer is dry. First glue it to the fuselage and check that it follows the center line of the fuselage and is perpendicular to the horizontal stabilizer. Then glue the tail landing gear wire to the underside of the rudder with the installed plastic tube. Slide the longer control horn onto the pushrod Z-Bend and glue it also to the bottom side of the rudder. **Beware that no glue flows in the plastic tube!!**



We recommend using the Emax CF 2812 motor, as no further modifications have to be made to the fuselage. The motor mount (supplied with the motor) is installed in reverse order, so it is shorter, see picture. ➡

Be careful when gluing the motor bulkhead to its **correct orientation!** The opening in the bulkhead is prepared eccentrically because of the correct side-thrust and down-thrust. The bulkhead must be glued into the fuselage so that the opening is more in the upper right corner (in view from the front), see picture.
Roughen the bulkhead before gluing and glue it thoroughly with CA to the fuselage. Mount the motor and align it slightly to the right and downward (spacer in the top-right corner between motor mount and bulkhead - as viewed from front). Some pieces of the fiberglass plate can be used as spacers and the servo screws can be used for motor installation. Burn small openings through the engine cowling with hot wire from both sides for tightening of the grub screws with 1.5 mm Allen key. After installation and connection of the motor, it is absolutely necessary to glue the motor cables with a drop of CA to the motor mount so that the cables will not be damaged by the rotating part of the motor, see 3rd picture.



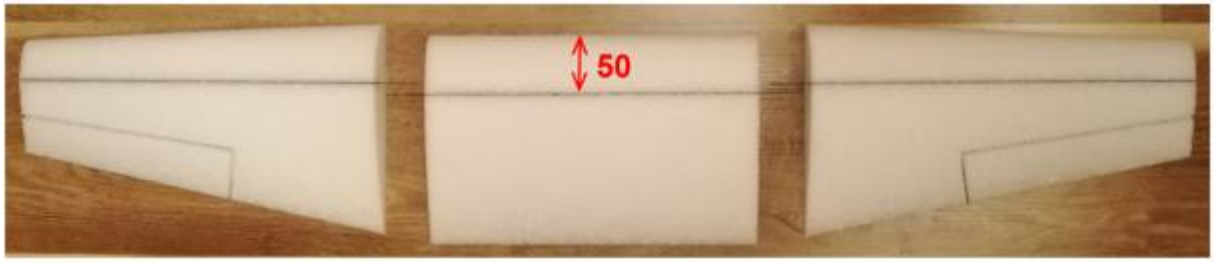
Connect the motor ideally with connectors to the ESC and check the correct direction of rotation. Hollow out a small opening for the cables in the engine cowling and attach it with a few drops CA to the fuselage. Paint the engine "shutters" silver and press them after painting the model in the cowling. The shaft of the motor should come out approximately in the center of the "shutters" with the correct side-thrust and down-thrust.

Cut an opening in the rear wall of the cockpit as access to the receiver and the servo cables. The cut should be straight so that the cut-out EPP part can be inserted back in (after connecting the receiver, the EPP part can be secured with two pins from the sides of the fuselage).

Wing:

Begin the construction of the wing by cutting the carbon strip 3x0.5 mm into three roughly equal parts - approx. 330 mm. One piece for the wing center section and one each for the left and right side of the wing. The carbon strips are only cut from the top into the wing parts.

Prepare a groove in the top of the wing center section 50mm from the leading edge of the wing for the carbon strip with a sharp knife. Approximately 30 mm from both sides, the grove must be slightly deeper, so that a second carbon strip has enough space from the outer wings in the correct dihedral.
Press the carbon strip into the center wing section on a flat surface, the strip should protrude on both sides in the same length.



Lay the outer wings to the center wing section and make the cuts for their carbon strips according to the position of the carbon strip in the center wing section. The carbon strips in the outer wings may be in front of or behind the center wing carbon strip, and later the overlapping ends are glued together from the sides. The grooves in the outer wings must be slightly deeper on the side where they are glued to the center wing section, so that the carbon strip of the center wing section in the outer wings also has enough space in the correct dihedral.
Glue the carbon strips into all wing parts with thin CA, but do not glue them in the places where the strips will overlap (about 30 mm from the edges).

Note: **If you also want to retrofit the flaps, the wing trailing edge should not be glued in the depth of about 35 mm, or better, cut off the flaps before gluing the wing parts together. Read the instructions further.**

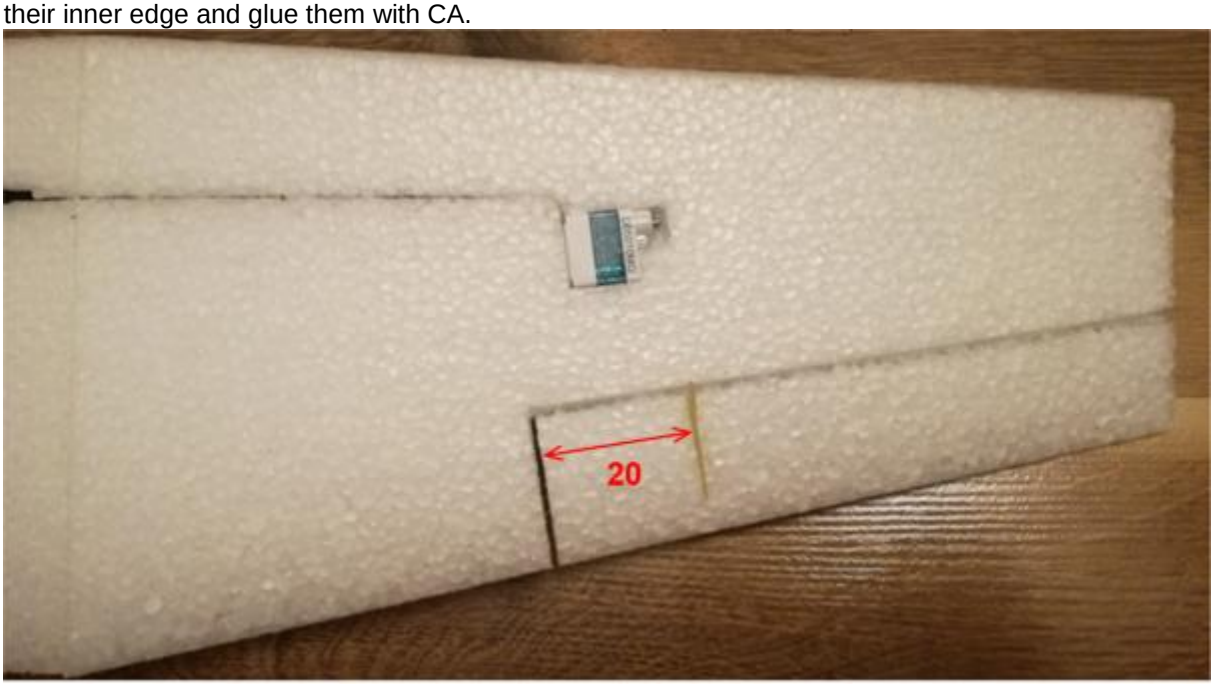
Try to put the wing pieces together, the correct dihedral is 40mm at both wing tips. If everything fits and you do not need to make the cuts for the carbon strips deeper, you can glue the wing parts together, again, ideally with the PU glue in the core as described above and thin CA on the circumference. It is helpful to first glue the wing on the underside with the CA + activator, then adjust the correct dihedral (40mm at the wing tips) and then glue the overlapping carbon strips with low-viscosity CA first (+ lightly spray with activator) together in their full length.
For the glue to be better able to tile in, you can slightly open the carbon strips with pins when gluing.

Then glue the circumference of the area with CA from above.

The leading-edge slats can be attached to the end of both wings with narrow pins, according the image to the right. There are 4 pins per side and are only glued to the wings after the first flight with a few drops of CA.

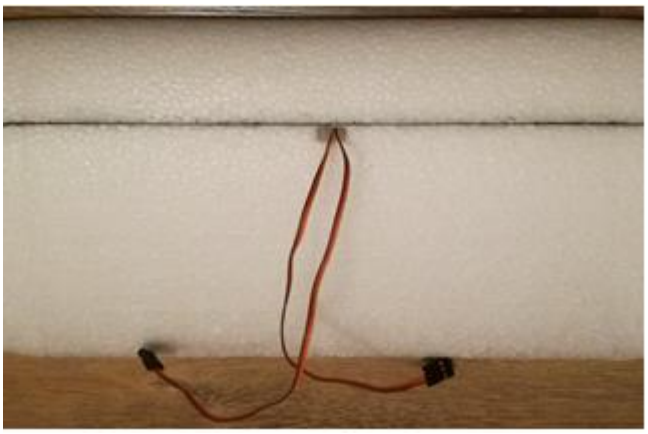
Aileron Servos:

Cut the aileron control horns from bottom perpendicular to the "hinge" at a distance of 20 mm from their inner edge and glue them with CA.



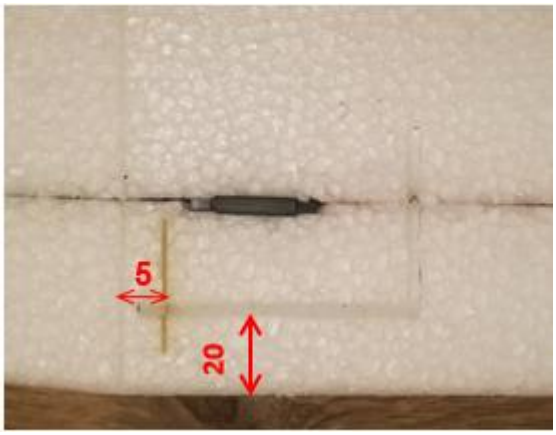
Choose the position of the servos so that their levers are flush with the control horns and have a distance of about 20-25 mm from the "hinge".
If the servos are wider, then choose the distance so that the servos may be cut flush with the underside of the wing profile. Install the servos in the same way as in the cockpit (cut-out in each direction about 1 mm smaller). Glue the servos in after painting the model.
Prepare the pushrods for the aileron linkage. The length corresponds to the distance between the control horn and servo lever, with Z-bends on both ends. It is recommended to make a V-bend on the pushrod in the middle, so that the length can be adjusted later, see picture.

The servo cables are routed in cuts (not too deep) at the bottom of the wing into the center and there through the wing to the top (to the channel in the fuselage).
Use servo extension cables in the length corresponding to the servo cable length, which extend into the cavity for the receiver in the fuselage (normally 20 - 30 cm - measure!). If the channel for the cables in the fuselage still needs to be modified, it is best to be done with a piece of hot wire.
If you only want to use a 4-channel receiver, a Y-cable must be used for the aileron servos.

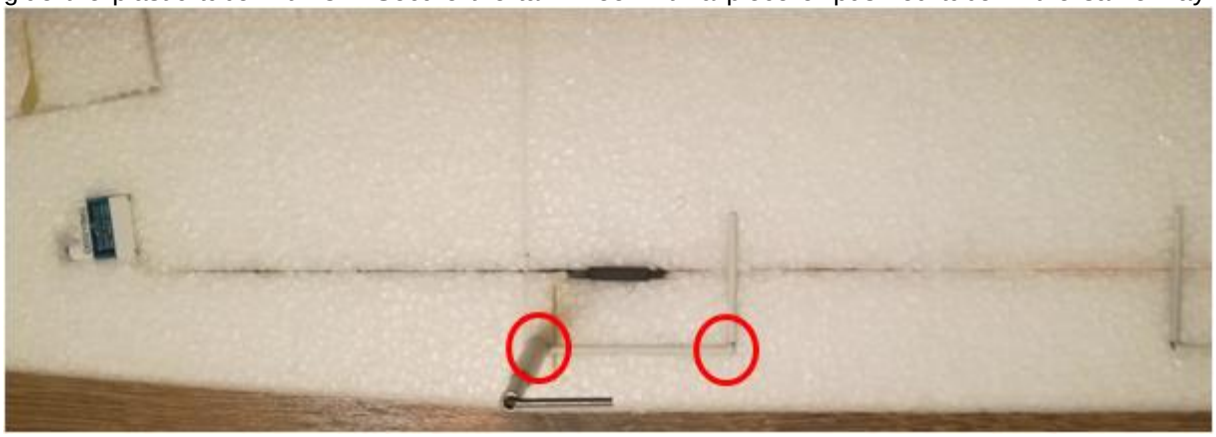


Main Landing Gear:

Bend the main landing gear from the ø 2 mm steel wire according to the drawing at the end of this manual (second piece mirrored). When bending, insert the plastic tube with inside ø 2 mm in the 60-mm section of the wire and the big plastic and aluminum tube on the 80-mm section of the wire (these will serve as the landing gear leg dummies). After bending, the tubes can no longer be pushed onto the wire. Insert a plastic tube with inside ø 2 mm on the 40-mm section.

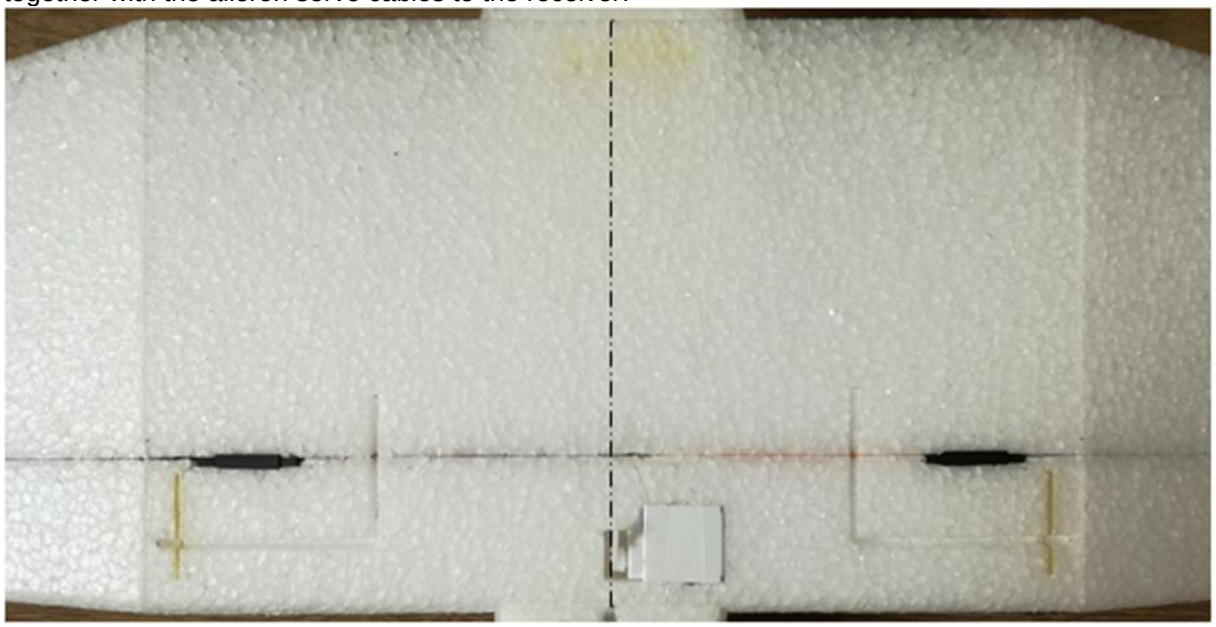


Both landing gear legs are attached only in the wing center section. Cut an L-shaped groove (according to the landing gear legs) into the wing center section. The landing gear legs come out of the wing at the points where the wing center part is joined to the outer wing parts, 20 mm from the leading edge of the wing center part.
Important is the fiberglass stiffener of the landing gear approx. 5 mm from the joint of the wing center section and wing outer parts. This stiffener must be cut so deeply that it is flush with the underside of the wing and its shorter side (from the groove for the landing gear) is towards the leading edge. Glue this stiffeners with CA before gluing the landing gear. The depth of the L-shaped groove in the wing must be as deep as the groove in the stiffener. It is recommended to apply some narrow tape to the plastic pipes on the corners of the landing gear (marked in the picture below) so that no CA glue can flow into the tubes, because the wire must remain freely movable in the pipes, otherwise the landing gear will tear from the wing during harder landings. This ensures a torsional suspension of the landing gear.
The landing gear can be glued after painting the model.
Use a small piece of plastic pipe glued with CA as wheel lock (alternatively use stop collars). A trick not to glue the wheels to the wire is to pierce a piece of plastic bag on the landing gear wire and then glue the plastic tube with CA. Secure the tail wheel with a piece of pushrod tube in the same way.

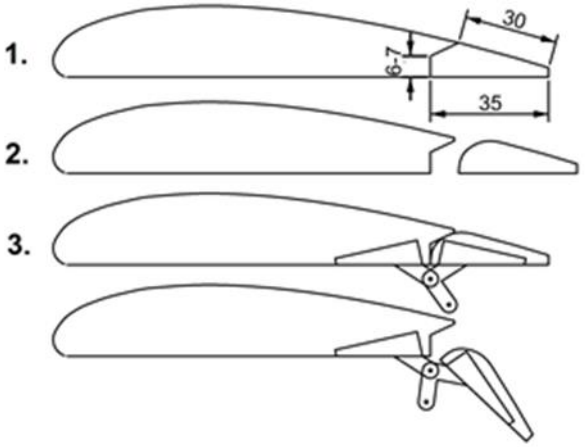


Flaps retrofit:

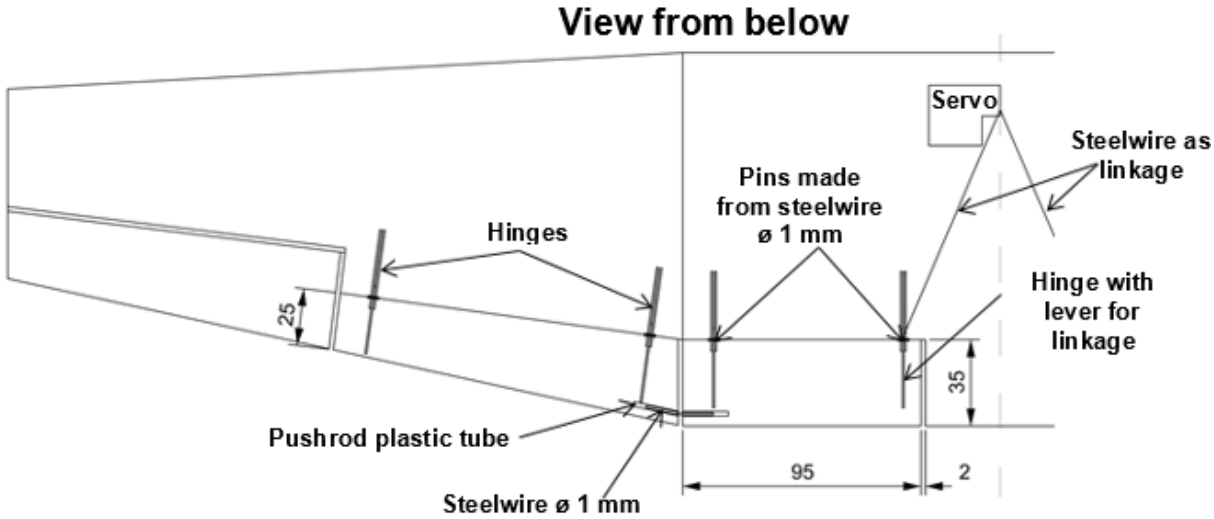
If you want to retrofit the flaps, it should be done before the whole model is assembled.
The flaps are driven by a single servo, with its lever in the center of the wing. The servo cable is routed together with the aileron servo cables to the receiver.



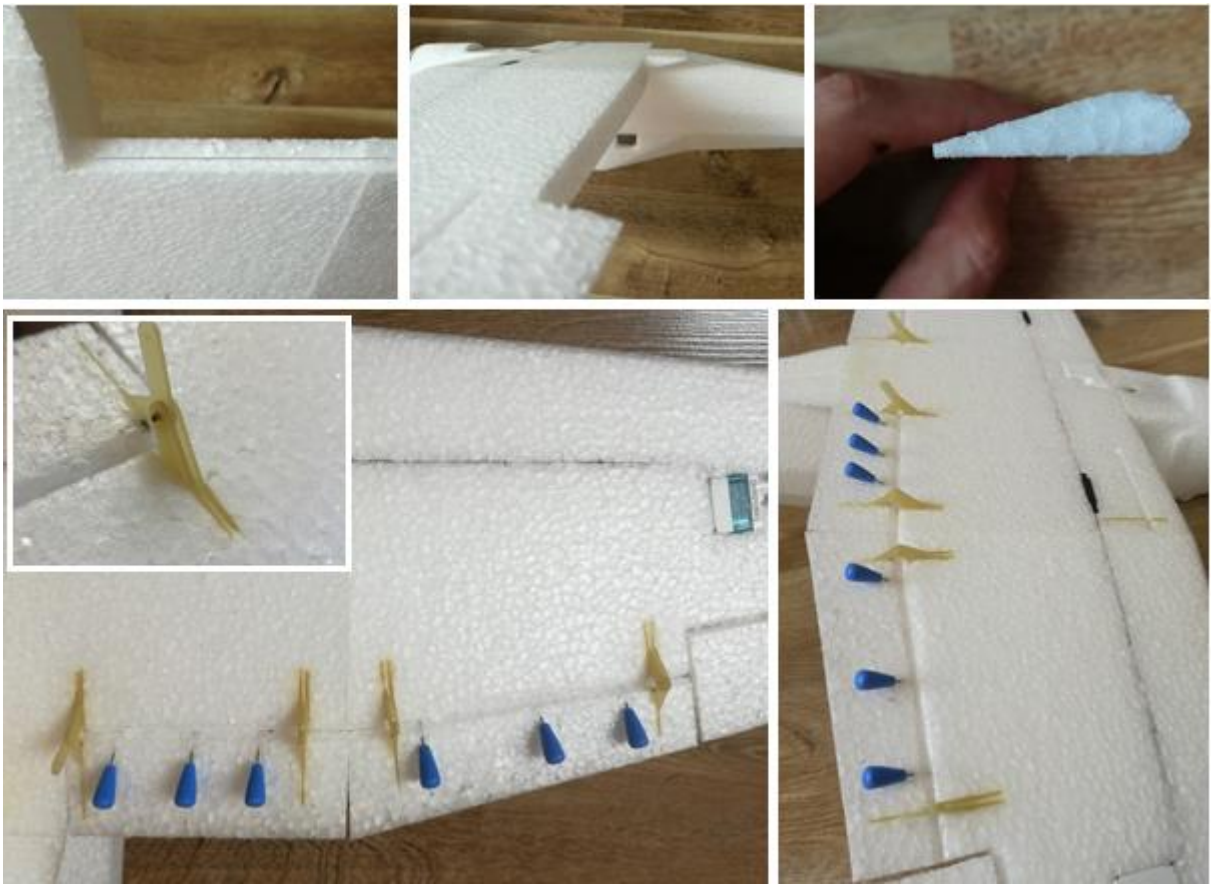
Cut the flaps off the wing, following the two pictures below.



Make the first cut from the bottom, 35 mm from the wing trailing edge (25 mm at the aileron) vertically to the depth of 6 mm. The second cut from the top should be made 30 mm from the wing trailing edge (20 mm at the aileron) obliquely until the first incision. Grind a leading-edge profile on the created flaps. Fix the flaps with pins in their original position. For each hinge two levers are cut into the wing with another lever between them in the flap. Cut the hinges about 10 mm from the side edges of the flaps.
Important: The levers on the inner flaps, close to the fuselage, are for the linkage, so the right-angled levers must be installed there.



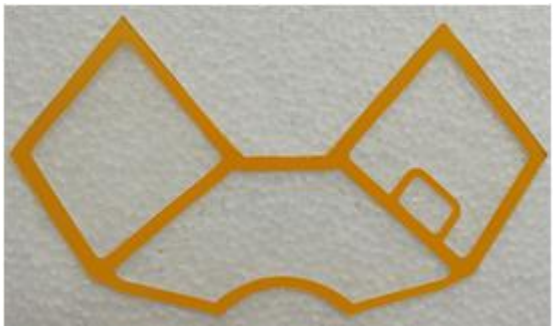
Slide longer pieces of wire ø 1 mm through both hinges of each flap before gluing the hinges. The wire is used for correct alignment of the flaps and hinges, the axis of rotation of the flaps should be parallel directly above the transition between wing and flap. If everything fits, glue the hinges with thin CA.
Pull the wires out of the hinges and cut the wire into short pins, which are put back in the hinges and glued with thicker CA from the side.



The inner and outer flaps are connected by a piece of wire and pushrod plastic tubes.

Pierce a piece of pushrod tube near to the trailing edges of the flaps to be connected (parallel to the trailing edge) so that they can be connected by a piece of bend wire. Glue the tubes from the outside carefully.
Bend a piece of ø 1 mm wire so that the angle is similar to that of the glued-in tubes. Insert the wire into the tubes only, do not glue it.
Attach a variable linkage connector to the servo lever and connect to the right-angled levers with 2 wires with Z-bends. Alternatively, only one wire, in V-shape and with Z-bends at the ends, may be used.

Assembly of the Model:



Draw a center line on the leading and trailing edge of the wing, make sure the wing fits well on the fuselage (pull the servo cables to the receiver cutout through the fuselage).
If everything fits, glue it together with PU glue + CA, as described above.

Paint the self-adhesive sticker of the cockpit frame with the same color as the model before applying to the windshield.
After the paint is dry, apply this sticker to the windshield and bend it as shown in the drawing at the end of this manual.
Bend the pillars for the cockpit from the steel wire ø 1 mm, both of one piece of wire. Insert the pushrod tube onto the wire before bending, it will then be easier to glue it to the EPP and to paint the pillars. Their shape is best estimated after applying the windshield to the fuselage. Glue the pillars in place when everything fits. The windshield will be installed after painting the model. It is sufficient to attach the windshield with pins with small heads at the corners, so that it is removable in case you need access to the receiver or servos. The rear windows are pressed into the fuselage after painting the model and glued with CA gently (apply the glue with a needle, for example), so that no white stain is created.

Finishing of the model:

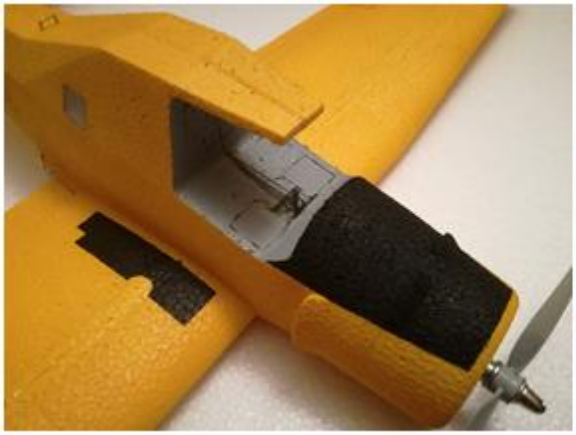
Sand the model with a sanding mesh for drywall for a better finish, if required.

Paint the model with either water-based paints or spray paint – we recommend **Montana** spray paint, it is cheap and has excellent adhesion (or DupliColor, PrismaColor, …).

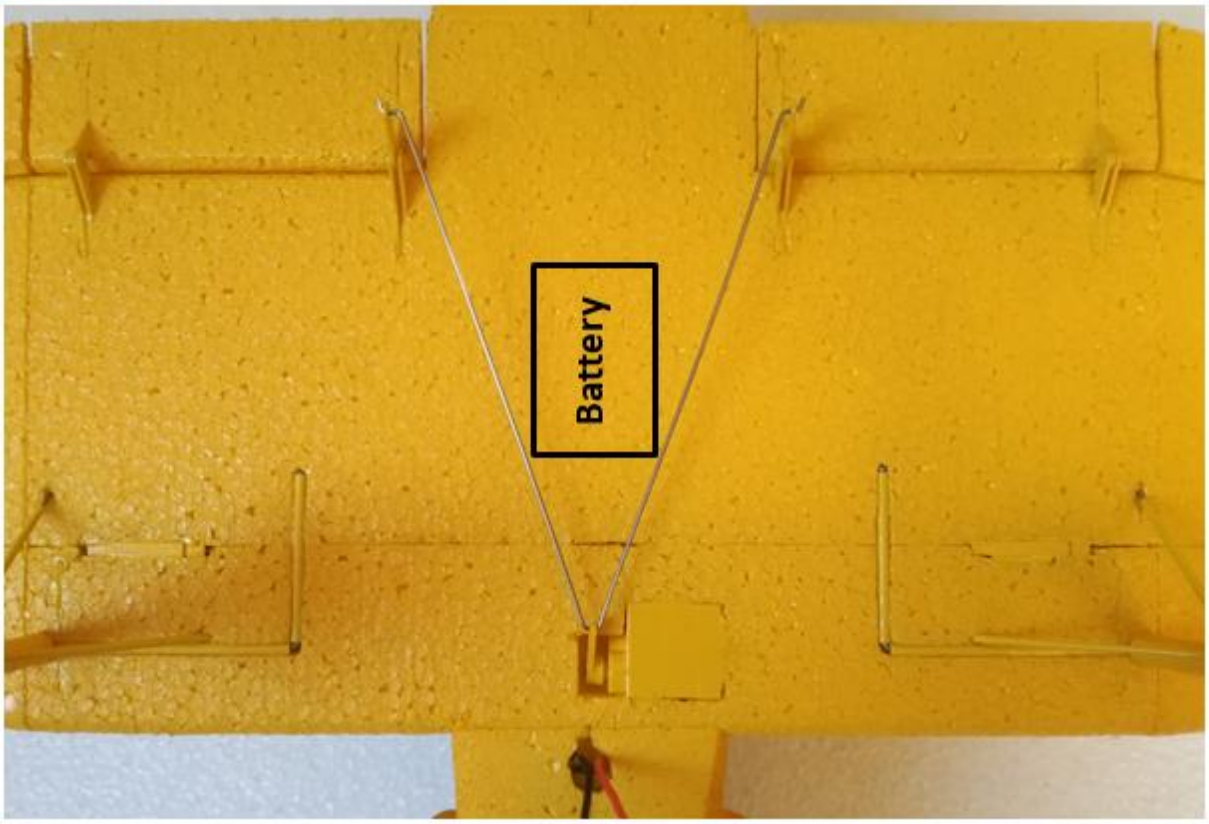
The model on the pictures is painted with spray paint DupliColor with color code **RAL 1021**. From other paint manufacturers also RAL 1023 may look good.

Anti-slip strips for the wings and tail numbers in the correct sizes are ready to print 1:1 at the end of this manual. If you wish to make your own tail numbers, create it in MS Word: font is **Arial Narrow**, switch on **Bolt**, font size for the wings is **145** and for the fuselage **88**.

Connect the complete electronics and check the function. Check the downthrust and sidethrust of the motor, slightly down and to the right in flight direction. Secure the servo levers with screws after centering them and glue the servos with hot glue gun in place. Connect the servo levers, control horns and flaps by the steel wire pushrods with Z-Bends on one side and variable linkage connectors on the servo side (or, alternatively, also Z-Bends).




OK-HJC


Battery

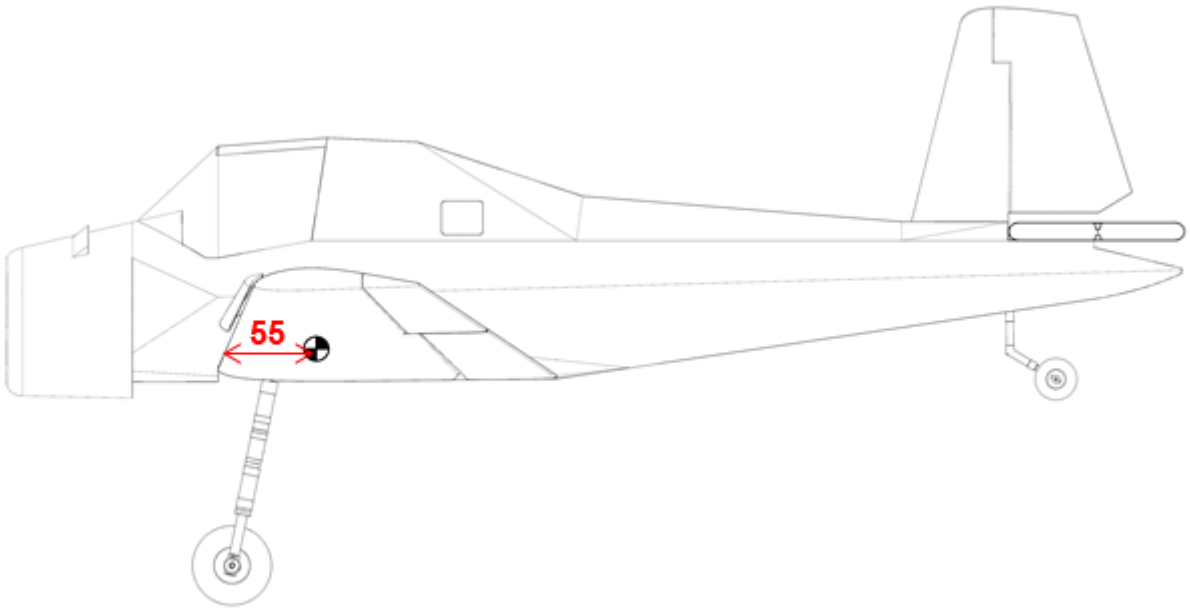
It is recommended to attach wire to the wing ends from below to protect them from contact with the ground.

Recommended control surface travel:

Ailerons – up 15 mm, down 10 mm
Elevator – up 10 mm, down 10 mm
Rudder – to both sides 20 mm
Flaps– uplift 30° - brakes 70°

Center of gravity: should be at a position 55 mm aft of the leading edge, at the fuselage sides (5 mm behind the carbon stringer). Mark this position on both sides. Turn the model upside down and support the model in the marked positions. The model should balance leveled, otherwise change the position of the battery forward or aft.

Cut the flight battery into the wing behind the carbon spar so that the specified center of gravity can be reached without additional weight. The opening must be slightly smaller than the battery, so that the battery fits with slight pressure into the opening and can not fall out during flight. The cables from the battery and ESC can be led to the outside to be able to connect and disconnect them easily.



First flight:

If possible, choose a windless day for the first flight. If you don't have much experience with test-flying of a model, please ask a more experienced model buddy to check the model and to help with the maiden flight.
A hard surface is recommended for take-off, grass should be short and the surface should be flat.

Always take off against the wind!

After reaching a safe altitude, trim the model on the transmitter so that it flies straight. Test whether the model is flying straight without power as well as with full throttle, and align the motor by changing the spacer between the motor bulkhead and the motor accordingly, if necessary.

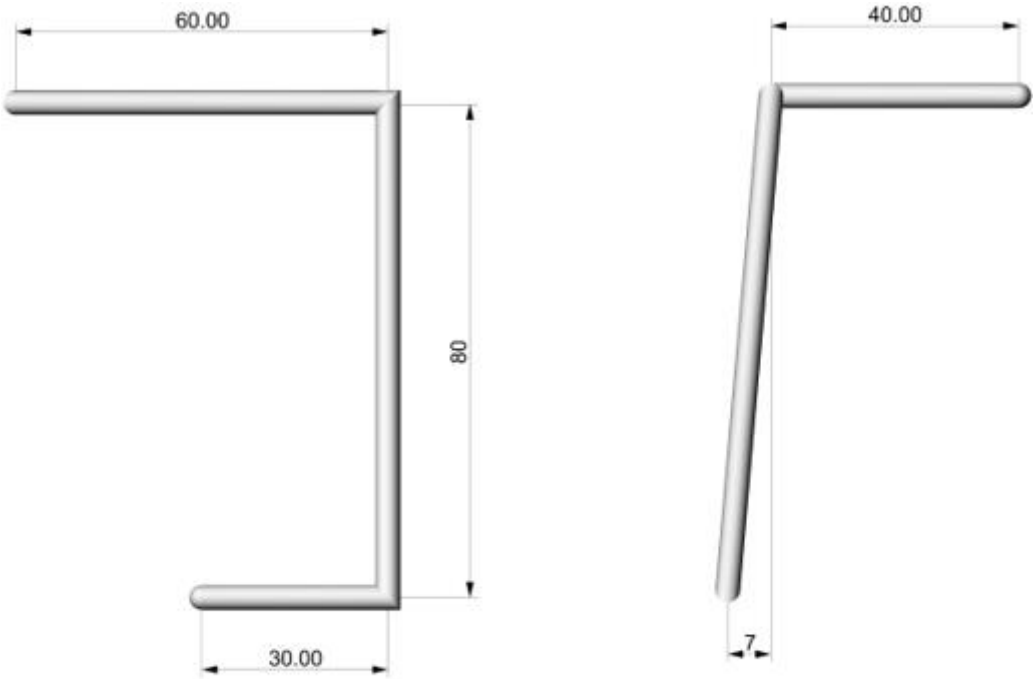
If you have any questions or comments, please contact us!

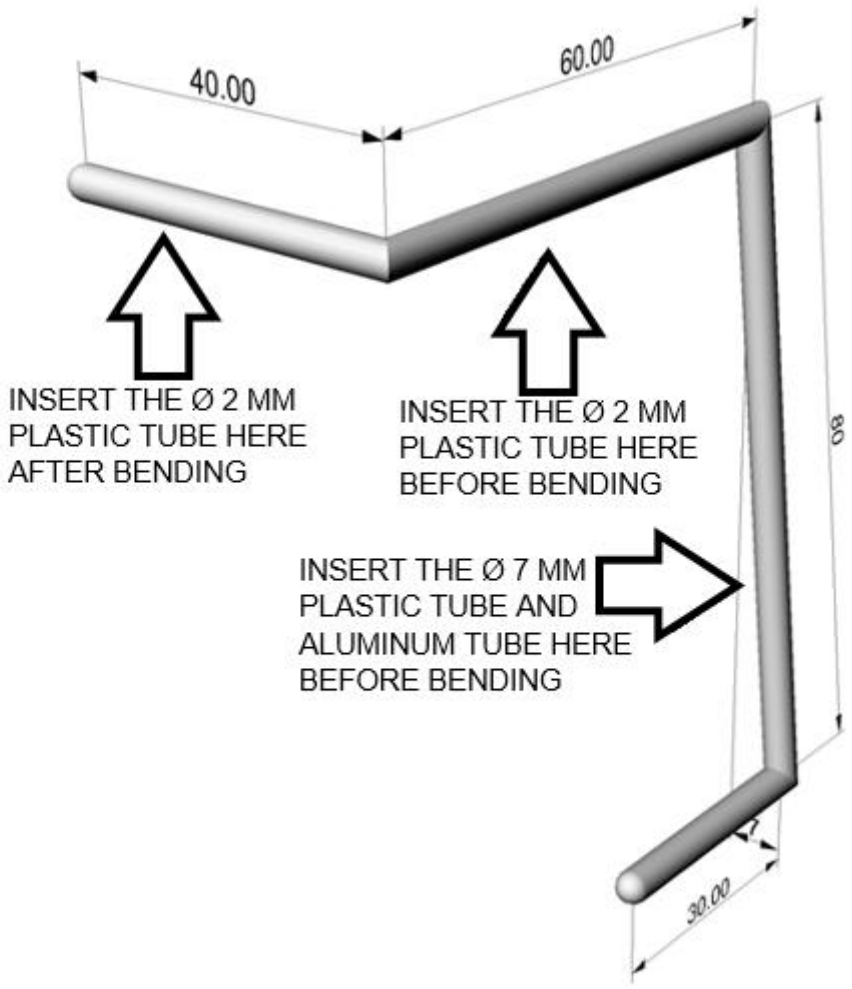
And don't forget to send us pictures from your models and flights!!!

We wish you many pleasant flights!

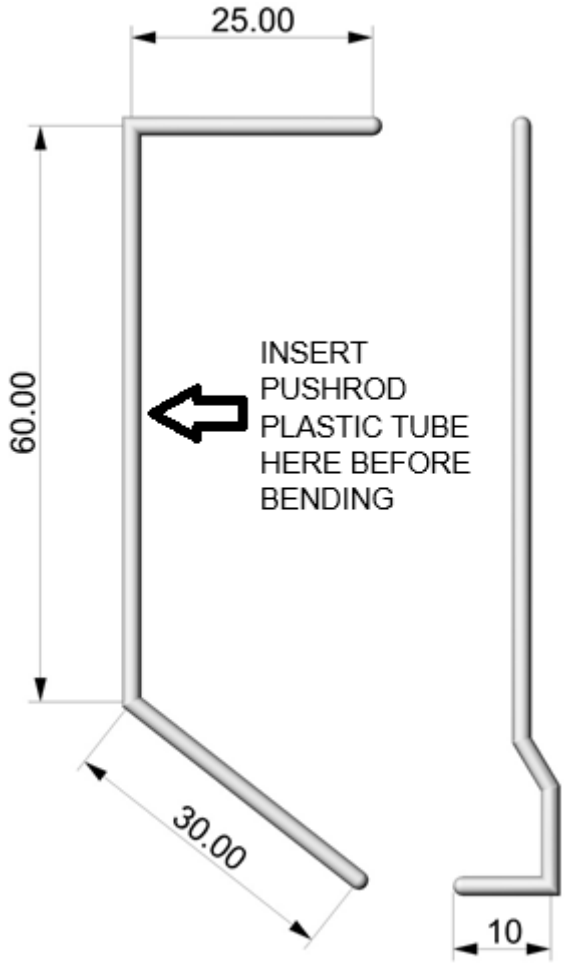
Kor-Model

Bending of the main landing gear legs:

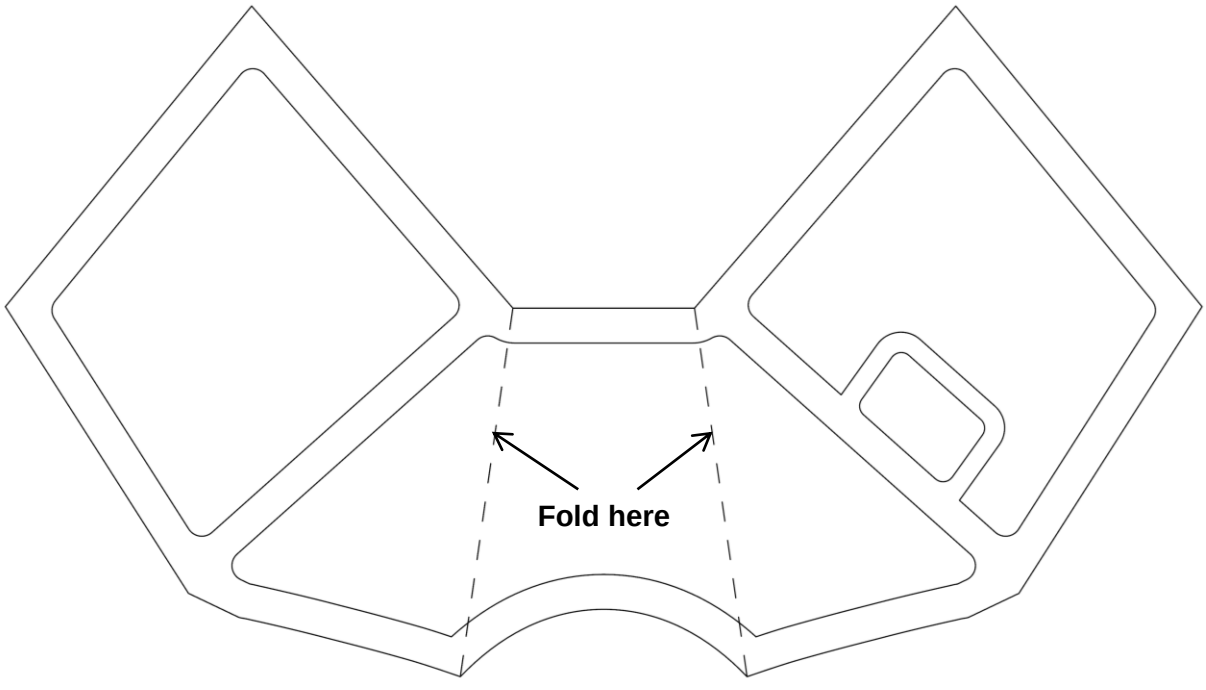




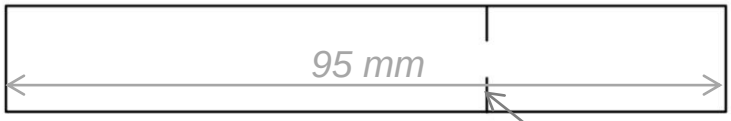
Tail landing gear:



Bending of the windshield:

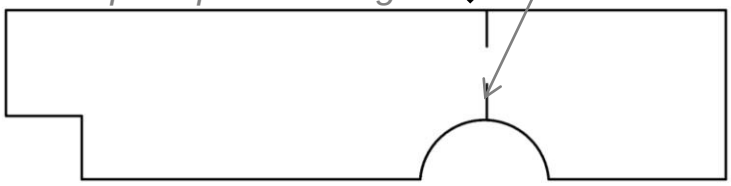


Anti-Slip Strip – left wing ⬇ *PRINT 1:1*

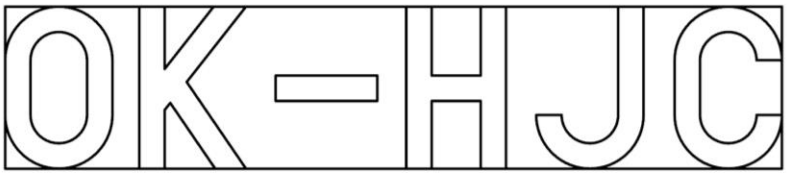


Carbon stringer position in the wing

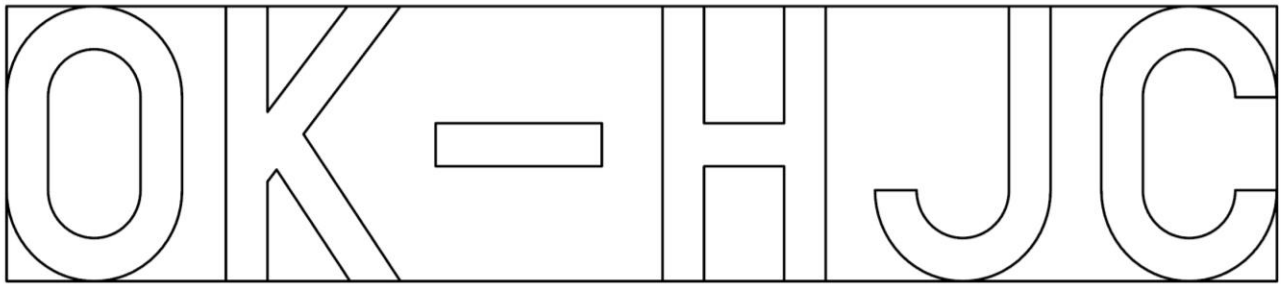
Anti-Slip Strip – left wing ⬇ *PRINT 1:1*



Tail number of the fuselage ⬇ *PRINT 1:1*



Tail number for the wing ⬇ *PRINT 1:1*



Text for the vertical stabilizer ⬇

Z-37 A

Cockpit panel ⬇ *PRINT 1:1*