L – 410 UVP-E Turbolet

Recommended equipment and guide for the building of RC model aircraft.

History of L-410

It has been 45 years since the first small commercial L-410 prototype took off. The first flight was carried out on 16th April 1969. An interesting thing is that as the development of the M601 engines, an engine developed for the L-410A aircraft at national corporation Motorlet (later known as Walter), was not completed yet, Canadian engines PT6-A27 were installed on the first L-410A prototypes and their later series production aircraft. 31 pieces of L410-As with PT6 engines were made in total.
The first aircraft with the M601 engines and Avia propeller V508, designated as L-410M, was produced in 1973 and the first test flight was performed at the end of the same year. The largest customer was the Soviet Union. 100 pieces of the L-410M version were gradually sent to the Soviet Union between 1977 and 1979, part of which were the L-410MA (with the M601B engines).
Due to the requirements of then practically the only customer, the Soviet Union, the L-410UVP version was developed. The specially required parameter was the possibility to take off and land at airports with very short runways (the abbreviation UVP in Russian stands for shortened take-off and landing). The difference compared to the previous versions was significant. The wing-span increased by 2 meters, the length by 87 mm and the height by 18 mm. The number of passenger seats was decreased to 15. Taking-off with one shut-down engine was made easier by an automatic bank control system and automatic feathering of the propeller of the shutdown engine. To reduce the weight, all control areas were covered in cloth. Many other changes followed during serial production, for us the most interesting one is probably the installation of the M601D engines in 1983.
Growing requirements for the operation economy in the 80´s caused development of a new variation - L410UVP-E. The major difference was an installation of the M601E engines and new 5 bladed propellers V510, movement of the luggage compartments and the toilets, which created extra space for 4 more seats. The aircraft´s capacity was therefore increased to 19 seats. The most visible change is, however, an installation of drip tanks at the end of the wing. 300 aircraft of this version were produced and have been flying all over the world ever since. During the 90´s as well as in the new millennium, the L410UVP-E is being modernized by having installed new avionics systems. Furthermore, the new GE H80-200 engine is installed on the aircraft.
There were around 1100 of the L410 aircraft made and most of them still fly.

Technical information:

Wingspan:	1270 mm
Overall Length:	920 mm
Flying weigth:	~700g
RC Functions:	Rudder, elevator, ailerons, motors (throttle), optional flaps

Recommended equipment:

Brushless motor:	Emax CF 2812	2 pc
Electronic Speed Controller (ESC):	18-20A	2 pc
Propellers:	8x4“ counter-rotating	2 pc
Servos:	8 – 12 grams	4 pc
Battery:	3S Li-pol 2200 mAh	1 pc
Receiver:	min. 4 channel	1 pc

Parts needed for the finishing of the model:

Carbon strip 5x1 mm	2 pieces
Carbon rod ø 1 mm	1 piece
Carbon rod ø 2 mm	1 piece
Pushrod connector (linkage stopper)	4 pc

Adhesives:

Cyanoacrylate glue thin (CA)
Activator for CA (Kicker)
Polyurethane adhesive
Dispersion adhesive
5 min. epoxy

Parts included in the set:

Fuselage parts	8 pc	Pushrod sleeve	1 pc
Center section of the wing	2 pc	Steel pushrod 0,8 mm	1 pc
Wings	2 pc	Spring loaded latch	1 pc
Wing-tip tanks	4 pc	Aluminium spars for the stabilizer	2 pc
Engine nacelles	6 pc	Steel wire for the landing gear	1 pc
Spinners	2 pc	Main landing gear wheels	2 pc
Tail group (empennage)	5 pc	Front landing gear wheel	1 pc
Motor bulkheads – fiberglass plate	2 pc	Wheel stop collar	3 pc
Plywood parts	11 pc	Magnet	1 pc
Control horns	5 pc	Brass tube	1 pc

Tools:

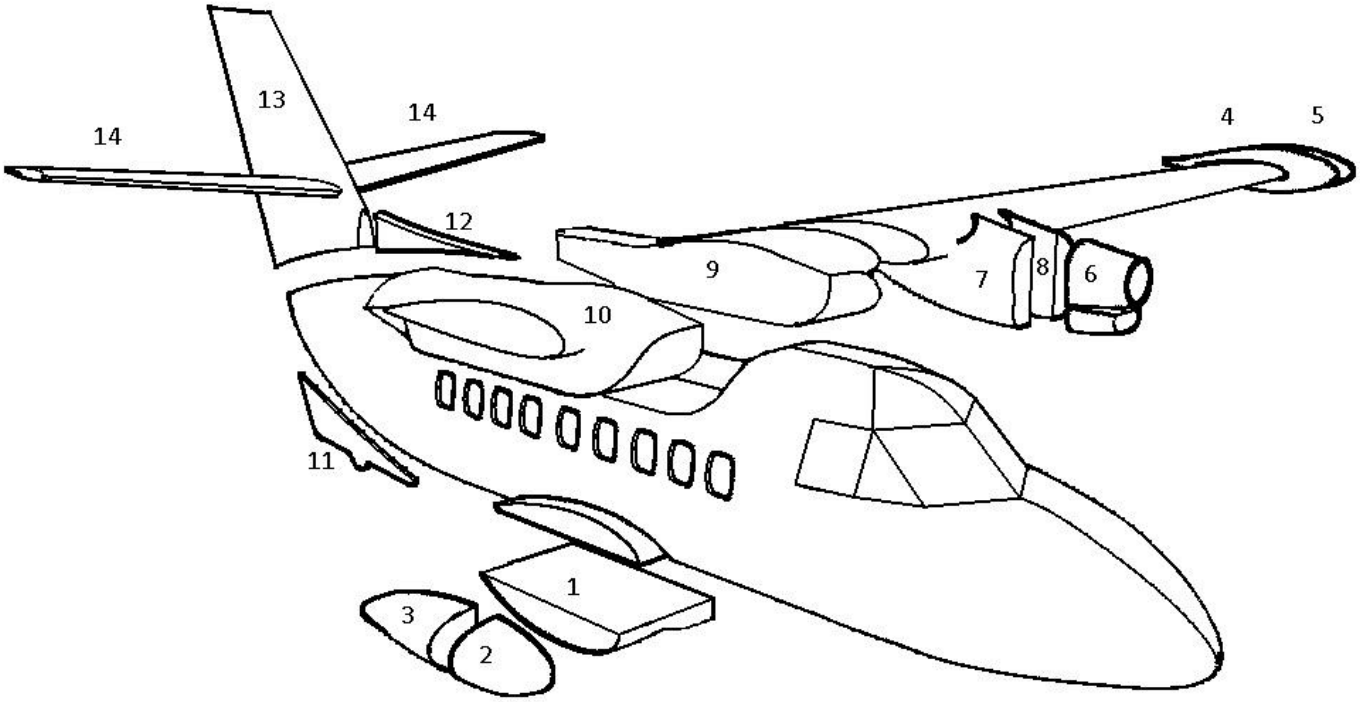
A sharp balsa knife, drywall sanding sheets, steel ruler, soldering iron, water based paint and common tools.

Construction of the model:

Everything has to be glued by cyanoacrylate adhesive unless otherwise stated.

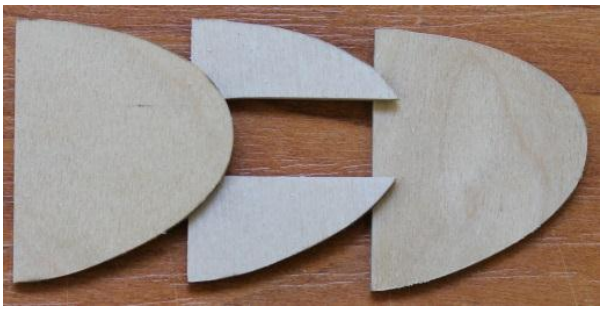
Read carefully the whole building instructions before the actual construction. This instruction manual is only a guide to building the model by yourself, using your knowledge.

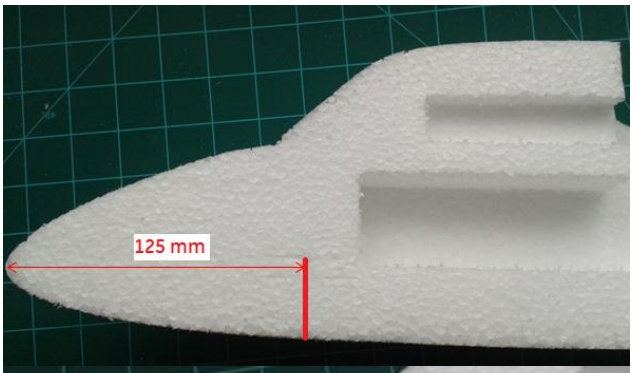
All dimensions are given in milimeters (mm). 1 inch = 25,4 mm.

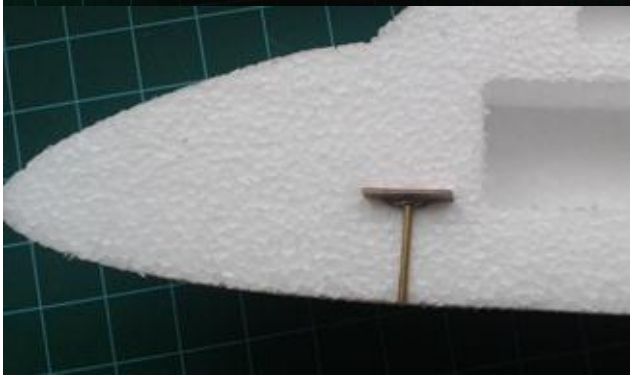


Main landing gear mount:

Glue the part „1“ to the R.H. fuselage shell (caution: part „1“ has to be glued in the correct way).
Glue the 3 plywood parts together with the „C“ shaped part in the centre using the dispersion adhesive. This has to be glued between the parts „2“ and „3“ and then to the fuselage. The same procedure has to be done on the other fuselage shell.



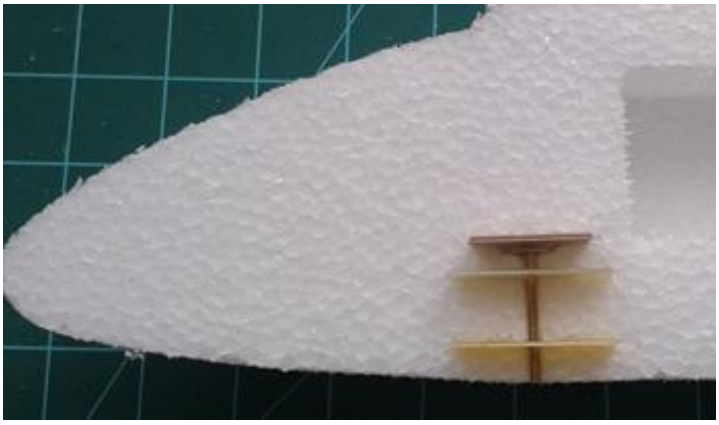




Front landing gear mount:

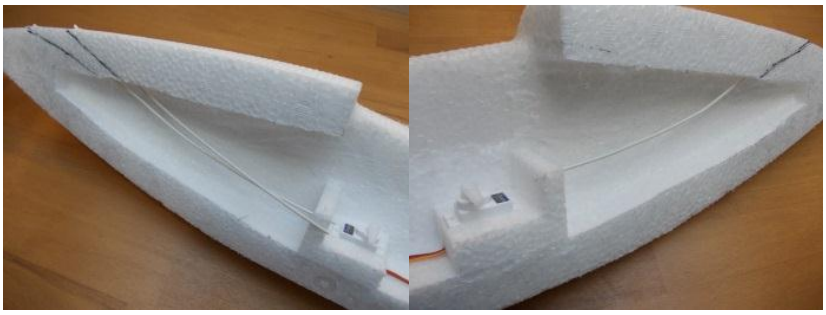
Glue the magnet to the centre of the plywood plate (size 28x18 mm) using 5 min. epoxy.
Draw a vertical line 125 mm from the front of the fuselage, the length according the brass tube, from the bottom of the fuselage – see pictures (don´t glue the tube yet).

Make a horizontal cut approx. 2-3mm above this tube and 10 mm deep for the plywood plate with the magnet and glue it in this position – the magnet is facing down (must touch the brass tube). Be careful not to put any glue on the magnet.



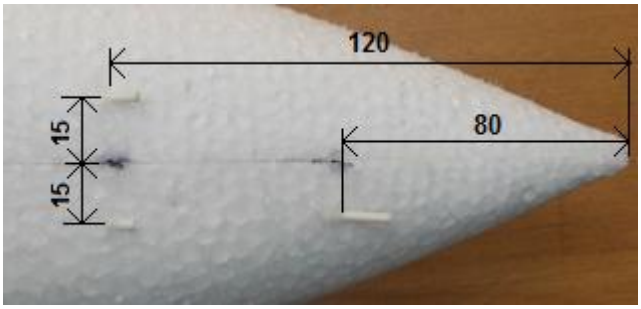
Insert the brass tube through the two fiberglass plates.
Make a cut for both of them, the top plate shoud be approx. 3 mm from the top of the brass tube, the lower plate shall be approx. 10 mm from the fuselage bottom. Before glueing them in place together with the brass tube, make sure the brass tube is perpendicular to the half of the fuselage in front view (insert a piece of straight wire into it to compare) and can also make a flat groove for the brass tube.
Glue the fiberglass plates and brass tube in place, be careful not to get any glue into the brass tube or between the brass tube and the magnet.
When dry, set the two fuselage shells to each other and press them slightly to mark the positions of the plates, then make cuts for them and for the tube in the second fuselage shell and make sure, the shells fit together smoothly before glueing them together. Glue them together after the installation of servos and pushrods.

Fuselage:



Prepare openings for the servos in the rear part of the fuselage shells. The openings shall be smaller by 1 mm on each side to tightly fit the servos. Test the servos prior glueing them into the fuselage. Glue the servos using hot melt glue or CA at the area of the hole for the screws.

Cut 3 pieces from the pushrod sleeve:
For the Rudder with the length of 275 mm, for the L.H. elevator 240 mm and for the R.H. elevator 235 mm.
Push the pushrods through the rear part of the fuselage and then push the pushrod sleeves in (for the rudder 80 mm from the end of the fuselage and 15 mm from the centerline, 2 for the elevator 120 mm from the end and 15 mm from the centerline on both shells).

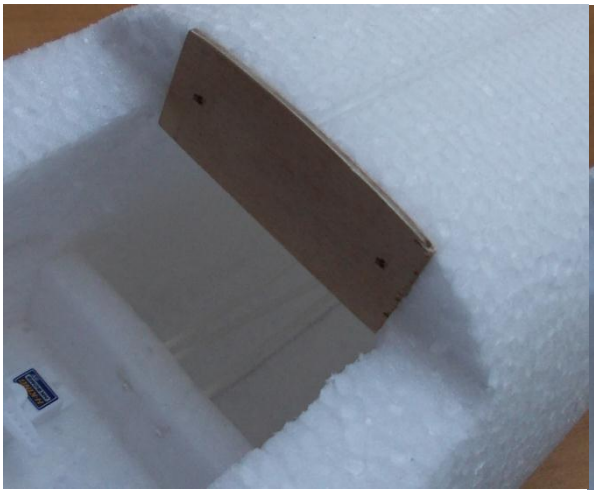


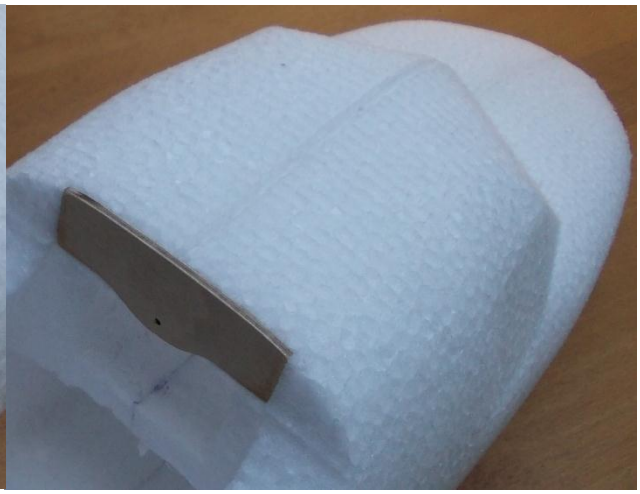
The pushrod sleeve for the rudder (on the L.H. side) goes to the L.H. fuselage shell through the wall behind the servo, approx 5 mm from the top of this wall.
Both pushrod sleeves from the elevator are going to the R.H. fuselage shell through the wall behind the servo, approx. 5 mm from top of this wall.
Both ends of each pushrod sleeve have to be glued in place using CA.

Note: Both pushrod sleeves from the elevator are leading to the R.H. servo (in the direction of flight).
Put the servos in the center position, install the servo arms with screw and linkage stopper.

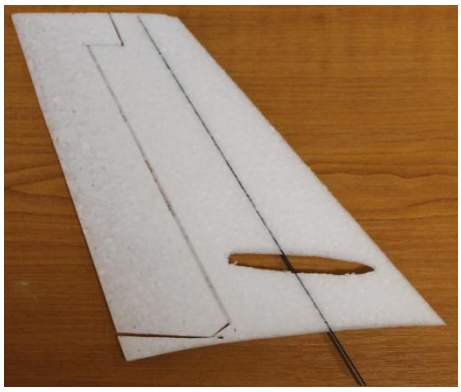
Make Z-bendings on the pushrods and insert them into the sleeves with Z-bendings from the outside.

Check if the battery compartment is sufficient for the size of your battery (the best is Li-Po 3S / 2200 mA for the corect CG), enlarge it otherwise (the battery has to fit tightly).
Glue both fuselage shells together. Glue part „11“ at the bottom of the fuselage (we recommend to make a reinforcement out of a thin wire to the arch of this part and glue it there – as a protection for harder landings). Embed the the plywood wing mounts and glue them in place - they have to be flush with the outer surface, so that the center section of the wing fits easily in its place.





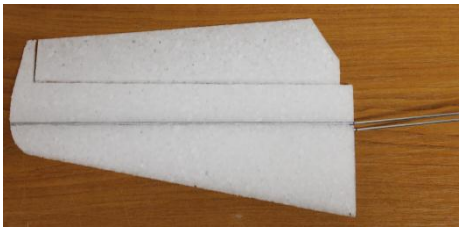
Tail group (empennage):



Draw the stabilizer profile at the marked area on the fin and cut a tight opening. Cut and glue in the carbon rods (diameter 1 mm and 250mm long) from both sides at 2/3 of the opening- see picture. The exceeding parts of the carbon rods on the bottom will be glued into the fuselage later.

Prepare two pieces of aluminium wires with the length of 420 mm. Roughen their surface for better glue adhesion and make a 20° bend in the midle.

Cut into both halves of the stabilizer two grooves, one above the other, at the position to touch the carbon rods in the fin (best if the upper aluminium wire touches the carbon rods from the front and the lower aluminium wire touches the carbon rods from the back).



Glue both aluminium reinforcement wires into one half of the stabilizer (with the direction that it forms a „V“ shape when both halves of the stabilizer are glued together). Insert the aluminium reinforcement through the fin on the designated place and glue the other half of the stabilizer to the aluminium reinforcement. Align the stabilizer in the fin precisely and glue properly to the fin.

Attach the finished tailgroup to the end of the fuselage, make holes at the place of the carbon rods from the fin, push and glue them in. **Be careful when aligning the tail group with the fuselage to be perpendicular!**

Glue the dorsal fairing - part „12“ in front of the fin.

Glue control horns in both parts of elevator and rudder – the longest control horn goes into the rudder.

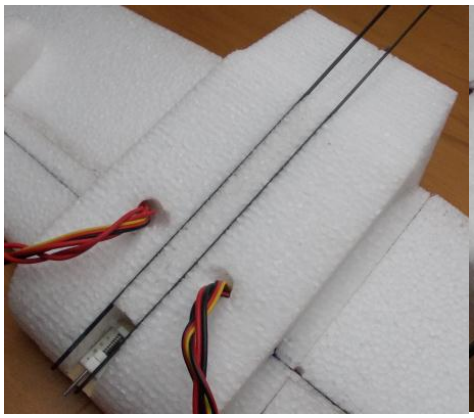
The center section of the wing:

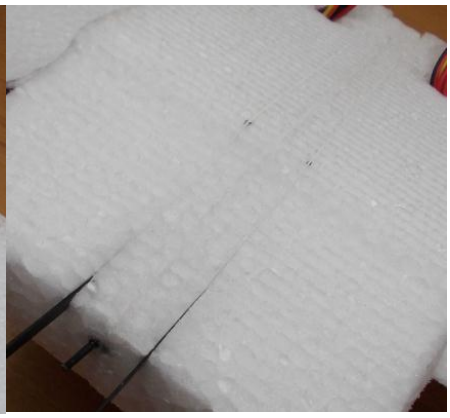
Glue the parts „9“ and „10“ together. Glue the plywood part with the corresponding shape to the rear face of the center section of the wing. Cut two pieces of 2 mm carbon rod with the length of 50 mm, insert and glue them into the holes in the plywood part, let them protrude by 10 mm (that will go into the fuselage rear plywood wing mount later).

Glue the spring loaded hatch to the plywood plate with the groove (37x16 mm).

Insert the pin from the hatch into the front wing mount in the fuselage and measure the depth from the top edge on the fuselage. According the measured value cut an opening into the midle of the center section of the wing from the bottom and make a groove from the top for the plastic unlocking lever. **Everything has to be fit very precisely!**

Cut in and glue the rest of the wing carbon spars lengthwise into the center section of the wing from bottom – see the details in the pictures.





Wings:

Cut openings for the aileron servos close to the ailerons (10 – 15 mm) on the bottom of the wing. The openings shall be smaller by 1 mm on each side to tight fit the servos. Test the servos prior glueing them in and lock the servo arms with the screw in the centered position. Glue the servos using hot melt glue or CA at the area of the hole for the screw.

Cut a slit and glue the control horns into the ailerons in line with the position of the servo arms. Connect the horns with the piano wire of 1 mm diameter with Z-bends on the ends.

Draw a line (to the bottom side of the wing) parallel from the wing root at the distance of 105 mm with the length of 80~90 mm from the leading edge – this will be the centre of the engine nacelles.

Hollow out (using a sharp knife or soldering iron) the engine nacelles – parts „7“ and „8“ according the size of the ESCs (Electronic Speed Controlers) as close to the motor bulkheads as possible, leaving at least 10 mm of the material on each side. Further make a small opening at the rear of the nacelles for the cooling of the ESCs.

Glue the outer half of the nacelle to the bottom side of the wing. Insert the ESC with soldered supply wires (minimum 2,5 mm2 – 13 AWG - and 350 mm long – will be

shortened later). The use of servo extension wires may be necessary, depending on the length of the ESC wires to the receiver. The 3 wires to the motor need to be long enough to come out at the front of the nacelle (opening for the cooling air). Prepare a groove in the wing big enough to acommodate all the wires including the extension wire from the aileron servo going in the direction of the fuselage (also make a groove for the servo extension wire to the servos). Adjust the wires in the groove and the ESC in the nacelle and glue the second half of the nacelle in its place. Repeat this step on the other side.

Roughen the fiberglass motor bulkheads and glue them in using polyurethane glue to the engine nacelles (don´t use too much PU glue, otherwise it will „bubble out“ and make the joint ugly), alternatively you can use also CA, if you are not able to buy the PU glue.

For shortening of the motors rotate the motor mounts – see picture. The screws holding the motor inside the mounts have to be horizontal. Use the servo screws to attach the motor mounts – bore holes smaller than the screws. **Important: after finishing of the motor installation, the motor wires have to be secured with hot melt glue or CA so that the rotating part of the motor will not damage the wires!**

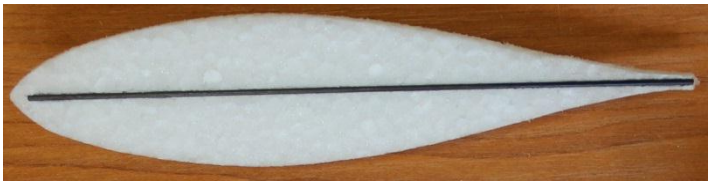
After soldering of the wires between the motors and the ESCs test the sense of rotation, the motors have to be counter-rotating, the left motor has to turn clock-wise and the right one counter-clock-wise in the direction of flight.

Widen up the opening for the motor in the parts „6“ using a sharp knife and soldering iron and cut the opening in the air inlet area for the cooling of the ESCs. Glue these parts only with a few drops of CA for easy removing in case of necessary engine alignment.

Attach the wings to the center section and at the place of all the wires from the wings create an opening into the center part with hot wire - going into the midle into the fuselage.

Glue the wings to the center section.

Cut a groove in both wings and the center section from the top for the carbon strip 5x1 mm so that they overlap in the whole center section of the wing and glue them in a dihedral of 3° (at the end of the wing 25-30 mm).

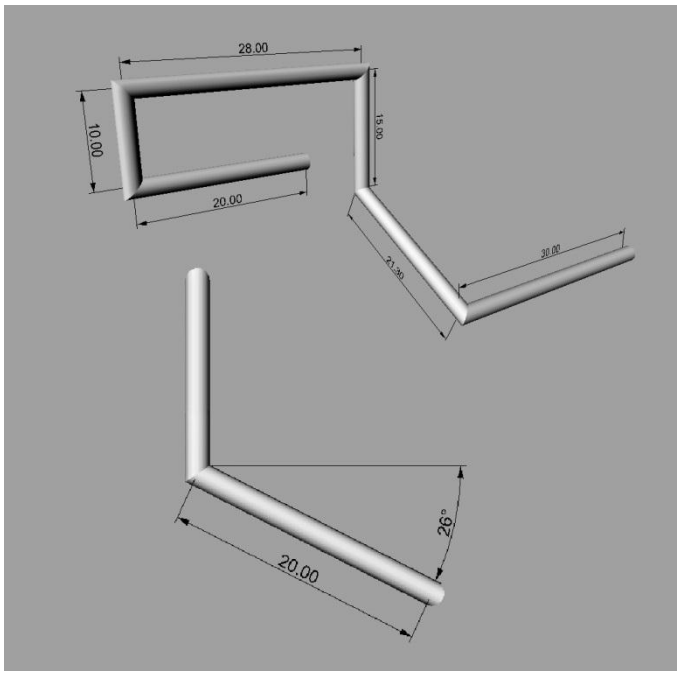


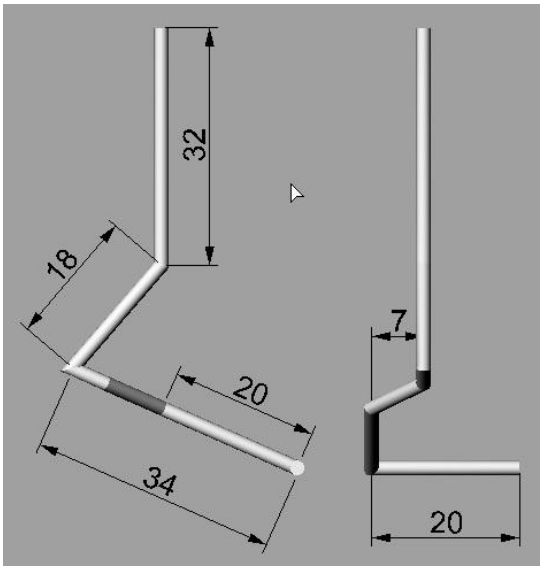
Glue a carbon rod 1 mm dia. between the parts „4“ and „5“ – wing tip tanks. Extend the wing profile cutout in the part „4“ till the trailing edge of the wing. Glue them to the end of the wings.

Landing gear wires:

Bend the main landing gear from the 2 mm dia. steel wire according to the drawings with the dimensions on the right. The most important part of the landing gear is the „C“ shaped part, which has to fit tightly in the plywood landing gear mount in the fuselage. The other dimensions can be slightly different. Bend one wire according the picture and the other one has to be bend in the opposite direction.

Lock the wheels with the collars.





The front landing gear has to be made also from the 2 mm steel wire according to the picture left. Here it is important to have the 32 mm part straight, this goes into the brass tube and has to turn freely. The other dimensions can be slightly different. The end of the wire which goes inside the brass tube needs to be straight, flat and perpendicular for a good hold on the magnet.

Lock the wheel with the collar.

Finishing of the model:

If a smoother surface of the fuselage is required, sand it with the drywall sanding sheets.

We recommend to use water based paint for the model. Do not use too much of the paint – not to make the model unnecessarily heavy.

If you want to use flaps on this model, cut them from top at the trailing edge leaving a thin layer of material as a hinge or use special hinges for a slotted flap (more effective at higher angle and better looking). Install the servos and controls at your own decision. The flaps on this model act more for the scale look, but they are really not necessary, with the recommended equipment the flight charasteristics are very good.

Hook up all the servos to the receiver, **remove the red (+) wire from one ESC to the receiver (pull the pin from the connector out) and isolate it,** use a Y-cable to connect them to the receiver or mix them in the transmitter. The disconnected + could be also used to power a lighting system or other scale equipment.

Install the battery into the battery compartment inside the fuselage in front of the wing.

Check the alignment of the motors with the fuselage, check the travel and direction of movement of the control surfaces and their zero positions, secure the servo arms with the screws and tighten the linkage stoppers on the pushrods.

Recomended travel of the control surfaces:

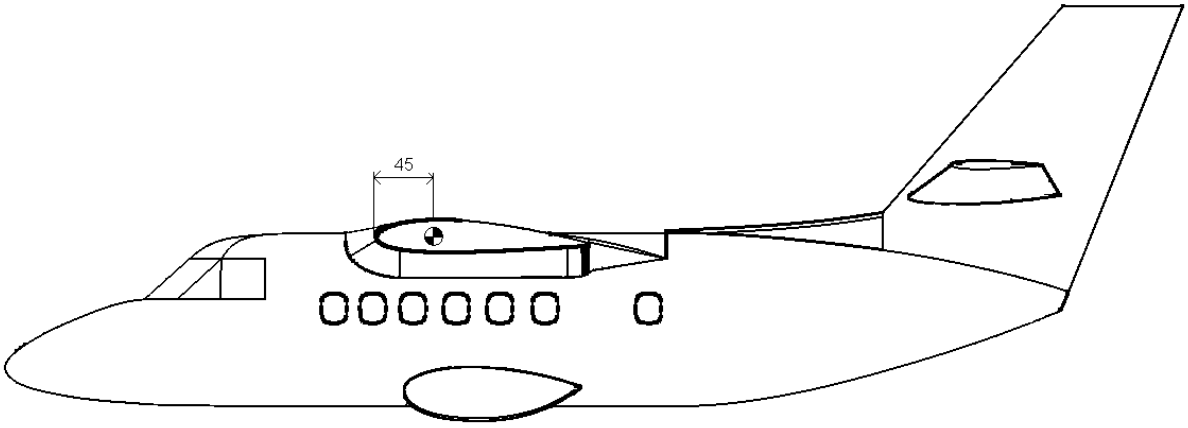
Aileron: 14 mm up, 7 mm down

Elevator: 13 mm up, 13 mm down

Rudder: 20 mm in both directions

Check the center of gravity (CG).

The correct CG is 45 mm behind the leading edge of the wing near to the center section of the wing (with installed battery).



First flight:

If possible, perform the first flight on a calm day.If you don´t have much experience with the adjustment of models and first flights, ask a more experienced modeler for checking of the model and for the first flight.

This model can take off from solid surface (also shorter grass), or it can be thrown from a experienced modeler.

Take off against the wind, with the recommended equipment it is not even necessary to use full power for take off.

Trim the model at a safe altitude to fly straight at approx. 50 of throttle.

Try how the model behaves at full power as well as without power, if it can not be adjusted only with trimming, it might be necessary to adjust the motor angles by shims under the motor mounts.

Do not let to discharge the batteries in flight completely, usually every ESC has the cut-off voltage set up a litle bit different, so one motor stops working sooner than the other, this can lead to loss of control.

Please do not hesite to contact us in case of any questions or recommendations.

We wish you many pleasant flights!