

ASSEMBLY MANUAL AND USER GUIDE



Mk Kato “Blue Angel”

By 3D AEROWORKS

OVERVIEW:

This scale replica of Masahiro Kato's famous 70's hit "Blue Angel" is designed for quick and easy construction printed in PLA. Designed to suit the 3542 1250kv outrunner on a 9x6 propeller. Utilising large ailerons, elevators and rudder this model flies like it is on rails. With a symmetrical aerofoil, even the more advanced aerobatic maneuvers are made to look easy. Links to components used can be found on the last page of the user guide.

This model has taken many hours of hard work and testing in order to provide a nice flying aircraft. Please do not share it. Please show your appreciation by directing interested parties to the link below.

<https://cults3d.com/en/3d-model/various/mk-kato-blue-angel>

GENERAL SPECIFICATIONS

WINGSPAN:	1200mm
PRINT TIME:	108 hrs
PRINT COST:	\$19 USD
PRINT WEIGHT:	925g
FLYING WEIGHT:	1500g

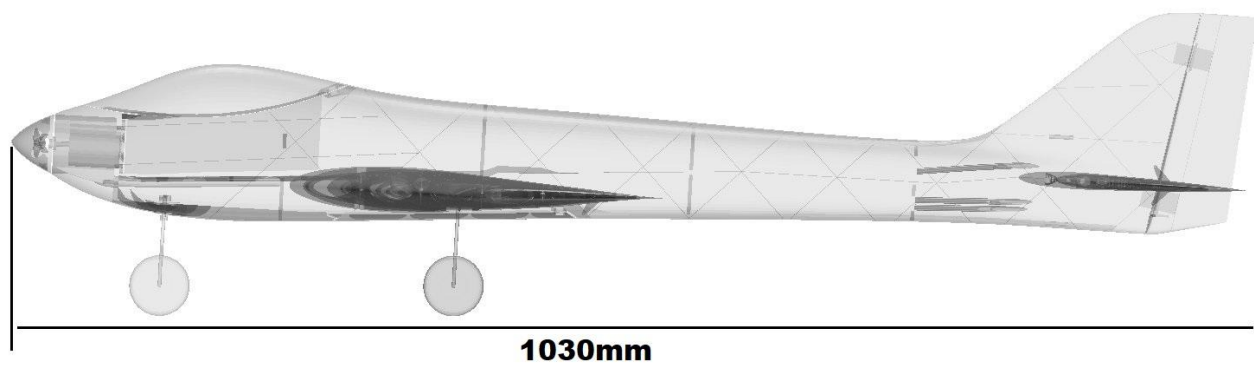
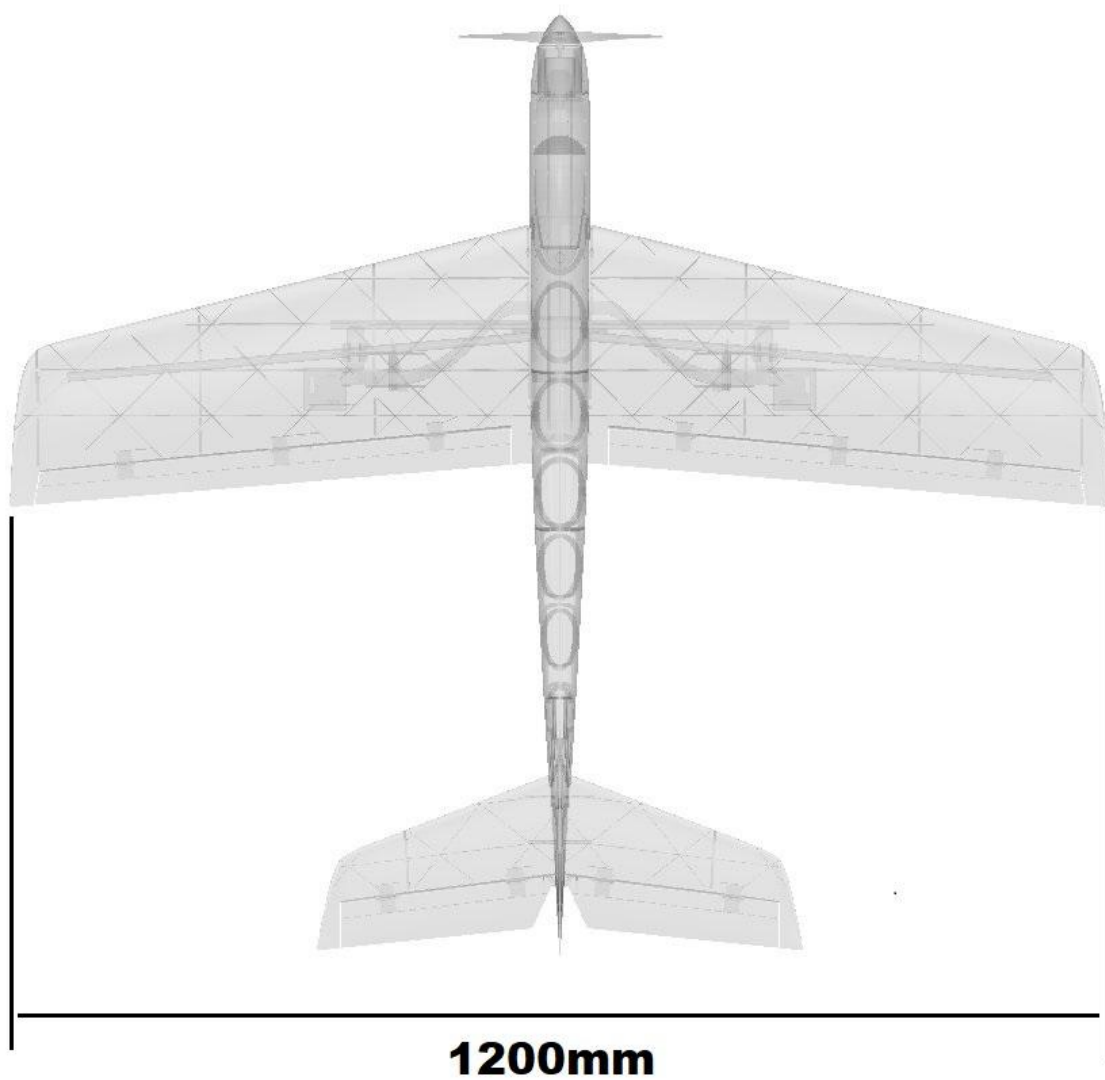
ELECTRICS

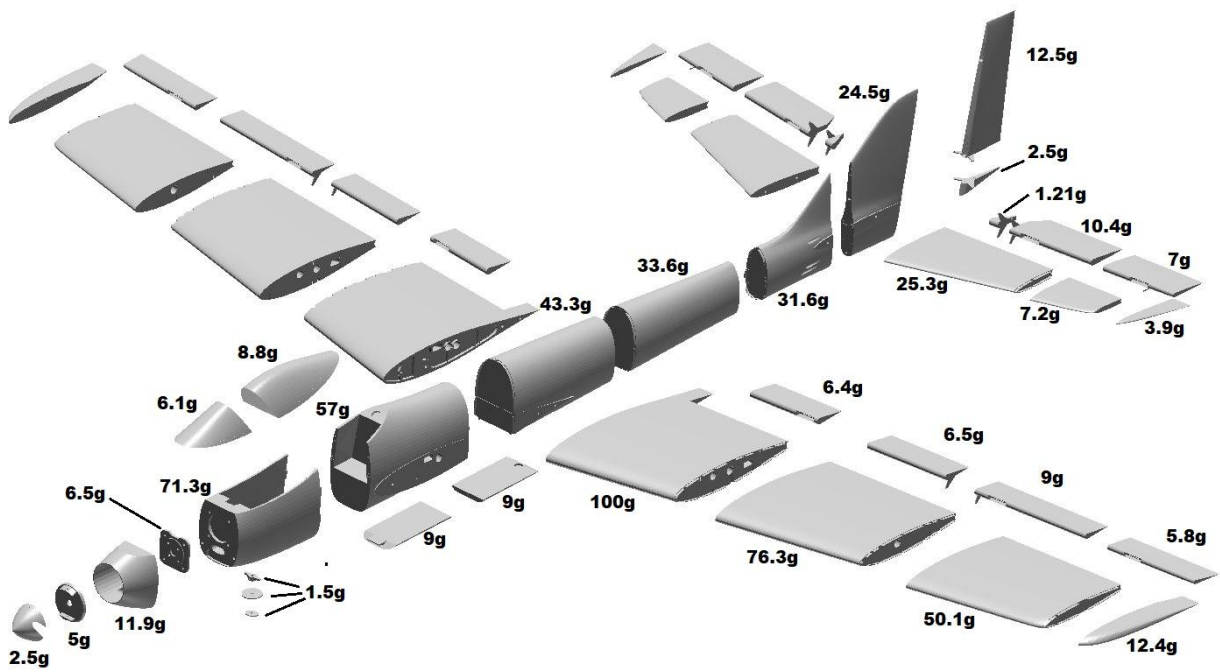
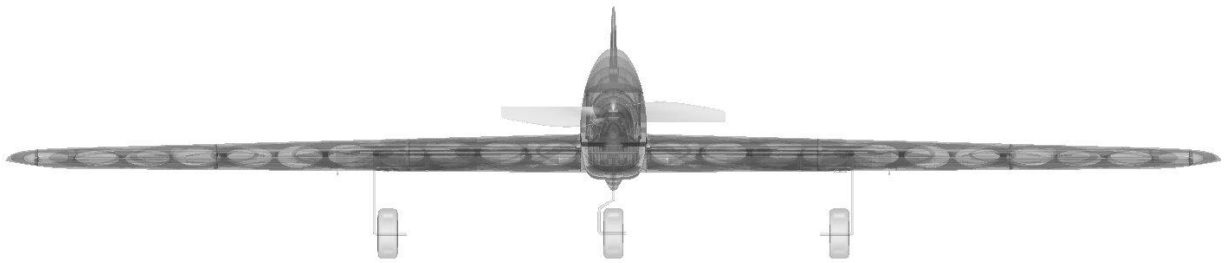
MOTOR:	3542 1450KV
ESC:	50 amp (min)
SERVOS:	x4 9g
BATTERY:	2200mah 3s (or similar)

INCLUDED:

STL FILES OF ALL COMPONENTS **(scale to 1000% if not using S3D)**

FACTORY FILES FOR (S3D) SIMPLIFY 3D FOR PRINTERS: 200x200200





REQUIRED TOOLS:

KNIFE

LIGHTER

SANDPAPER (MEDIUM GRIT 320 recommended)

PLIERS

CA GLUE

SCREW DRIVERS

FILE OR RASP

DRILL AND BITS 10mm, 3mm, 2.5mm, 1mm

REQUIRED COMPONENTS:

X1 3542 1450KV MOTOR (or similar)

X1 50AMP ESC

X1 2200MAH 3S LIPO OR SIMILAR

X4 9G SERVO

BAMBOO SKEWERS 3mm

X2 10mm X 10mm X 2mm MAGNET (ROUND)

X12 16mm x 29mm HINGES

X4 m3 bolts 10mm

X4 m3 brass inserts

VELCRO

m2 x 6mm screws

m3 x 10mm screws

X3 m3 collars and set screws

1mm or 1.5mm piano wire

Braided fishing line (20lbs)

X3 10x8mm carbon tube

X3 50x20mm foam wheels



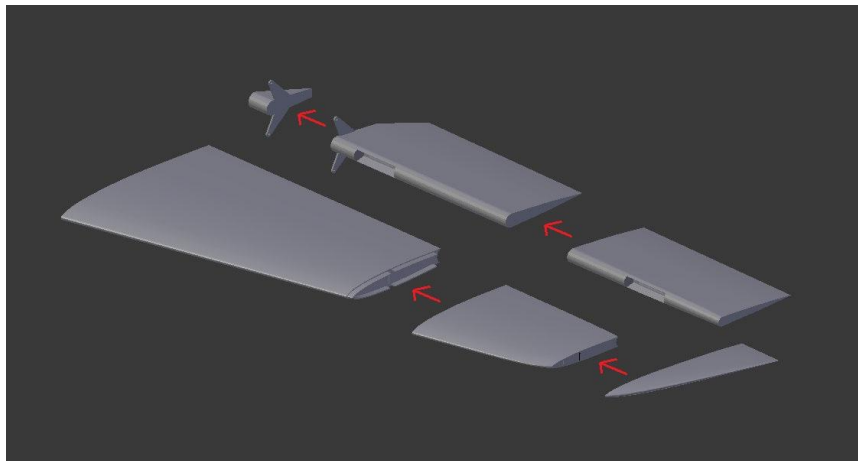
ASSEMBLY INSTRUCTIONS

1

All faces which are to be glued to other parts need to be given a light sanding (scuff the surface) to assist with glue adhesion.

2

Glue the sections of the horizontal stabilisers and elevators together with CA.



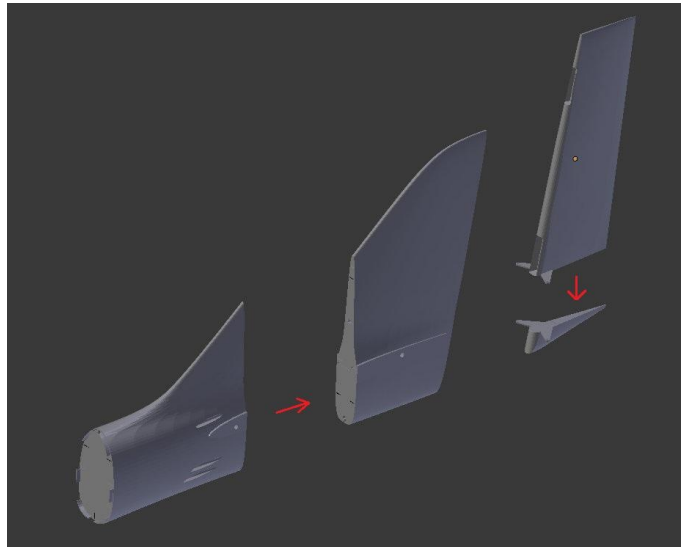
3

Glue the elevators to the horizontal stabilisers using 16x19 hinges.

Note - when gluing hinges, make sure all excess CA glue is removed. Any excess will cause the hinge to bind and be unusable.

4

Glue sections 6 and 7 of the fuse together along with the rudder sections.



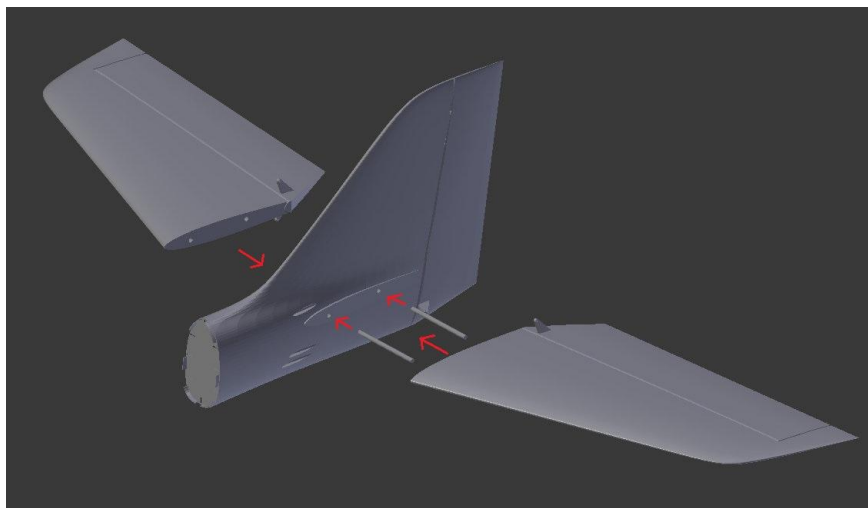
5

Glue the rudder to the vertical stabiliser using 16x19 hinges.

Note - when gluing hinges, make sure all excess CA glue is removed. Any excess will cause the hinge to bind and be unusable.

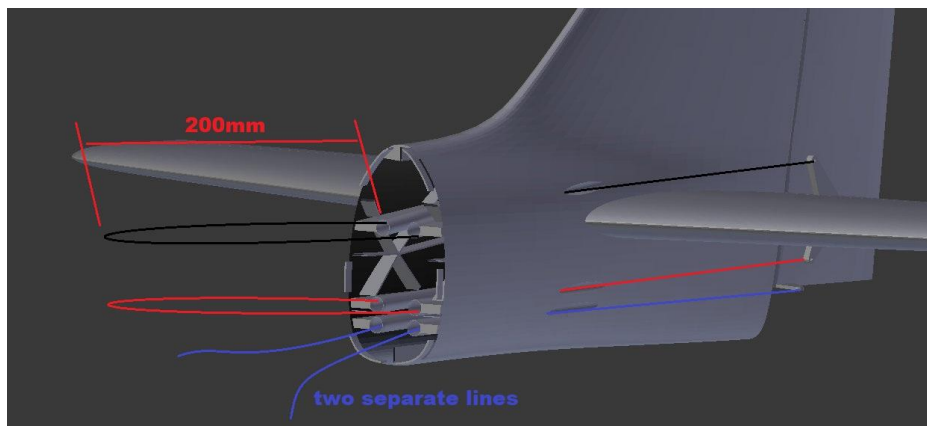
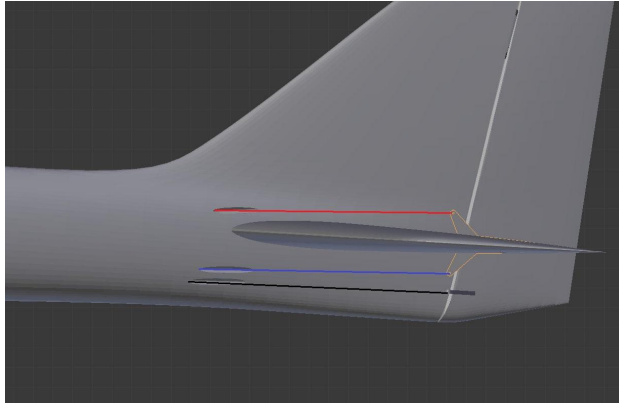
6

Glue the horizontal stabilisers to the aft fuselage assembly aligning the parts with x2 65mm sections of 3mm skewer.



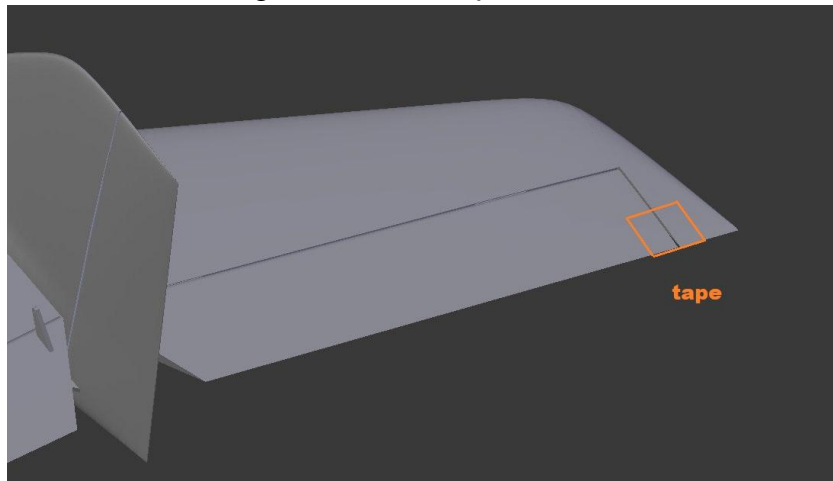
7

Connect braided fishing line to each elevator through the bowden tubes as described by the images below. Leave a 200mm length protruding from the end of the fuselage section.

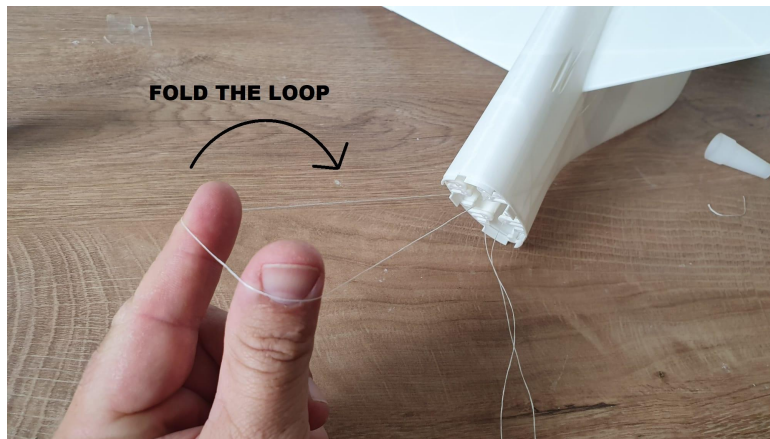


8

Secure the elevators in a neutral position by placing masking tape of the outer edges of the elevators connecting them to the top of the horizontal stabiliser.



Form a loop knot in the middle section of the fishing line and run a third string through the loop before tightening. Make sure that the loop is as close to the center-line of the aircraft as possible. If it is not, the elevators will deflect at different angles and will result in a rolling moment when pitching. Once the knot is in place and tight, apply a drop of CA to secure the knot. See images below



SKEWER THROUGH LOOP



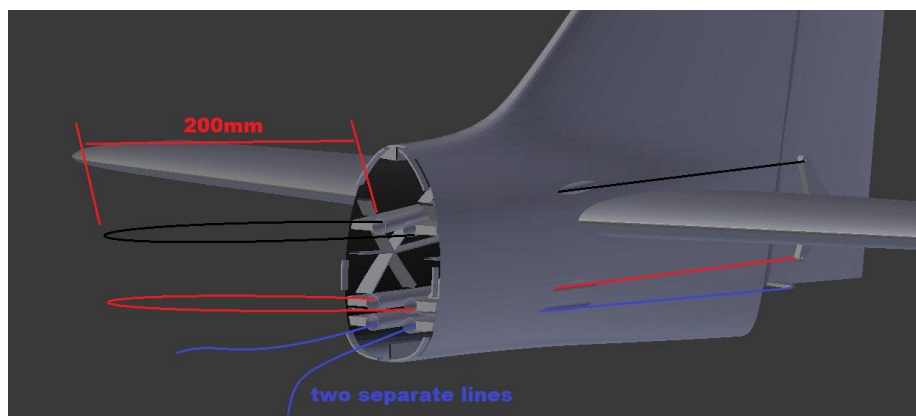
ENSURE LOOP IS CENTERED AND EQUAL TENSION ON BOTH SIDES OF LOOP



CONNECT STRING WHICH WILL CONNECT TO SEVRO ARM

Perform the same method for the **elevator braided lines only**, the rudder has separate lines from each control horn connecting it to the servo arm. **See image below.**

Note - other knots can be used depending on your knot tying abilities.



10

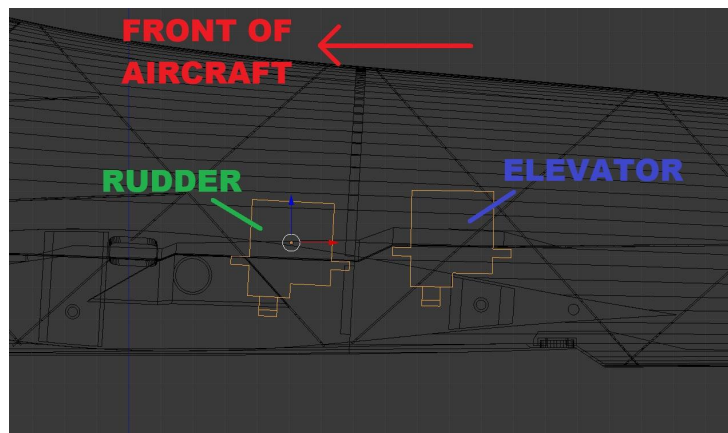
Glue fuse 3,4 and 5 together and remove the belly access hatch using a soldering iron.

11

Thread the three braided lines from the tail through the 3,4,5 fuse section and out through the belly access hatch. Glue section 3,4,5 to the tail section. Tension should be kept on the braided lines during gluing to stop them jamming.

12

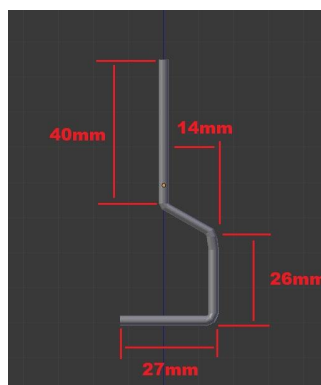
Install the elevator and rudder servo and connect up the braided lines (the **rudder** lines should not cross over). The braided lines should be secured with CA glue to a quite firm tension.



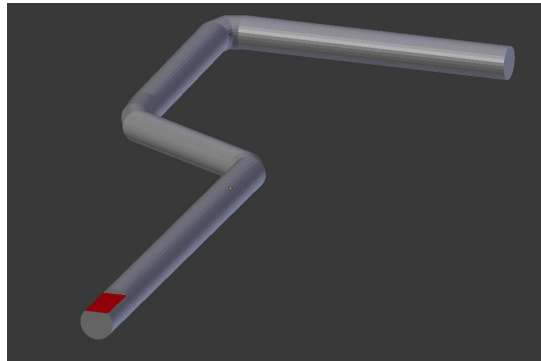
Note - It will likely be the case (as it was for the test model) that the knot for the elevator was not perfectly centered and resulted in a slight offset in the elevator deflection angles relative to each other. Remove the tape over the elevators and hold the braided lines over the holes of the servo arm. Note the position of the elevators and now switch over the braided lines to the other side of the servo arm. Again note the position of the elevators relative to each other. It should be possible to eliminate the offset using this method.

13 Installing the nose gear

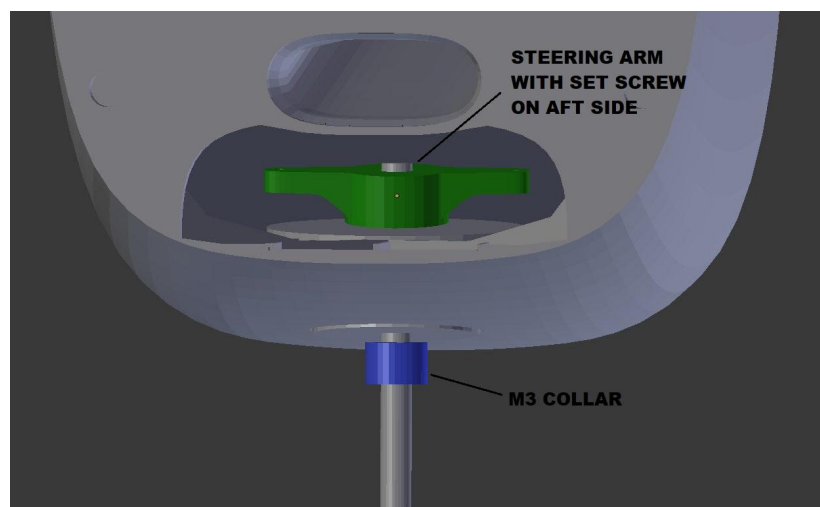
- Cut a 110mm section of 3mm rod and bend using the diagram below.



- Grind a flat spot to the top of the gear leg where the set screw of the steering arm will lock in place. The flat spot needs to be parallel with the axle of the gear leg. (marked in red)



- Run a 3mm drill bit through the nose gear washers and steering arm.
- Install the nose gear washers into their slots on either side of the nose gear slot on fuse 2 with epoxy. Be sure to clean the hole of excess epoxy or run the 3mm bit through again once dry.
- Run a 2.5mm drill bit through the set screw hole of the steering arm and install the set screw. Test fit the steering arm on the gear leg.
- Tie braided lines to each side of the steering arm and secure with a drop of CA.
- Slide an m3 collar over the gear leg and insert the leg into the nose gear slot.
- Install the steering arm and secure the set screw so that it may be adjusted from the belly access hatch in future if required.



- Slide the m3 collar up and secure it in place. The leg should be able to turn but there should be no vertical play in the leg.

14

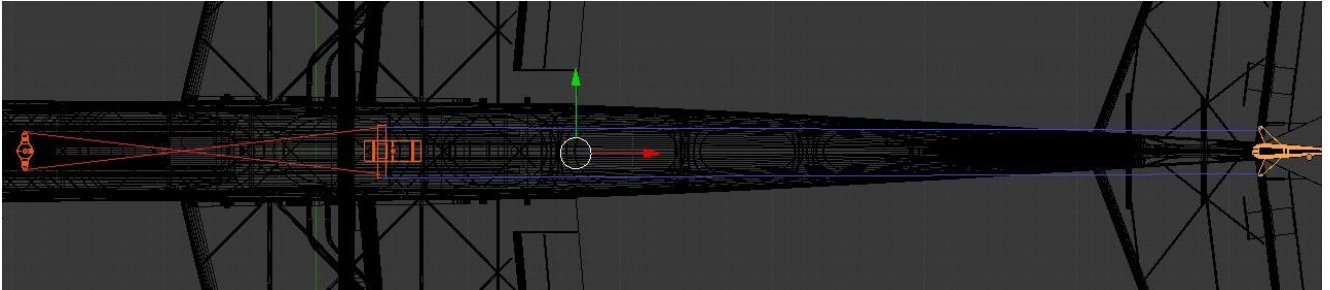
Feed the braided steering lines through section 3,4,5 and out through the belly access hatch.

Glue fuse 2 to section 3,4,5 of the fuse whilst keeping tension on the braided lines to ensure they don't jam.

15

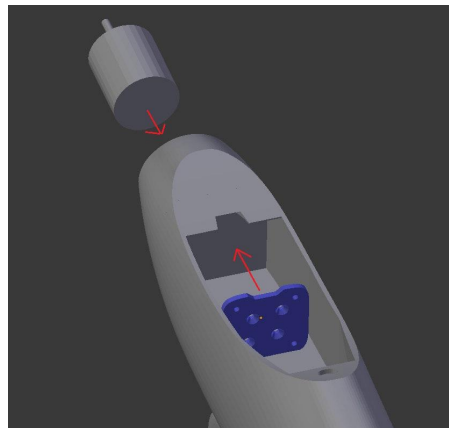
Connect the nose gear steering lines to the rudder servo. Ensure the correct direction is achieved before tightening any knot.

Note - assuming the lines for the rudder are not crossed, the lines for the steering should cross over. This will achieve the correct control input.



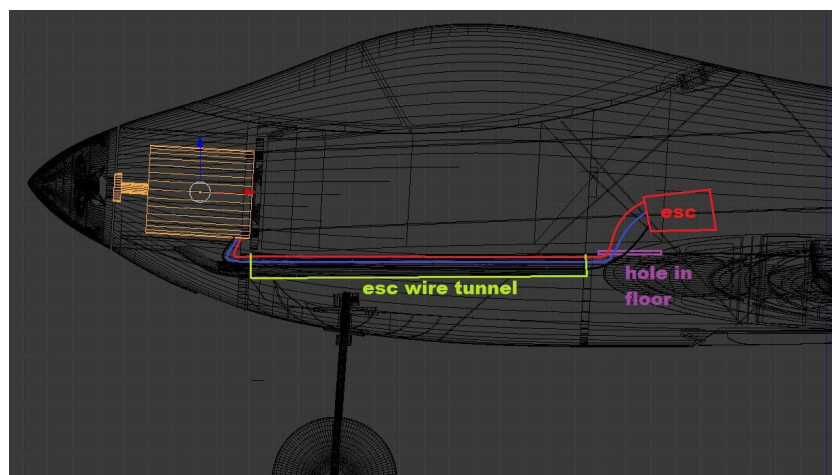
16

Install the motor mount to the fuse.



17

Install the motor to the mount and run the esc wires through the tunnel under the battery floor.



18

Glue fuse 1 in place

19

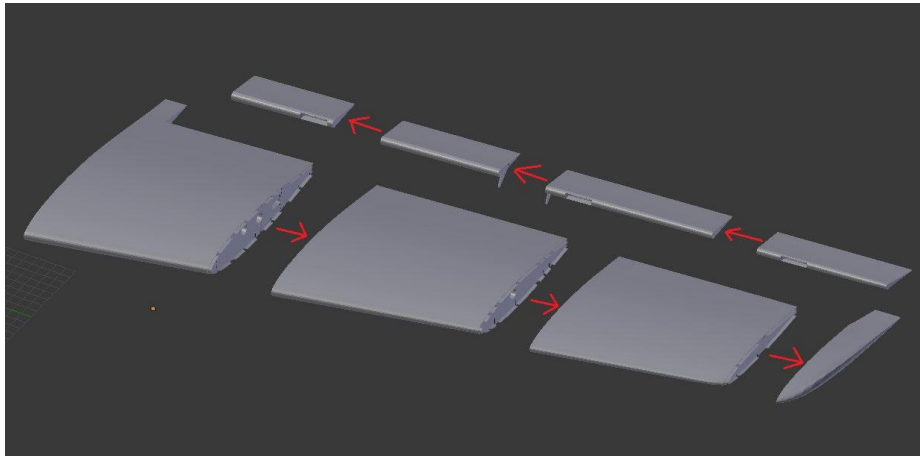
Glue the sections of the canopy together and install the magnets into the slots of the canopy and the fuse section.

20

Run a 10mm drill bit in reverse through the carbon tube slots of the wings to remove and zits inside the slots.

21

Glue the sections of the wings and ailerons together.



22

Glue the ailerons to the wings using 16x19 hinges.

Note - when gluing hinges, make sure all excess CA glue is removed. Any excess will cause the hinge to bind and be unusable.

23

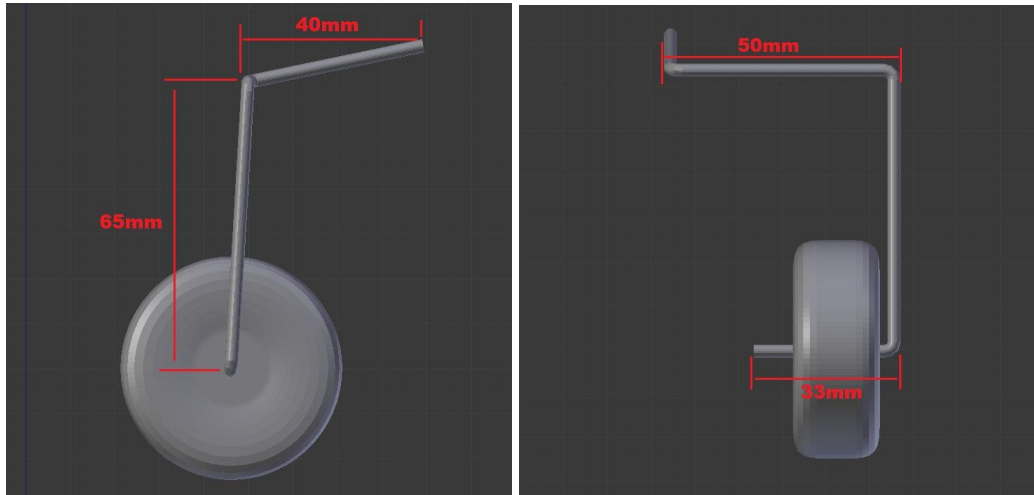
Install the servo to the servo cover and feed the cable through the wing.

24

Connect the aileron servo to the aileron and secure the servo cover in place with m2 screws.

25

Bend a 190mm section of 3mm rod for each of the main gear. See image below for dimensions.



26

Secure the main gear in place with the main gear lock using m2 x10mm screws and install the wheel, securing it with a m3 collar.

27

Insert a 10mm carbon tube into the aft slot in the wing. (the carbon tube should slide all the way in)

28

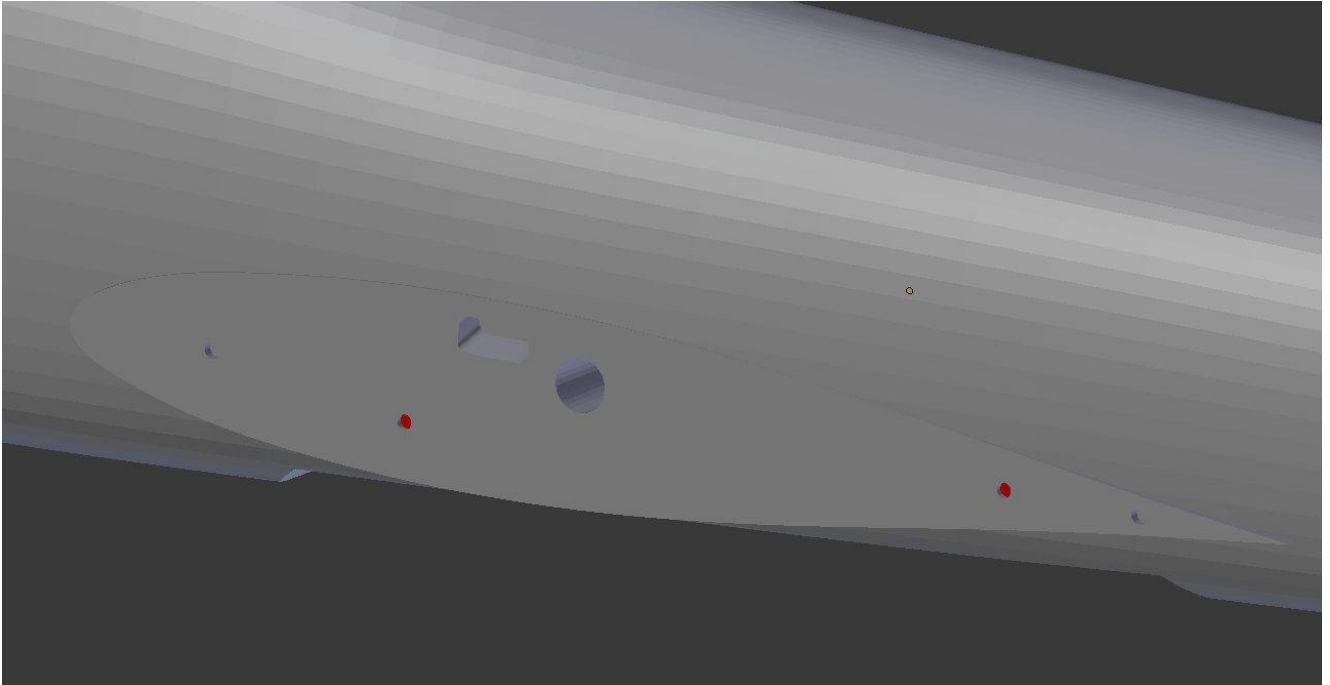
Install the brass inserts into the wing using a soldering iron to melt the inserts into place. The top of the inserts should be flush with the root face of the wing.



29

Using a soldering iron melt a small hole for the wing screws to go through. Be sure not to make the holes too large.

Hint - melt the smallest hole possible through the indent and then follow through with a 3mm drill bit. (indents to be melted marked in red)

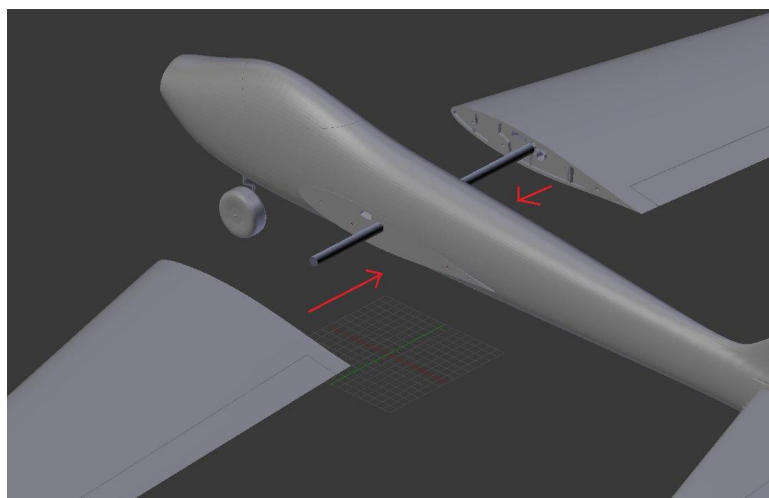


30

Glue the sections of the belly access hatch together and install the magnets to the hatch and fuselage.

31

Install the last 10mm carbon tube through the fuselage and fit the wings in place.



32

Secure the wings in place by screwing the m3 screws into the brass inserts. The screws should be firm but not over-tight.



33

Fit the belly access hatch.

34

Install the propeller hub. Secure the spinner to the hub using m2 screws.

BALANCING AND CG

Fit the battery using Velcro as required and balance the aircraft inverted on the CG marking points located **125mm aft of the leading edge at the wing root.**

It is advisable on the first flight for the aircraft to be balanced on the cg markings, then move forward or aft as desired.

RANGE OF TRAVEL:

NORMAL / MAIDEN FLIGHT:

Elevator	+/- 15mm
Aileron	+/- 15mm
Rudder	+/- 15mm

AEROBATIC FLIGHT:

Elevator	+/- 20mm
Aileron	+/- 20mm
Rudder	+/- 20mm

PARTS LINKS:

X1 3542 1450KV MOTOR (or similar)

https://de.aliexpress.com/item/4000938105740.html?spm=a2g0o.productlist.0.0.6a16714epjM0VY&algo_pvid=7909b1d2-c713-4ec7-a89e-c1384c69cca6&algo_exp_id=7909b1d2-c713-4ec7-a89e-c1384c69cca6-1

X1 50AMP ESC

https://de.aliexpress.com/item/1005001677828436.html?spm=a2g0o.productlist.0.0.4018c15agqfYKm&algo_pvid=6be5df25-544c-4729-8c58-de09ddb390f9&aem_p4p_detail=2021090103433414685134071778880000504172&algo_exp_id=6be5df25-544c-4729-8c58-de09ddb390f9-4

2200mah 3s LIPO

https://de.aliexpress.com/item/32833411481.html?spm=a2g0o.productlist.0.0.64ef480aYCzI2n&algo_pvid=f86fc7a0-0324-4584-9081-c8b4b1a543a2&algo_expid=f86fc7a0-0324-4584-9081-c8b4b1a543a2-1&btsid=2100bdf016211822705142563e2ed8&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

9G SERVO

https://de.aliexpress.com/item/32898059654.html?spm=a2g0o.productlist.0.0.7d394771z9xfZq&algo_pvid=26dd1d90-4d3b-4f94-955c-e26a127ba26c&algo_expid=26dd1d90-4d3b-4f94-955c-e26a127ba26c-3&btsid=2100bdf016211823001362964e2ed8&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

BAMBOO SKEWERS 3mm

X2 10mm X 10mm X 2mm MAGNET (ROUND)

https://www.aliexpress.com/item/1005001362617359.html?spm=a2g0o.productlist.0.0.5da3607dAATH5j&algo_pvid=b9e32b8a-0d4f-469a-b838-b478442dda50&algo_expid=b9e32b8a-0d4f-469a-b838-b478442dda50-0&btsid=0bb0623a15991797178681785e1811&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

X12 16mm x 29mm HINGES

https://de.aliexpress.com/item/32659926010.html?spm=a2g0o.productlist.0.0.5e7f7ef2zlc3qX&algo_pvid=478c4573-19ad-4939-ba11-475e3dc6139e&algo_expid=478c4573-19ad-4939-ba11-475e3dc6139e-0&btsid=2100bdf016211823370763498e2ed8&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

X4 m3 bolts 10mm

https://de.aliexpress.com/item/32971605141.html?spm=a2g0o.productlist.0.0.579f389cCkw61g&algo_pvid=a0fe0287-28d2-4868-a6d9-0434689e59f7&algo_exp_id=a0fe0287-28d2-4868-a6d9-0434689e59f7-11

X4 m3 brass inserts

https://de.aliexpress.com/item/1005002288716120.html?spm=a2g0o.productlist.0.0.55655304YDb3jD&algo_pvid=858d4c4e-5aff-4e4d-bee1-a5e541c1ffe2&algo_exp_id=858d4c4e-5aff-4e4d-bee1-a5e541c1ffe2-3

VELCRO (local hardware)

m2 x 6mm screws

https://de.aliexpress.com/item/1005001706301780.html?spm=a2g0o.detail.1000060.3.5292252bbHpjfk&gps-id=pcDetailBottomMoreThisSeller&scm=1007.13339.169870.0&scm_id=1007.13339.169870.0&scm-url=1007.13339.169870.0&pvid=1aee377b-969f-4c74-820e-036608804b82&t=gps-id:pcDetailBottomMoreThisSeller,scm-url:1007.13339.169870.0,pvid:1aee377b-969f-4c74-820e-036608804b82.tpp_buckets:668%230%23131923%2380_668%230%23

m3 x 10mm screws

https://de.aliexpress.com/item/4000982209705.html?spm=a2g0o.productlist.0.0.55f52c731yIJke&algo_pvid=06e4cbd2-95f3-48d3-8d40-4661110b29dd&algo_exp_id=06e4cbd2-95f3-48d3-8d40-4661110b29dd-11

X3 m3 collars and set screws

https://de.aliexpress.com/item/1005001853761239.html?spm=a2g0o.productlist.0.0.1de412eaviuA7t&algo_pvid=aff41e2a-f8b9-4f0c-aaf2-68ec54f8748e&algo_exp_id=aff41e2a-f8b9-4f0c-aaf2-68ec54f8748e-0

1mm or 1.5mm piano wire

<https://de.aliexpress.com/item/32975279180.html?spm=a2g0s.9042311.0.0.2e0f4c4d0HE2dZ>

Braided fishing line (20lbs)

https://de.aliexpress.com/item/33018161006.html?spm=a2g0o.productlist.0.0.121241fdnYQPhP&algo_pvid=1f1dddac-beaf-4d44-8224-594452da050e&algo_exp_id=1f1dddac-beaf-4d44-8224-594452da050e-0

X3 10x8mm carbon tube

<https://de.aliexpress.com/item/32552340930.html?spm=a2g0s.8937460.0.0.6c1b2e0eXbtrlE>

X3 50x20mm foam wheels

https://de.aliexpress.com/item/32703989205.html?spm=a2g0o.productlist.0.0.32ec29bewVRJHh&algo_pvid=7488f7f2-cc64-4ec3-a7a2-5115005fdef4&algo_exp_id=7488f7f2-cc64-4ec3-a7a2-5115005fdef4-4

Thank you for supporting us! We hope you enjoy many hours of flying your Blue Angel. If you have any questions regarding the build process or set-up of your model, please contact us at:

Aeroworks3d@outlook.com