

ASSEMBLY MANUAL AND USER GUIDE



Piper Turbo Arrow IV PA-28T IV

By 3D AEROWORKS

OVERVIEW:

This replica of the famous Piper arrow IV is designed for quick and easy construction and printed using light weight PLA (LW-PLA). For best results the canopy should be printed with clear PLA The motor mount and propeller assembly in regular PLA. Designed to suit the 1806 2300kv outrunner on a 2 or 3 blade (5x5) propeller. Utilizing full 4 channel controls; aileron, elevator, rudder and throttle, this model performs extremely well given its small size and lightweight. 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://www.rc3dmarket.com/piper-pa-28t-turbo-arrow-iv>

GENERAL SPECIFICATIONS

WINGSPAN:	650mm
PRINT TIME:	50 hrs
PRINT WEIGHT:	150g
FLYING WEIGHT:	250g (without landing gear) - 280g (with landing gear)
CENTER OF GRAVITY	40mm aft of L.E at wing root. (Marked with indentation)

ELECTRICS

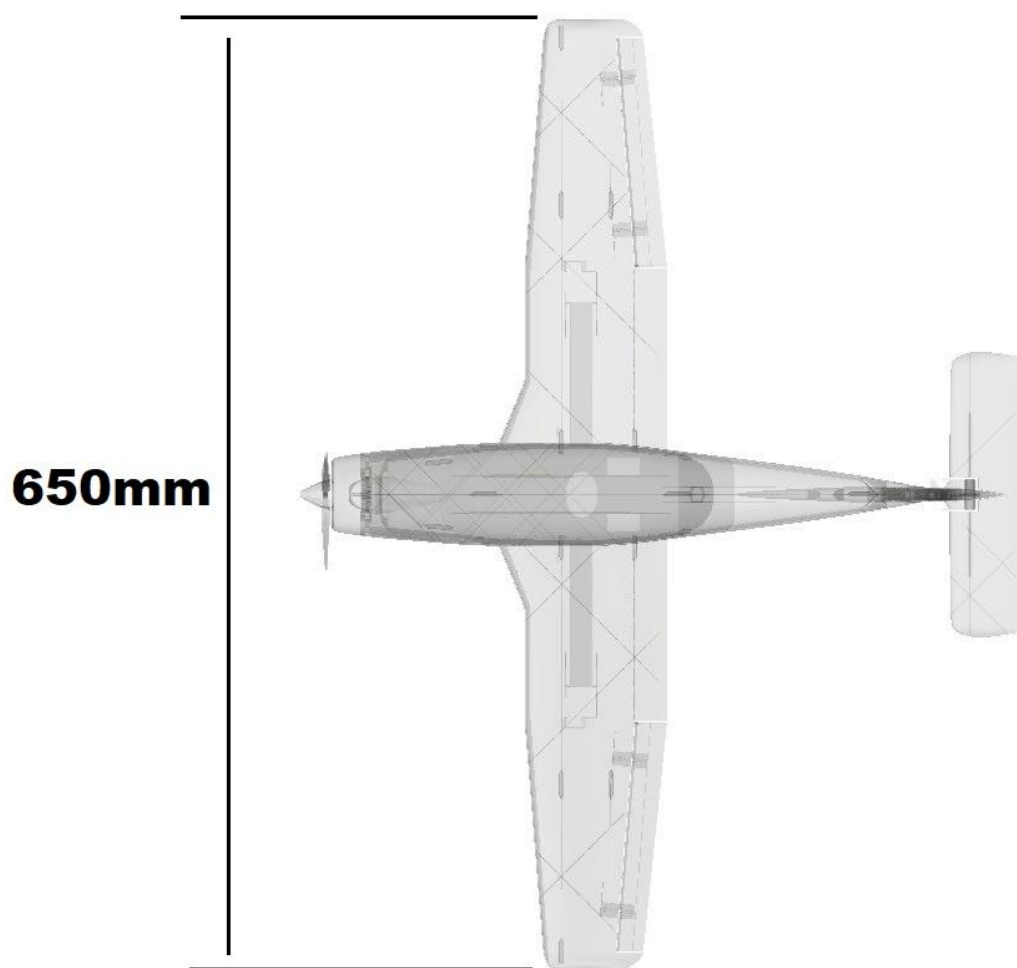
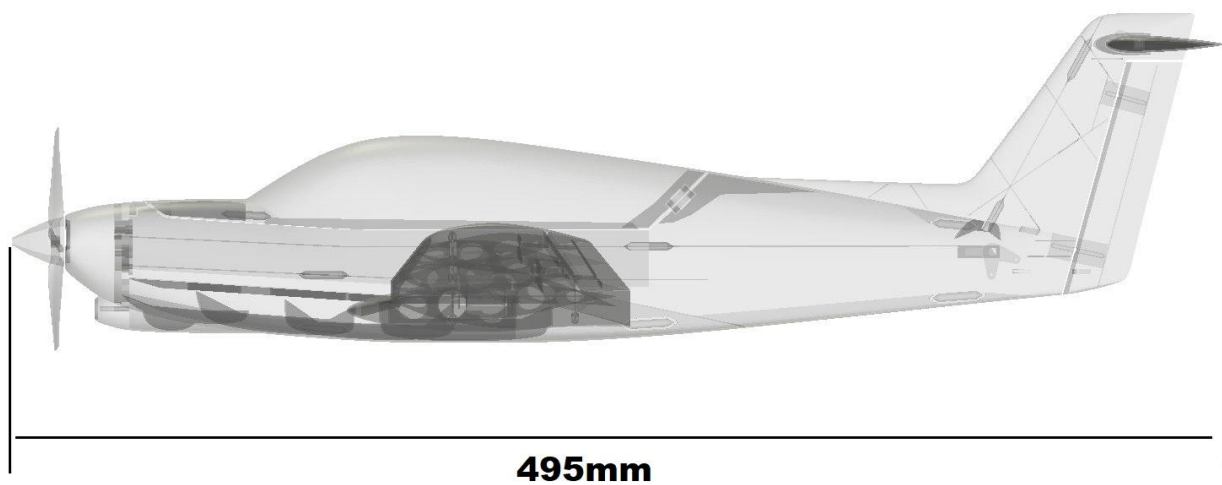
MOTOR:	1806 2300KV
ESC:	6amp (min) 15amp (recommended)
SERVOS:	3.7g MICRO
BATTERY:	800mah 2s (or similar)

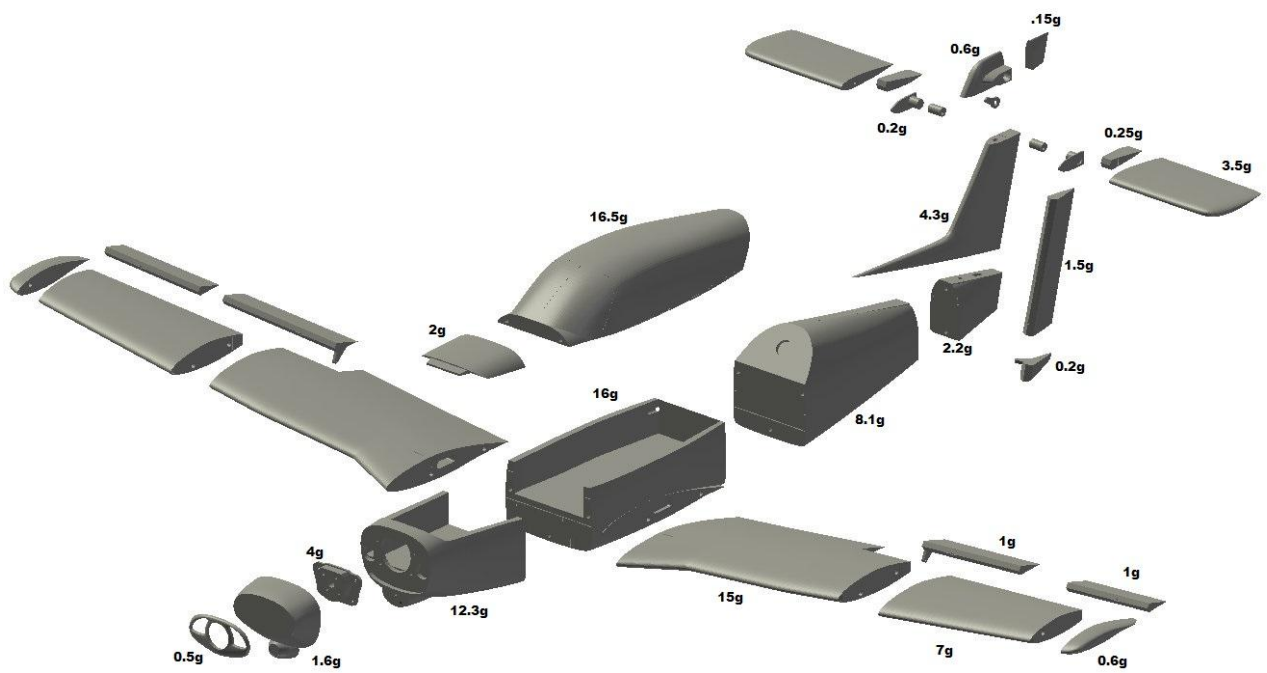
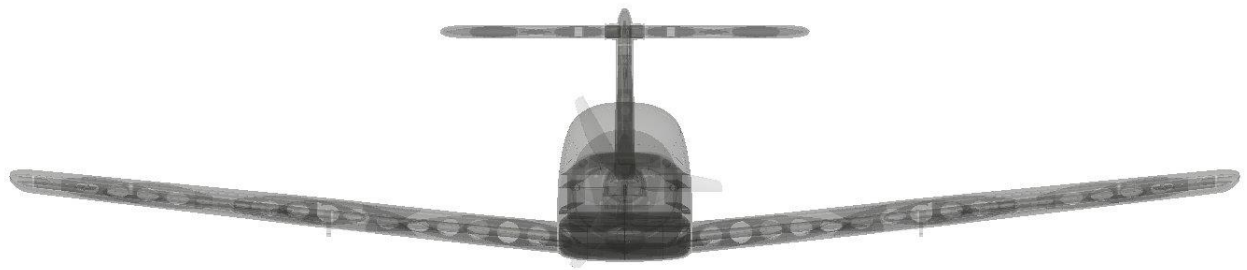
INCLUDED:

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

G-CODE OF ALL FILES (sized for 200X200X200 printers but works larger printers also)

FACTORY FILES FOR (S3D) SIMPLIFY 3D FOR PRINTERS: 200X200X200





REQUIRED TOOLS:

KNIFE

LIGHTER

SANDPAPER (MEDIUM GRIT)

PLIERS

CA GLUE

SCREW DRIVERS

FILE OR RASP

DRILL 1mm, 2mm, 3mm bits

REQUIRED COMPONENTS:

X1 1806 2300KV MOTOR (or similar)

X1 6AMP or 15AMP ESC

X1 800MAH 2S LIPO OR SIMILAR

X4 3.7G MICRO SERVO

X1 5x5 PROPELLER

BAMBOO SKEWERS 3MM

HEAT SHRINK TUBE 3mm

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

X10 MICRO HINGES (OPTIONAL)

VELCRO

X2 x 200mm CARBON STRIP 3mm x 0.6mm (RECOMMENDED)

M2 x10mm SCREWS

1mm PIANO WIRE

M2 PUSH ROD (200mm MINIMUM LENGTH) (ONLY REQUIRED FOR FIXED GEAR OPTION)

M2 WHEEL STOP COLLAR

X1 3mm Square carbon tube (100mm length)



ASSEMBLY INSTRUCTIONS

1

After all parts have been printed, some may require to be cleaned as LW-PLA is prone to stringing. Do this by gently sanding back the rough sections with a file, sandpaper or blade until the surface is smooth.

2

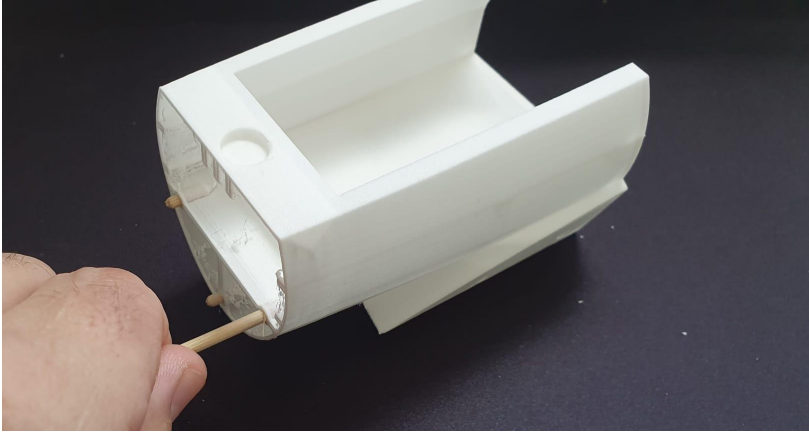
All faces which are to be glued to other parts need to be given a light sanding (scuff the surface) to assist with glue adhesion.

3

Cut 15mm sections of skewer and place into alignment holes in the fuselage sections.

NOTE - It may be required to open up the holes a small amount if the fit is too tight. Do this by using a 3mm drill bit. Gently spin it in reverse as you insert it into the hole. This will ensure the bit does not tear the print.

Test fit the sections of the fuse before gluing to ensure a clean fit.

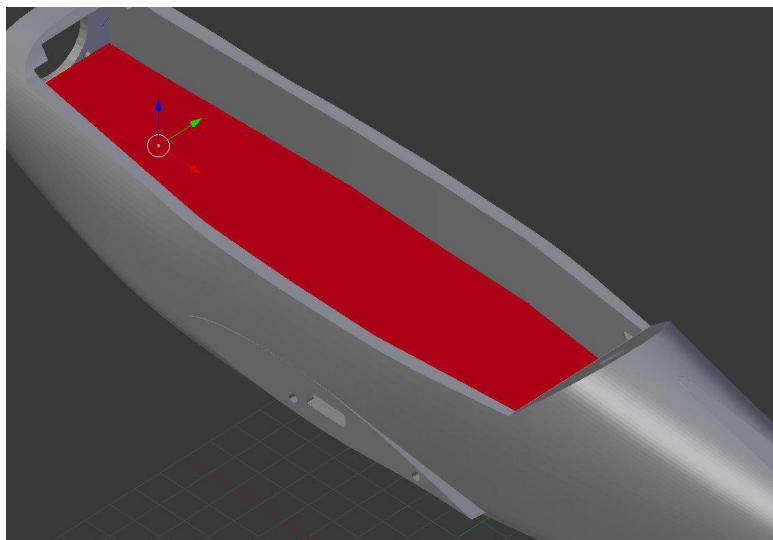


4

Glue all sections of the fuse together except fuse 1 and 4. Fuse 1 will be glued on last in order to allow for cg balancing and Fuse 4 will be glued fitted after installing the elevator drive gear.

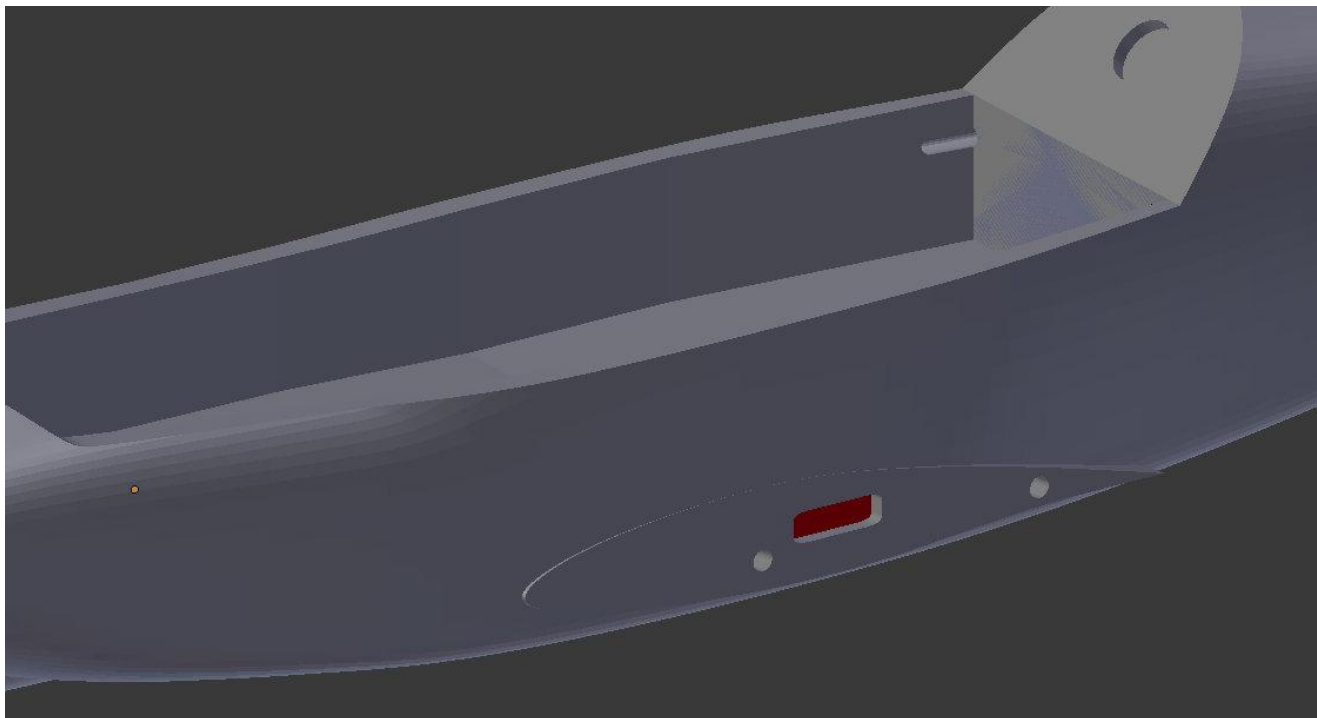
5

Once glued, with a sharp knife, remove the false floor of the battery hatch. (refer section marked in red) **NOTE:** The removed sections of LW-PLA that is the false floor will be used as hinge pieces later. **Do not throw away.**



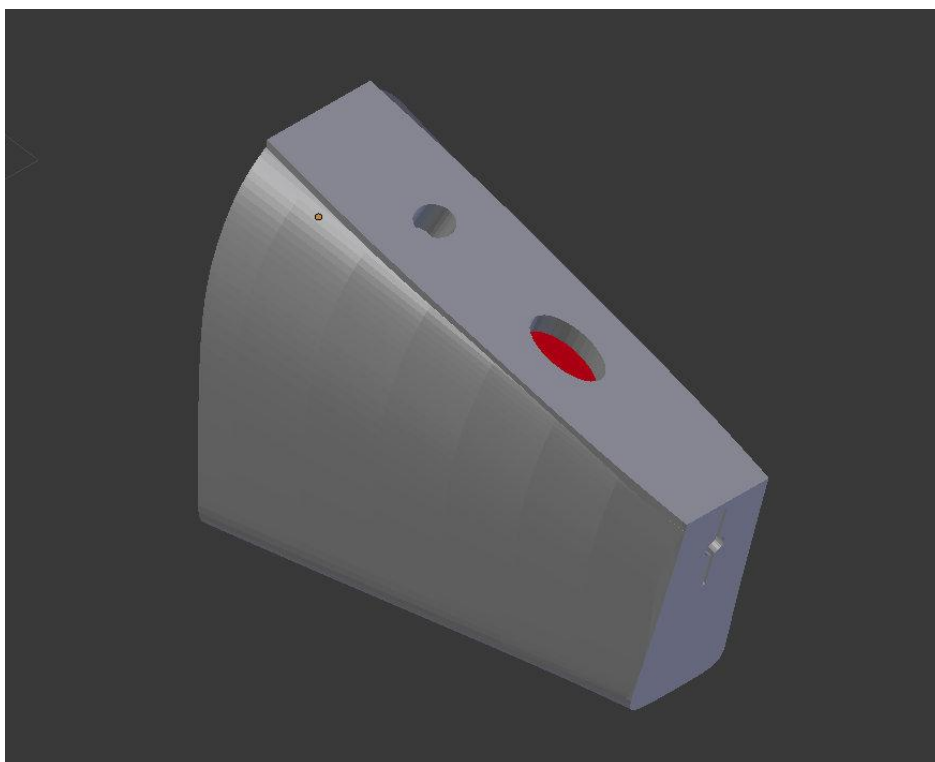
6

From part “fuse 3” remove the inner section of the lead tunnel with a knife or heated metal rod to allow the servo lead for the aileron to pass through. (refer section marked in red)



7

From fuse 4, remove the section marked in red for the elevator pushrod connecting the bellcrank to the elevator control arm.



8 INSTALLING THE ELEVATOR DRIVE

-Cut a 15mm section of 3mm bamboo skewer and test fit it in the bellcrank seat located inside fuse 4. Trim as required to obtain a good fit. Once happy with the fit, cut the same length of 3mm carbon.

-Run a 3mm drill bit through the pivot point of the bellcrank to ensure the carbon rod will rotate freely. NOTE- there should be no play in the bellcrank, any play will lead to slop in the elevator.

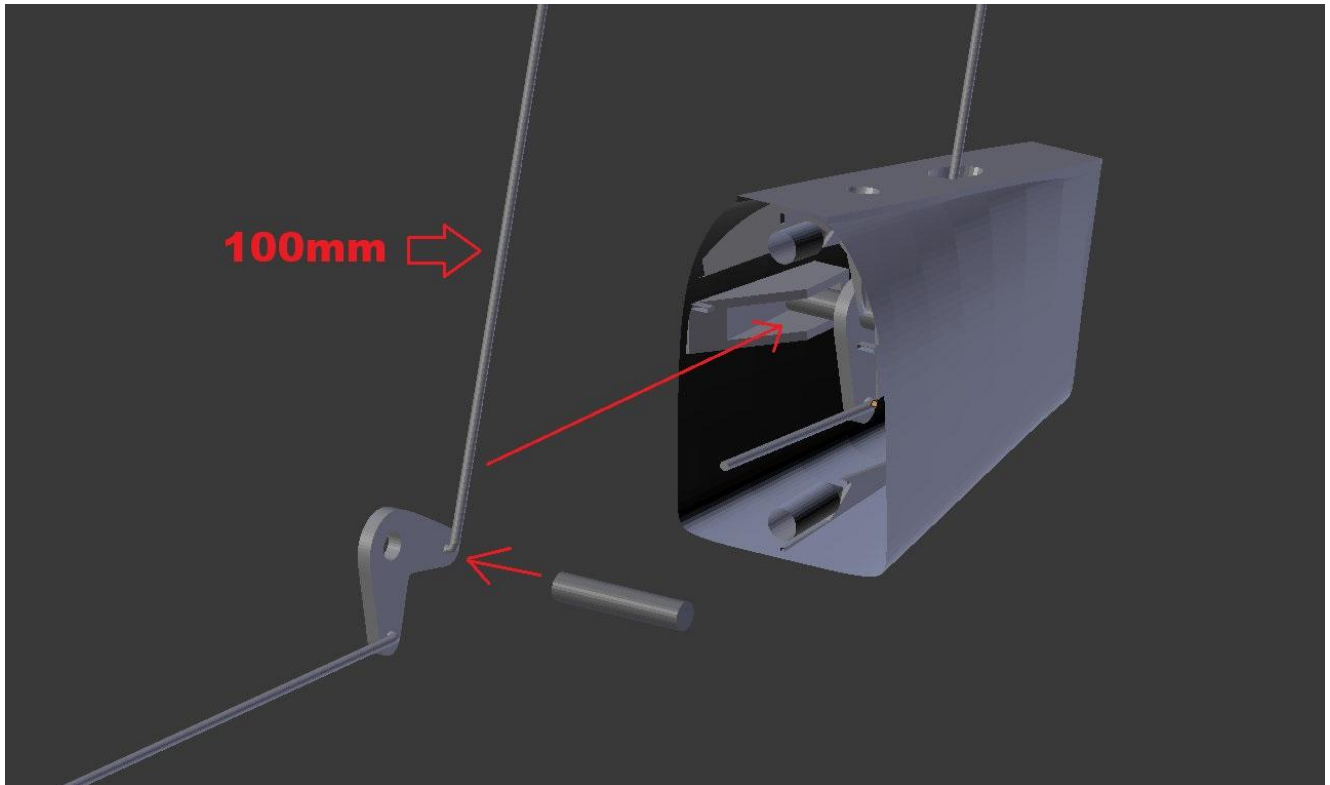
-Cut a section of 1mm push rod and bend according to the diagram below. A **100mm** length between the 90 bends is required.

- Fit the 100mm length to the bellcrank as indicated below.

- connect another length of 1mm pushrod to the other arm of the bellcrank, this end will connect to the servo arm and need only be long enough to reach the servo. Its final length can be adjusted later in the build.



- Fit the elevator bellcrank to fuse 4 with a small amount of hot glue as indicated below.



9

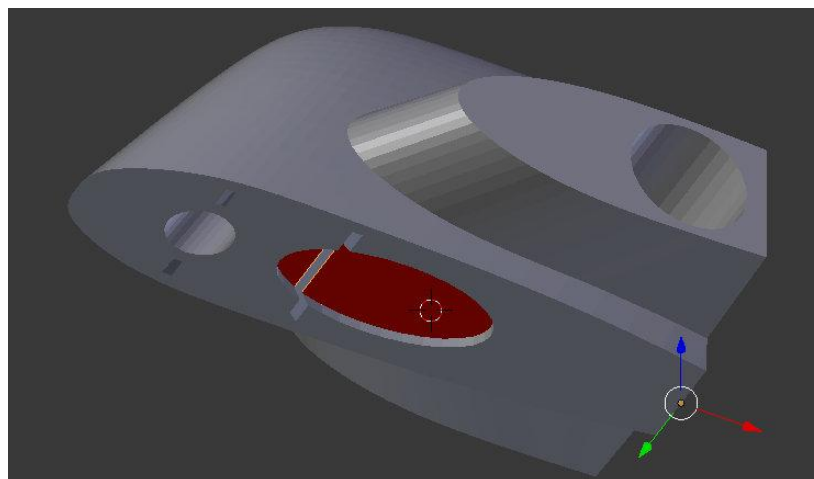
Glue fuse 4 to the remaining fuse sections.

10

Glue the “Vertical stabilizer lower” section to the fuse using the 3mm skewer as a guide. You may need to remove some material from the top of this section where the push rod is required to pass through.

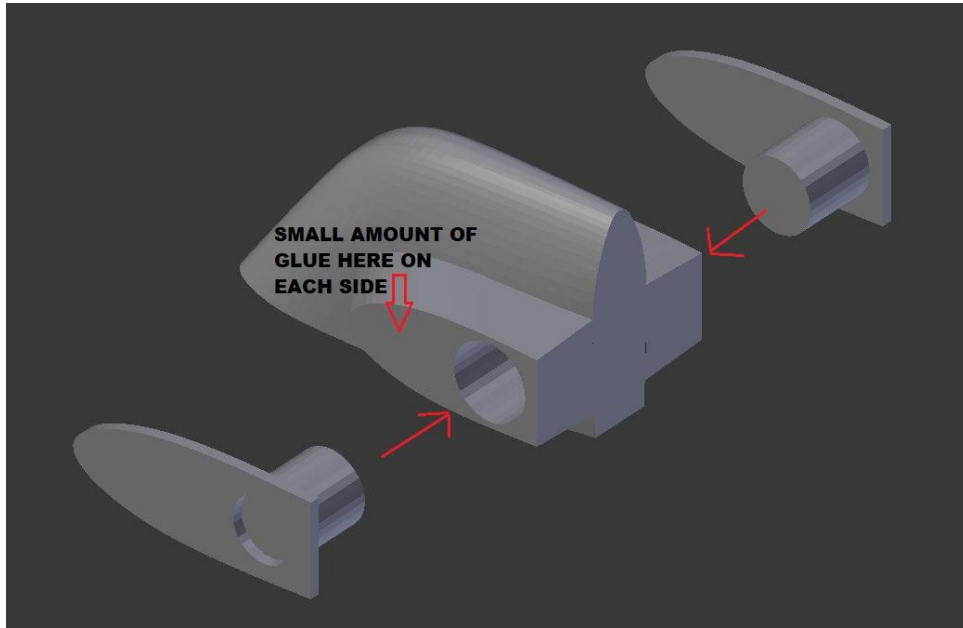
11

Remove the highlighted section of the “Vertical stabilizer upper front” in order for the elevator push rod to pass through.



12

Glue the “elevator races” to the “Vertical stabilizer upper front” section. Be sure that the back edge of the race is square with the “Vertical stabilizer upper front” section.



13

Test fit the 3mm carbon square tube in the elevator control arm. Make sure the fitment is tight. Once happy with the fitment remove the carbon tube.

14

Connect the elevator control arm to the upper end of the elevator push rod and insert it into the “Vertical stabilizer upper front” section.

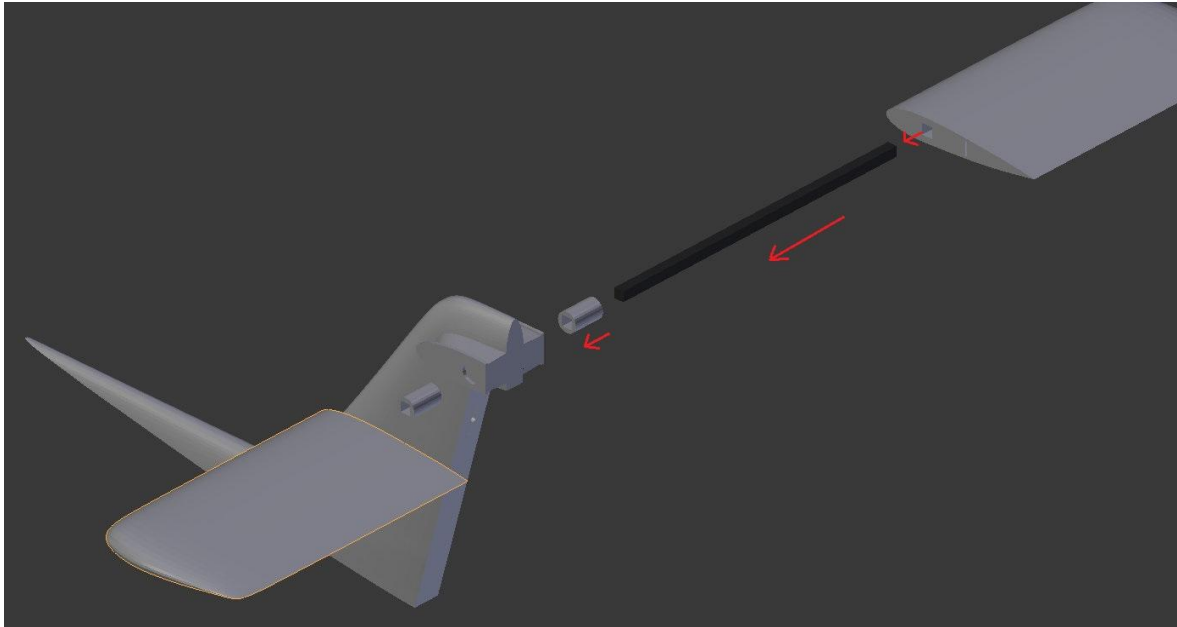
15

Test fit the “Vertical stabilizer upper front” section onto the “Vertical stabilizer lower section” and make sure the elevator push rod and assembly has unobstructed travel. Once confirmed the “Vertical stabilizer upper front” can be glued to the “Vertical stabilizer lower”.

16

Cut a 100mm length of 3mm square carbon tube and test fit it to the tail section through the elevator control arm.

Next feed the small “bearing liners” onto the carbon tube and press them into each race. The bearing liners and races should have a neat fitment with as little play as possible to reduce slop in the elevator.

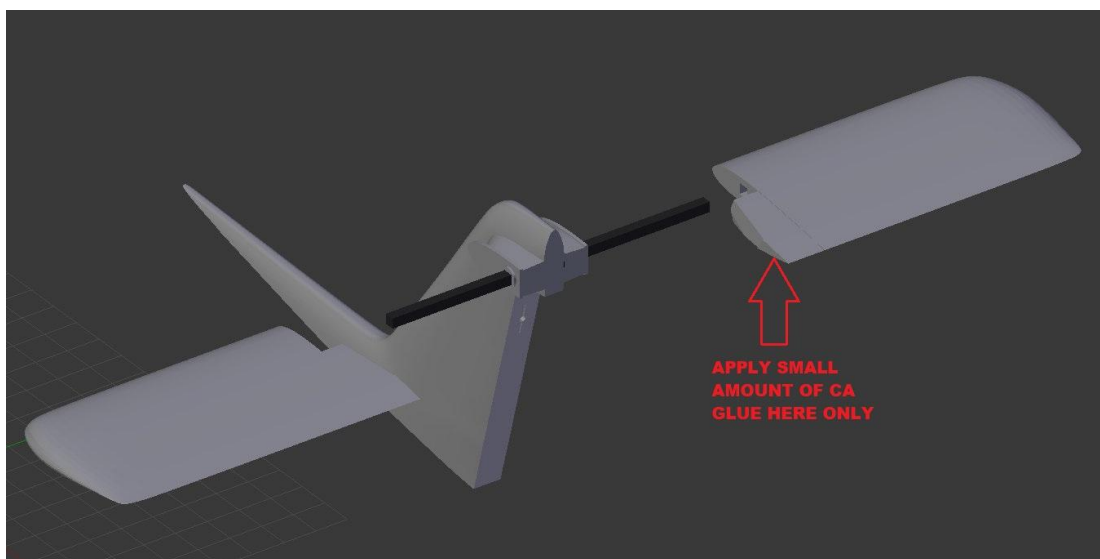


17

Glue the “Vertical stabilizer upper rear” section to the “Vertical stabilizer upper front” section.

18

Glue the elevator inner sections to the elevator outer sections. Then glue the elevator halves together. **NOTE** - Only glue the back of the elevators together as this will make adjustment possible later if required.



Note the correct neutral position of the elevator control arm relative to the elevator!

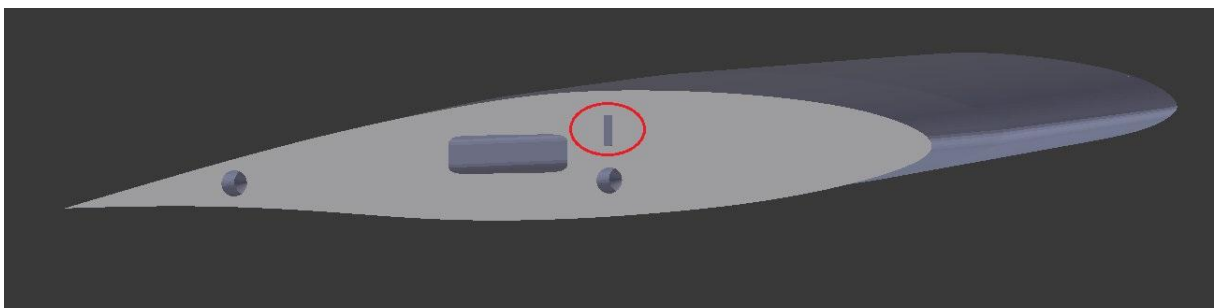


19

Glue the sections of the wings together.

20

Glue the wings to the fuselage **NOTE** – if using 3mm x 0.6mm carbon strip, now is the time to install it. Simply slide the carbon strip into the slot and cut it so it does not protrude out of the wing (circled in red, see image). The cross structure of the fuselage spreads the load of the wings at the root which negates the need of a connecting spar in the fuselage.



21

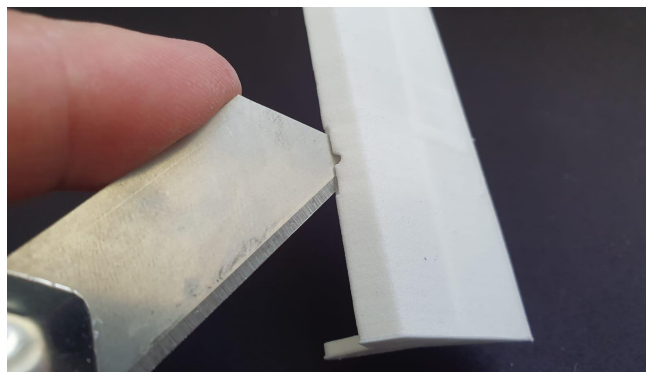
Run a string through the aileron servo wire tube from the mount hole for the aileron servo to the wing root. Leave enough length so that you will be able to feed the string through the fuse later.

22

Install all servos using a small amount of hot glue to secure them in place. The aileron servos mounting tabs will need to be trimmed. Connect the ailerons to the servos using 1mm wire and the printed linkage locks.

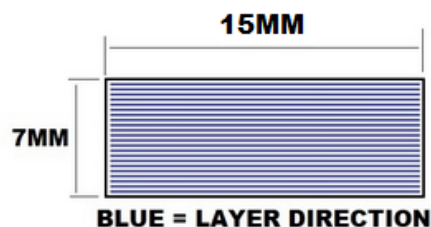
23

Test fit the hinges in the hinge slots for each control surface and its parent part, this will make gluing the control surface easier when the time comes. **NOTE**- Do not force the hinge if it is too tight. Loosen the slot by gently inserting a stanley knife.



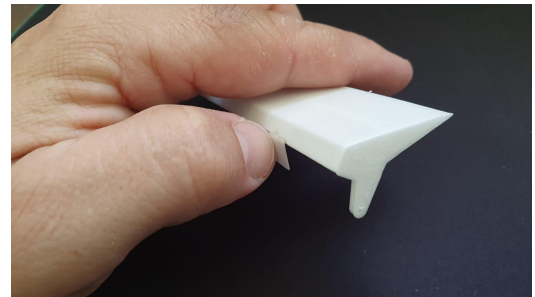
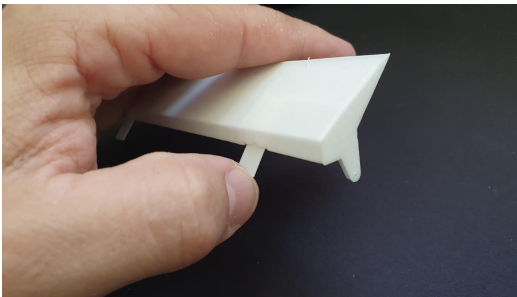
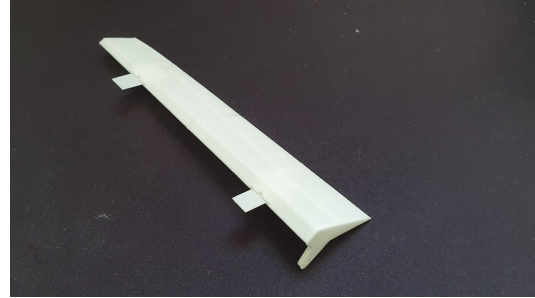
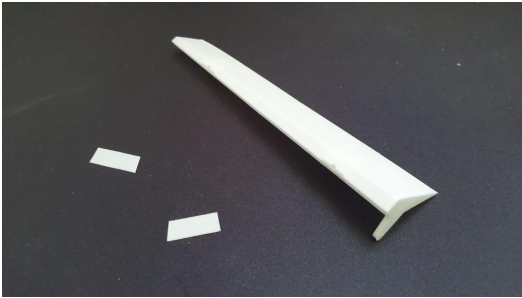
Using the LW-PLA as a hinge:

From the off-cuts from the fuselage false floor, cut small sections of 15mm x 7mm with the 7mm side being against the grain of the layers. Test fit the pieces into the hinge slots of the control surface and stabiliser or wing.



24

Place a drop of CA in the hinge slot of the control surface and insert the hinge. Be sure that the hinge is perpendicular to the control surface. Then bend the hinges to 90deg back and forward a few times to make sure they are appropriately loose. **See below**



25

Glue the rudder and ailerons in place. Make sure each control surface has full and free movement.

26

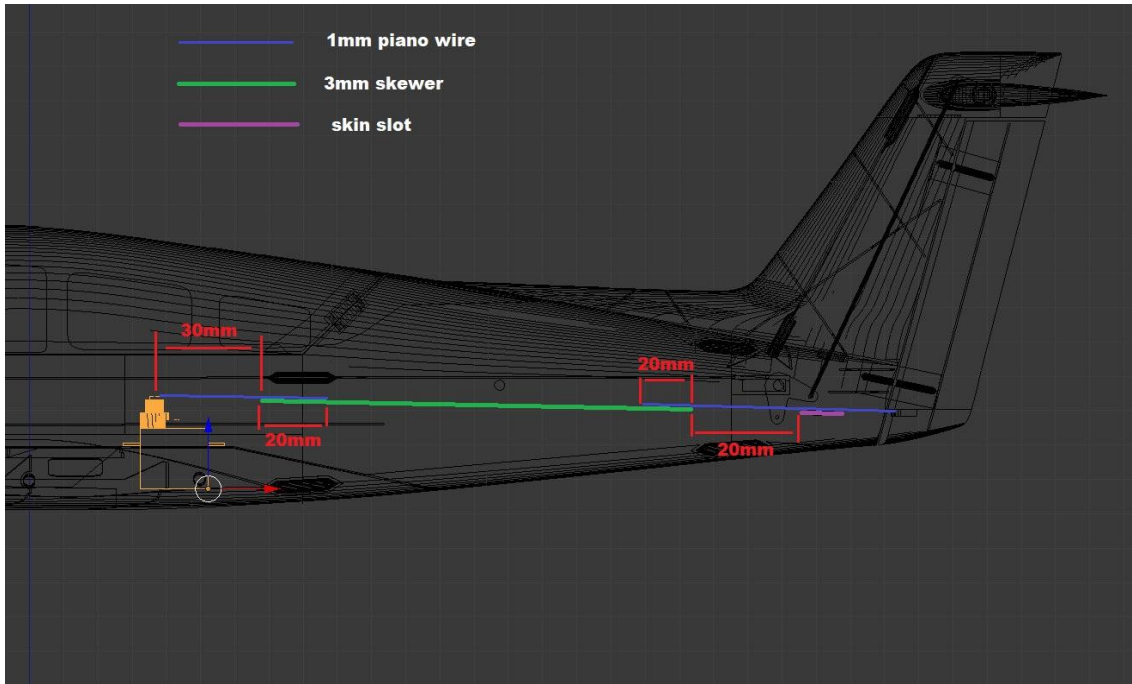
Using an appropriate length of skewer with 1mm steel wire on each end covered in heat shrink tubing, connect the elevator and rudder to their relative servo.

Elevator = left side

Rudder = right side



RUDDER and ELEVATOR

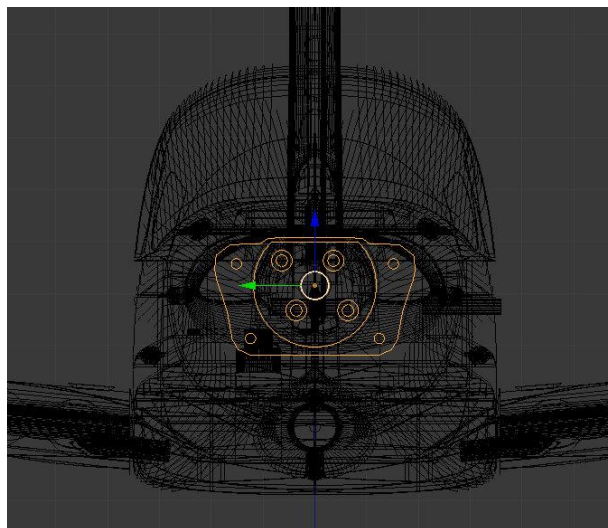
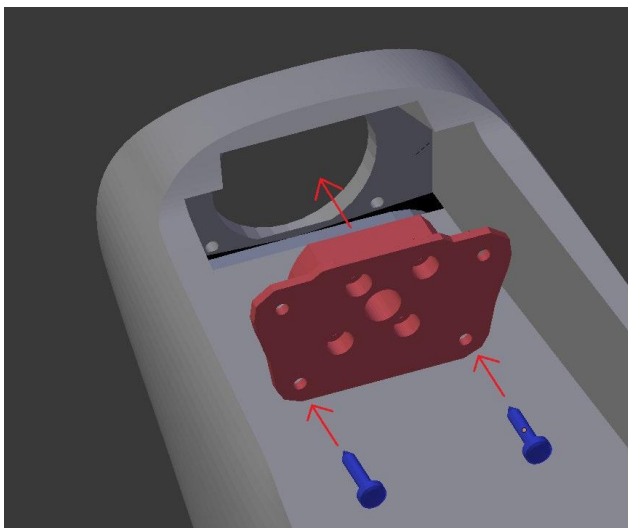


27

Install the magnets to both the fuselage and the canopy using CA.

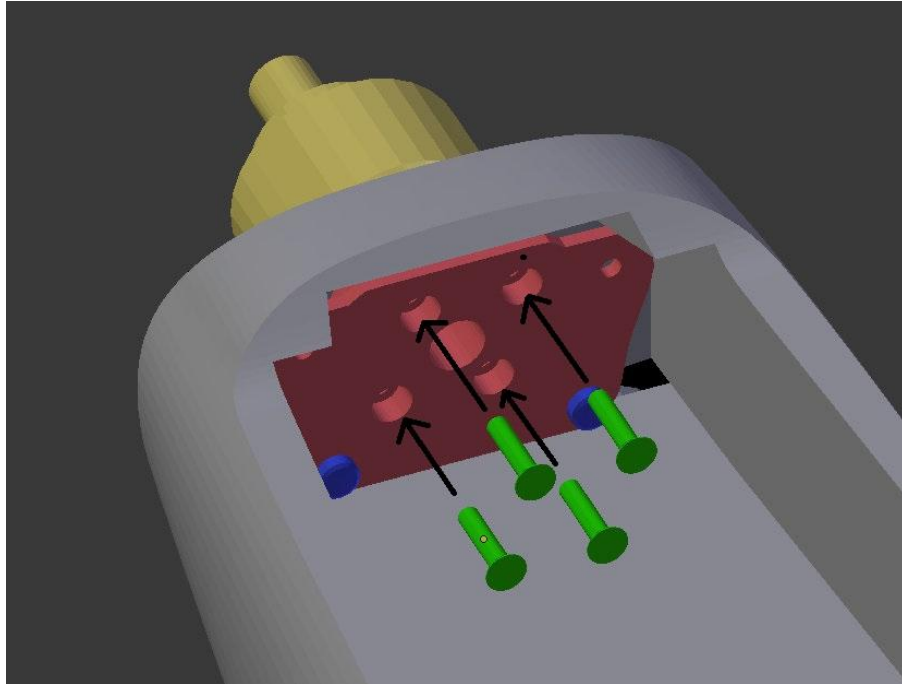
28

Place the motor mount in the slot provided on the firewall. Note the orientation of the mount with the small raised sections at the top. Secure it in place with two m2 x10mm screws into the **lower holes only**.



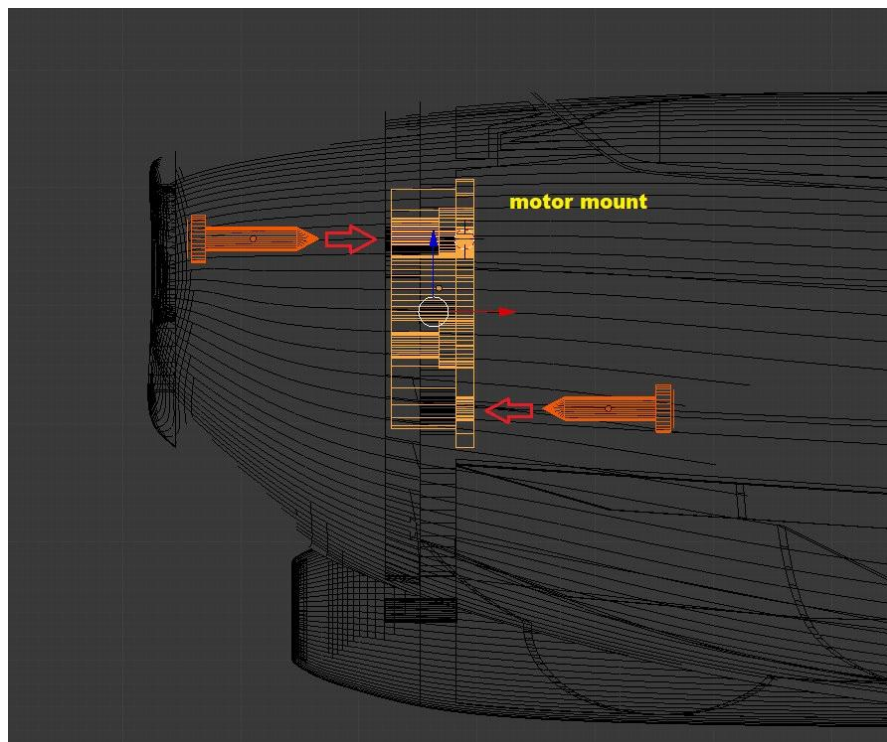
29

Install the motor to the motor mount. The motor mount holes may need to be pre-drilled with a 3mm drill bit.



30

Secure the motor mount with the final two m2 x10mm screws. The top two screws are first fed from the front of the aircraft through the cowling mounts, then through the firewall and finally through the motor mount. The **cowling mount** can be pre-drilled with a 2mm drill bit if desired to ensure a firm fitment of the cowling to the firewall. An m2 x10mm can now also be fitted to the lower center hole in the middle of the landing light to secure the lower section of the cowling to the fuse.



31

The holes on either side of the motor slot are for the ESC wires to pass through into the battery compartment of the model.

32

Fit the front cowling to the rear cowling using CA glue.

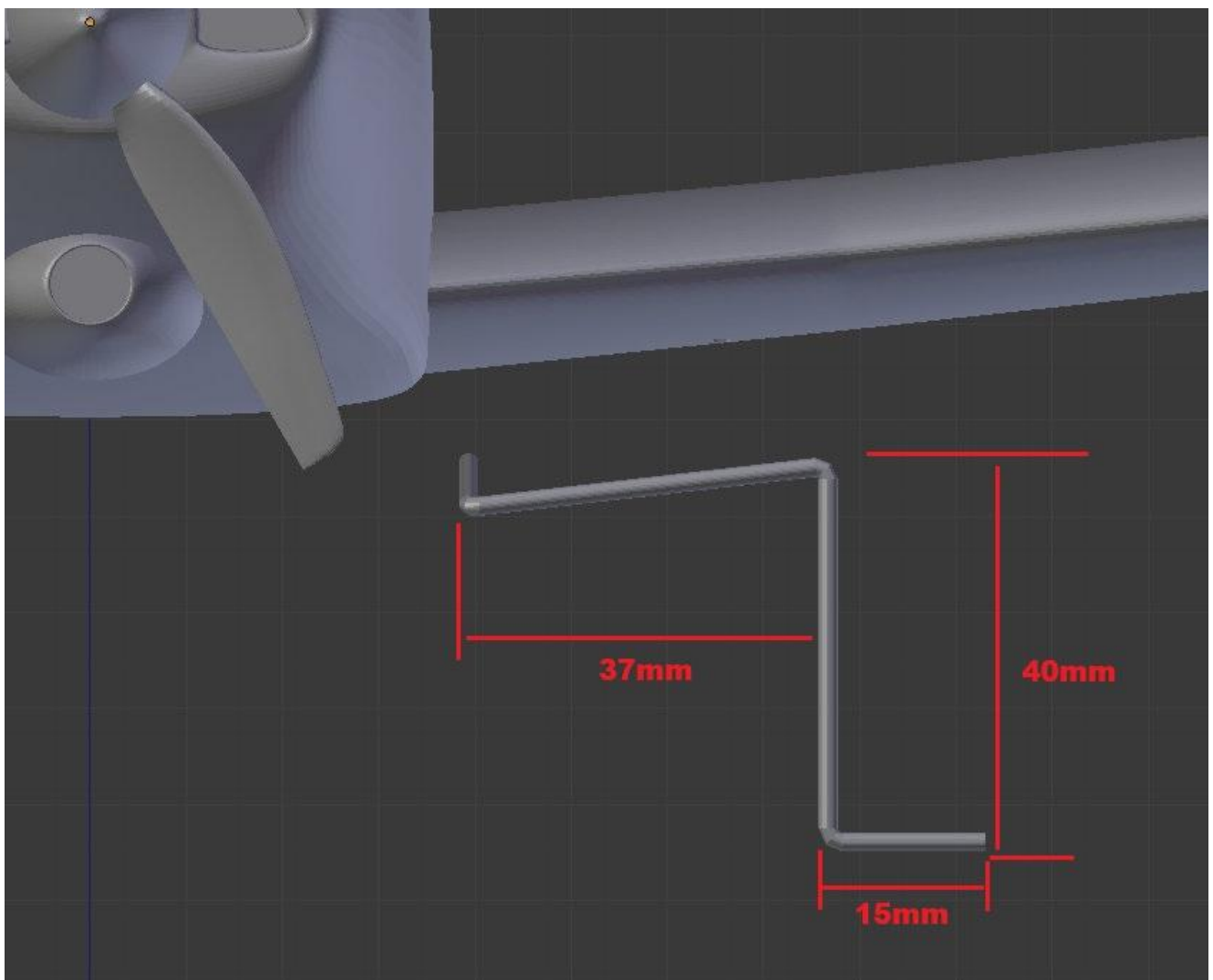
33

Glue the front and rear section of the canopy together.

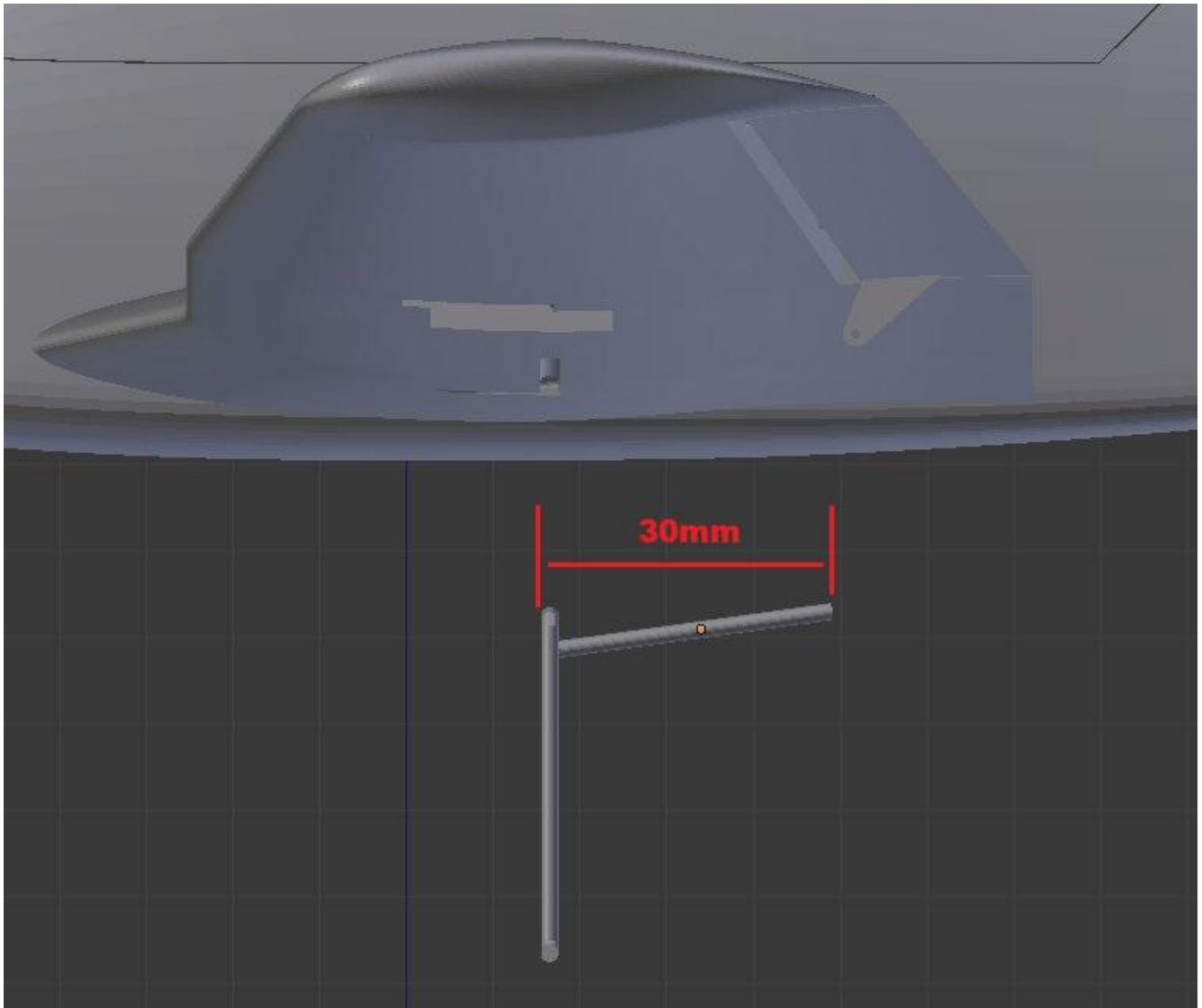
34 **** IF NOT USING LANDING GEAR SKIP AHEAD TO STEP 42 ****

Cut a 122mm section of 2mm wire and bend according to the diagram below. Make a mirrored version for the right side.

FRONT VIEW



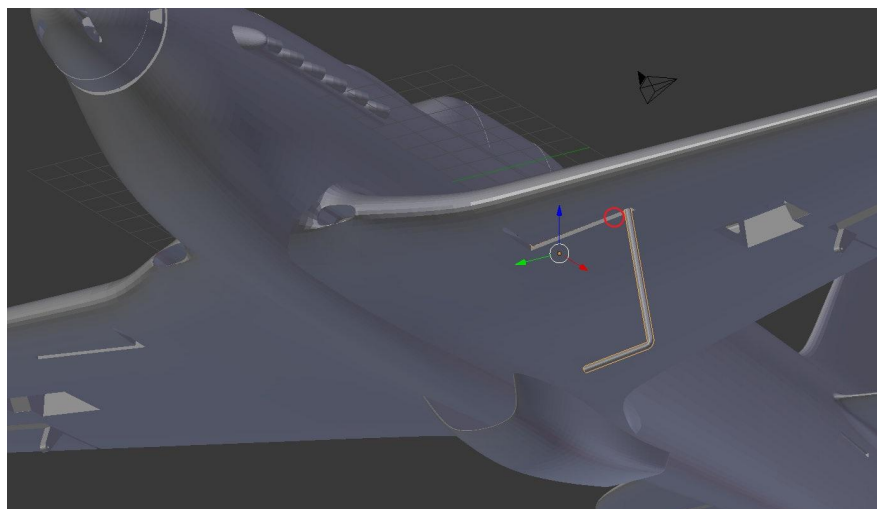
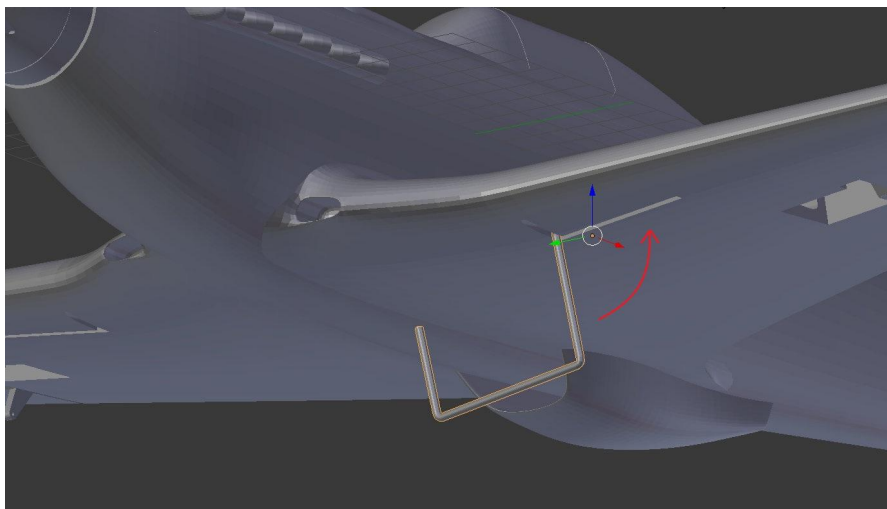
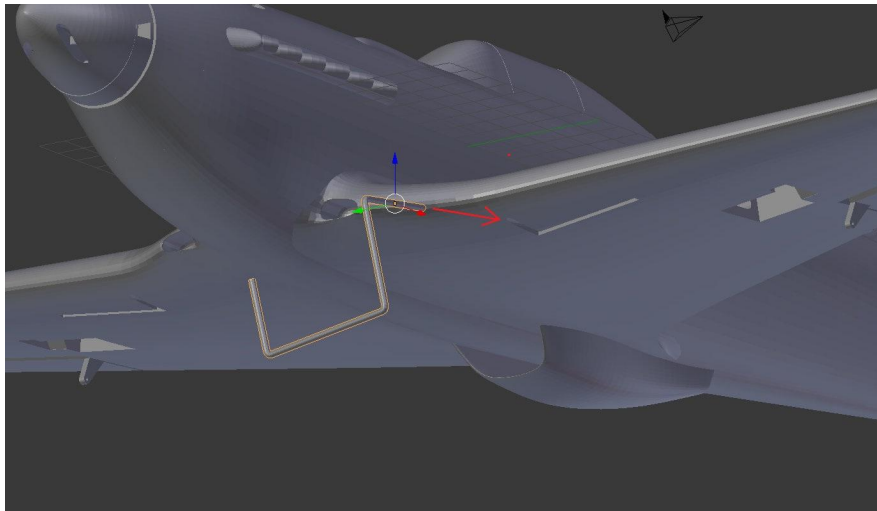
SIDE VIEW



Fit a 25-30mm foam wheel and secure with an M2 wheel stop collar.

Insert the gear leg into the wing as pictured below.

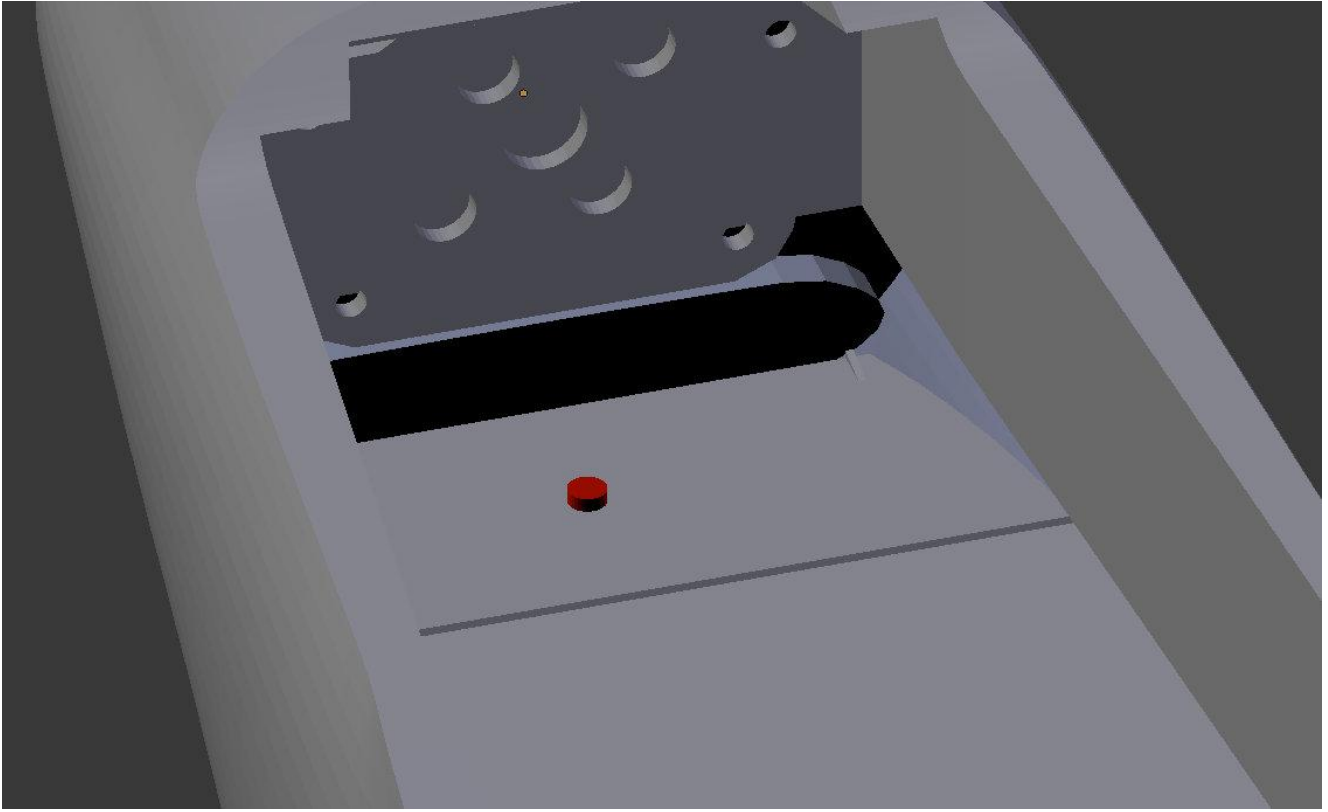
(different aircraft pictured below but the method is the same)



Apply a small amount of hot glue to the outer bend of the leg (red circle on image above). This will hold it in place but also allow it to be removed if desired. Fit the wheel and secure it with a shaft collar.

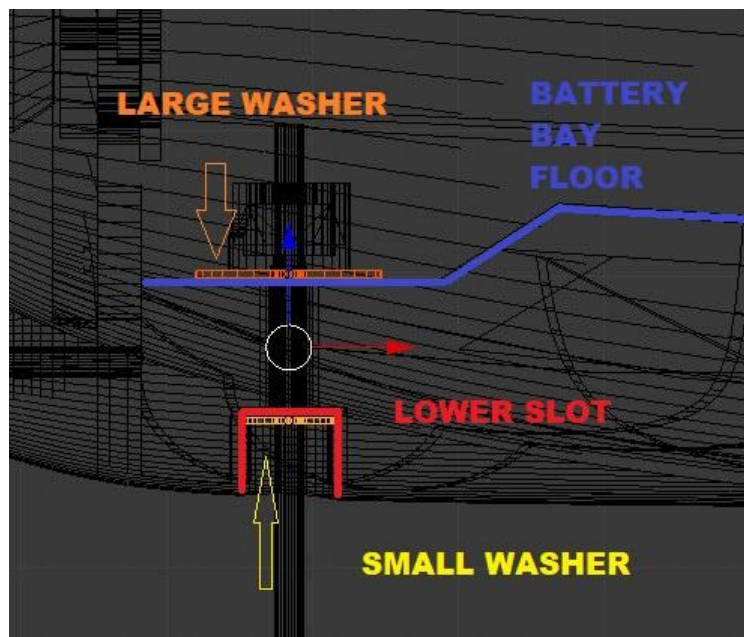
36

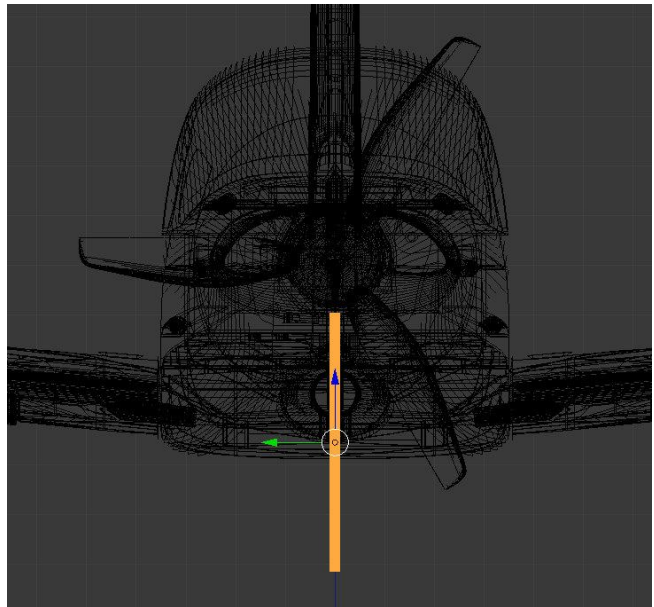
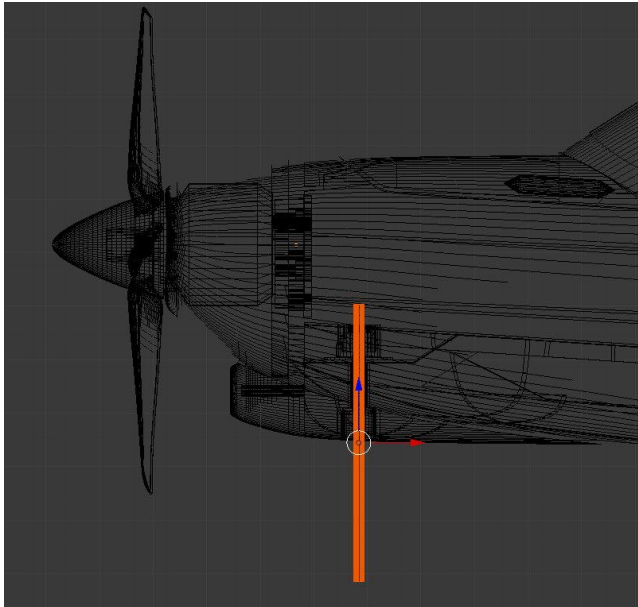
From the fuselage section near the nose, remove the over extrusion lump from the floor.
(marked in red)



37

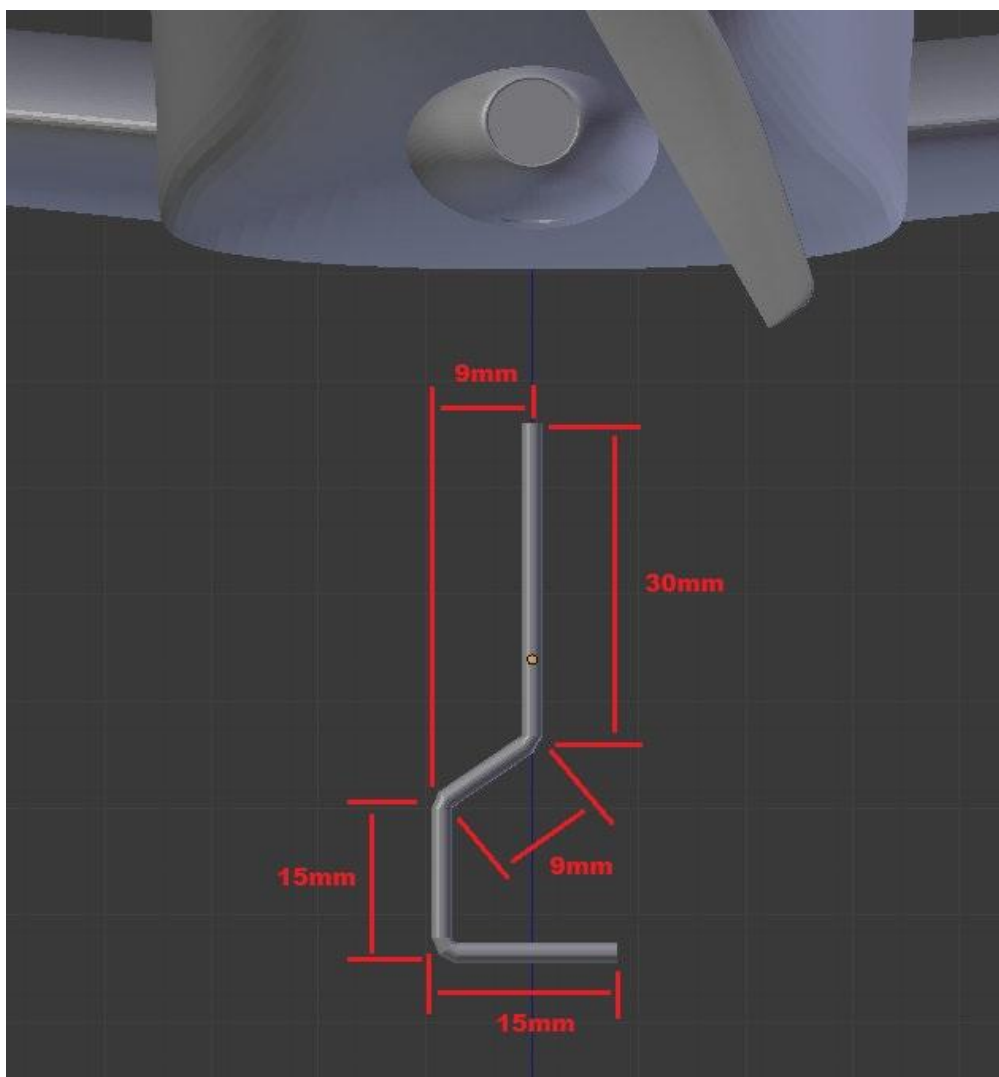
Insert a length of 2mm wire through the nose leg hole and place the nose gear washers over the wire (small washer in the slot on the belly of the model and the larger washer glued to the floor of the battery bay. NOTE- Ensure the 2mm wire is vertical and square with the model.
(see below)





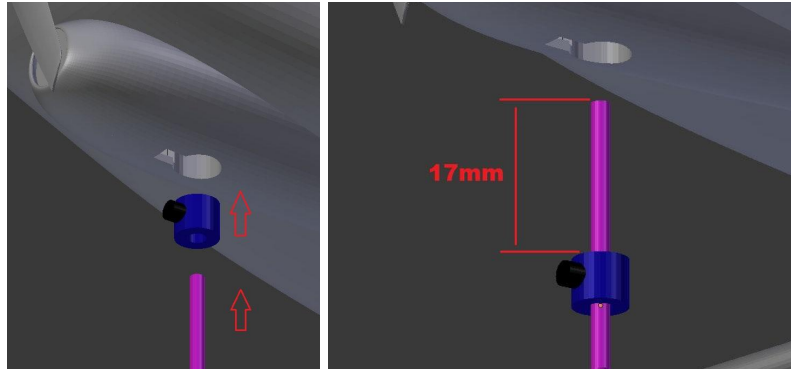
38

Cut a mm length of 2mm wire and bend according to the diagram below.



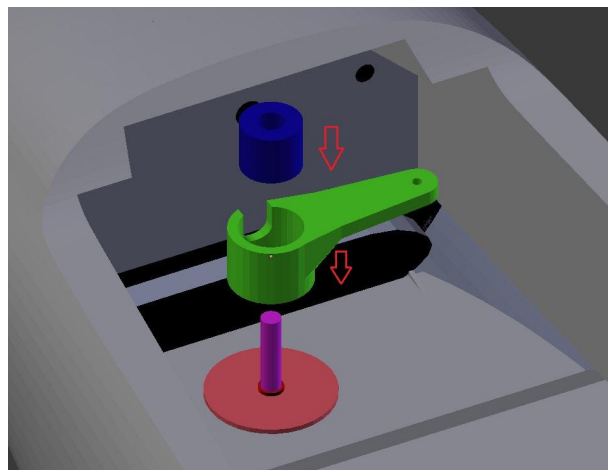
39

Place an M2 wheel stop collar over the top of the nose gear leg and secure the collar with 17mm protruding out the top. The grub screw should also be aligned with the neutral forward position of the gear leg. Then insert the leg into the slot.

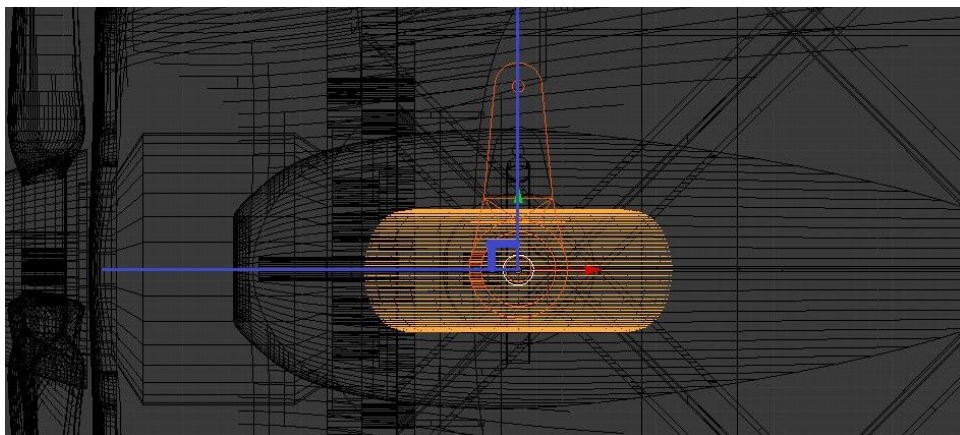


40

Press an M2 wheel stop collar into the nose gear steering arm and fit the assembly over the nose gear leg. Secure the collars in place with the grub screws. The leg should be able to rotate freely with no or very little vertical play. **(removing the cowling from the fuse will make securing the top collar easier)**

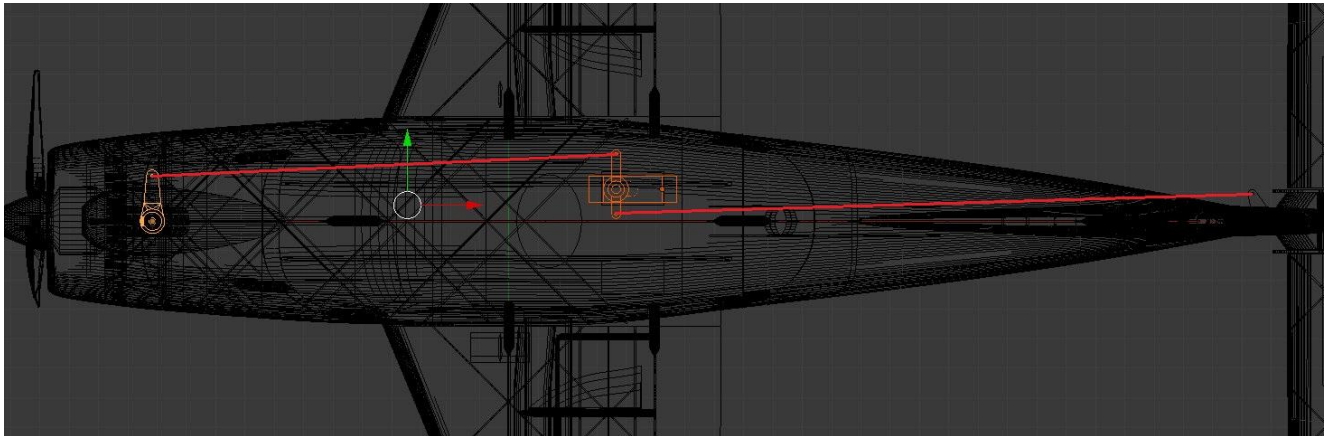


Ensure the steering arm is perpendicular to the nose wheel. This will ensure the same angle of travel left and right is possible.



41

Connect up the rudder servo with the nose gear steering as pictured below.



42

BALANCING AND CG

Fit the battery using Velcro as required and balance the aircraft inverted on the CG marking points located **40mm aft of the leading edge at the wing root.**

RANGE OF TRAVEL:

NORMAL FLIGHT:

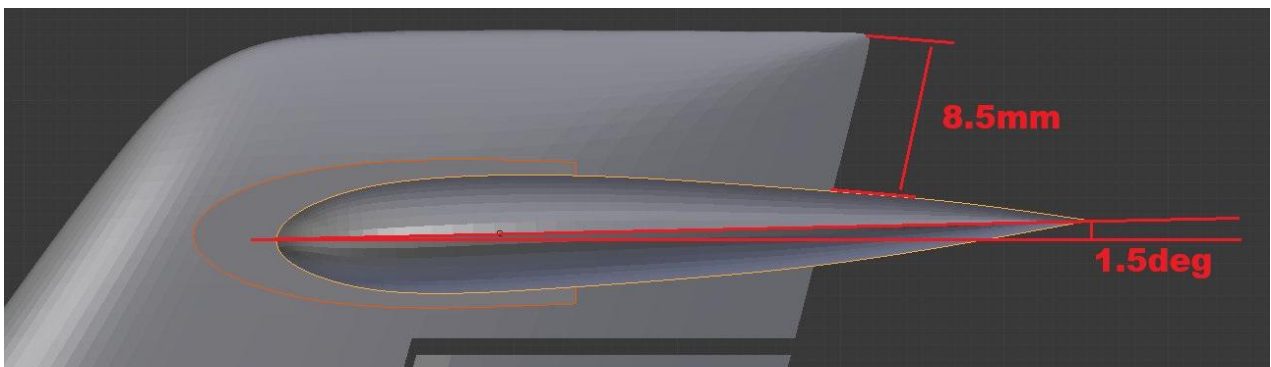
Elevator 8mm UP / 5mm DOWN

Rudder +/- 6mm

Aileron +/- 6mm

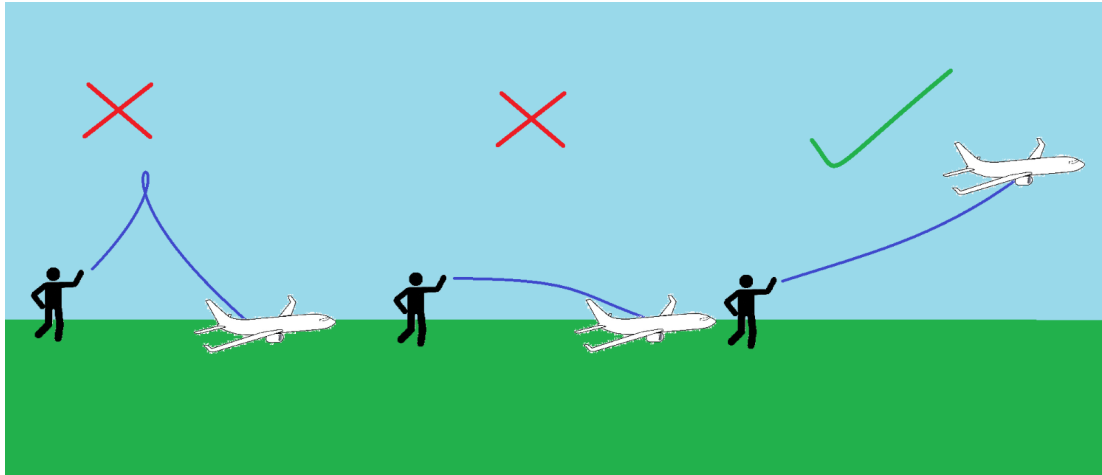
MAIDEN FLIGHT CAUTION

The full flying tail design is very pitch sensitive. For the maiden flight, ensure the elevator is placed in the slightly nose up position (see below). It is advised that low rates and expo should be used on the elevator.



LAUNCHING:

It was found that the safest and most successful launch technique for this model was the under-arm style. The aircraft should be launched at approximately 20deg nose up at 50% to 75% power. Too steep and the aircraft will stall, too shallow and it will contact the ground.



PARTS LINKS:

X1 1806 2300KV MOTOR

https://de.aliexpress.com/item/1005001967159663.html?spm=a2g0o.productlist.0.0.50e356aflqwGmi&algo_pvid=e9b3a1d4-f1c7-4e48-872e-9079e6678c10&algo_exp_id=e9b3a1d4-f1c7-4e48-872e-9079e6678c10-2&pdp_ext_f=%7B%22sku_id%22%3A%2212000018260434647%22%7D&pdp_pi=-1%3B10.97%3B-1%3BEUR+3.18%40salePrice%3BEUR%3Bsearch-mainSearch

X1 5x5 PROPELLER

https://de.aliexpress.com/item/1005001718982171.html?spm=a2g0o.productlist.0.0.106f34b4E7X6B9&algo_pvid=928efc8d-8144-4e0a-963d-e1925570d154&algo_exp_id=928efc8d-8144-4e0a-963d-e1925570d154-0&pdp_ext_f=%7B%22sku_id%22%3A%22-1%22%7D&pdp_pi=-1%3B4.46%3B-1%3B-1%40unknownPrice%3BEUR%3Bsearch-mainSearch

Or

X1 5x4.5 (5045) 3 blade propeller

https://de.aliexpress.com/item/4000346887424.html?spm=a2g0o.productlist.0.0.7ff3642a21tGZA&algo_pvid=f5073c91-c96b-47db-8663-9de7d456c813&algo_exp_id=f5073c91-c96b-47db-8663-9de7d456c813-15&pdp_ext_f=%7B%22sku_id%22%3A%2210000001430715178%22%7D&pdp_pi=-1%3B3.15%3B-1%3B-1%40salePrice%3BEUR%3Bsearch-mainSearch

X1 6 or 12 AMP ESC

https://de.aliexpress.com/item/4000386815523.html?spm=a2g0o.productlist.0.0.1c473d223lrGp5&algo_pvid=9f2b4b45-10fa-4a99-be62-60fa498b1648&algo_exp_id=9f2b4b45-10fa-4a99-be62-60fa498b1648-0&pdp_ext_f=%7B%22sku_id%22%3A%2210000001581643929%22%7D&pdp_pi=-1%3B7.51%3B-1%3BEUR+4.70%40salePrice%3BEUR%3Bsearch-mainSearch

X1 800MAH 2S LIPO OR SIMILAR (min weight = 35g)

https://hobbyking.com/de_de/turnigy-800mah-2s-20c-lipo-pack-parkzone-compatible-pkz1032.html?queryID=4b8d81603995f8a7c3e19502ea16c97e&objectID=18658&indexName=hbk_live_products_analytics

X4 3.7G MICRO SERVO

https://www.aliexpress.com/item/32965734270.html?spm=a2g0o.productlist.0.0.57d95e97aWNNAJ&algo_pvid=4824ea1c-06ed-43e8-b6c7-9737d1226dbe&algo_exp_id=4824ea1c-06ed-43e8-b6c7-9737d1226dbe-0&btsid=0bb0623415991458444523660eb7bd&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

X2 BAMBOO FOOD SKEWERS (3mm diameter)

HEAT SHRINK TUBE 3mm

https://hobbyking.com/en_us/turnigy-3mm-heat-shrink-tube-black-1mtr-1.html?queryID=c16c094bb26b18e39fabcb12a93a96cb&objectID=46911&indexName=hbk_live_magento_en_us_products

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_exp_id=b9e32b8a-0d4f-469a-b838-b478442dda50-0&btsid=0bb0623a15991797178681785e1811&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

X10 MICRO HINGES (optional)

https://hobbyking.com/en_us/super-light-pivot-round-hinges-d2xw8xl24mm-12pcs.html

VELCRO – (local hardware store)

X2 x 200mm carbon strip 3mm x 0.6mm (optional)

https://www.aliexpress.com/item/32576381076.html?spm=a2g0o.productlist.0.0.4e922cc3nR6757&algo_pvid=500714e5-ce74-4e52-a1b0-e349cac3f595&algo_expid=500714e5-ce74-4e52-a1b0-e349cac3f595-7&btsid=0bb0623e15991463277515177efc08&ws_ab_test=searchweb0_0,searchweb201602_,searchweb201603_

m2 x10mm screws

<https://www.ebay.com.au/itm/400PCS-M2-M2-6-Pan-Head-Self-Tapping-Screws-Assorted-Kit-Stainless-Steel-Black/254399626404?hash=item3b3b663ca4:g:CLEAAOSwQLZdsqkd&frcectupt=true>

M2 PUSH ROD (200mm MINIMUM LENGTH) **(ONLY REQUIRED FOR FIXED GEAR OPTION)**

<https://de.aliexpress.com/item/4000682811650.html?spm=a2g0o.9042311.0.0.27424c4dO7QvIJ>

M2 WHEEL STOP COLLAR

https://de.aliexpress.com/item/32367176766.html?spm=a2g0o.productlist.0.0.103f8bdcGo69MK&algo_pvid=269e7532-755e-49b1-963f-c5fc23d25ace&algo_exp_id=269e7532-755e-49b1-963f-c5fc23d25ace-2&pdp_ext_f=%7B%22sku_id%22%3A%2266304162649%22%7D&pdp_pi=-1%3B2.18%3B-1%3BEUR+5.01%40salePrice%3BEUR%3Bsearch-mainSearch

X1 3mm SQUARE CARBON TUBE (100mm length)

<https://de.aliexpress.com/item/4001086603237.html?spm=a2g0o.9042311.0.0.27424c4d9tDzxW>

Thank you for supporting us! We hope you enjoy many hours of flying your micro PA-28T IV. If you have any questions regarding the build process or set-up of your model, please contact us at:

Aeroworks3d@outlook.com