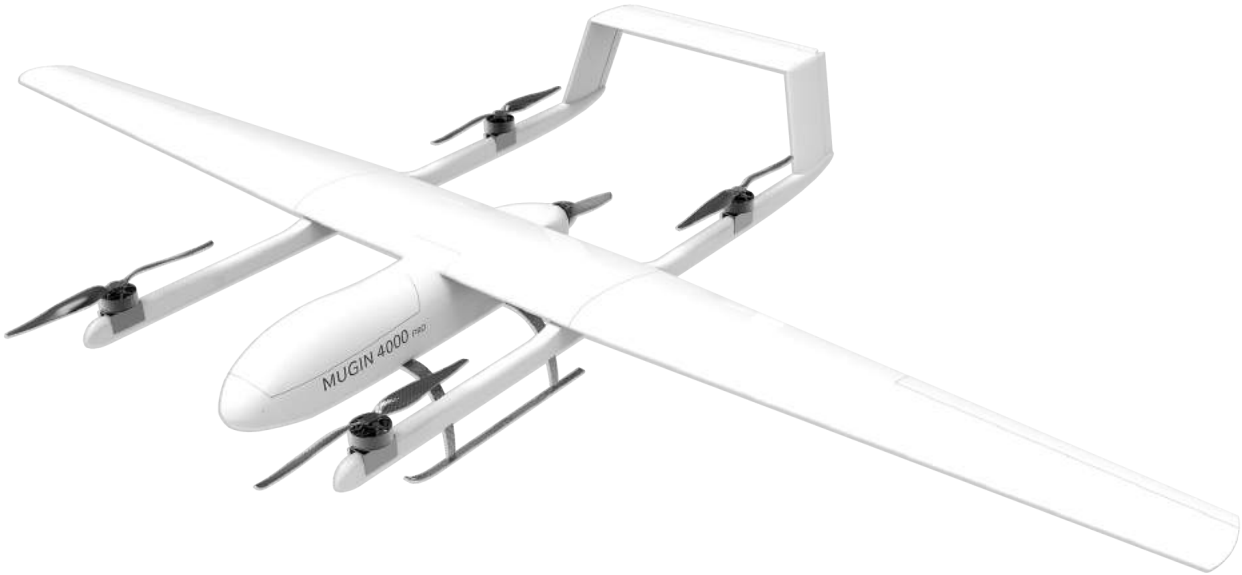
MUGIN VTOL UAV

（Electric Setup）

BUILD GUIDE V1



FOR

MUGIN-2 2930 VTOL　MUGIN-2 PRO 2930 VTOL

MUGIN-3 PRO 3000 VTOL　MUGIN-4 PRO 4000 VTOL

Safety & Warning

Thank you for your purchase of the Mugin VTOL. This product is a sensitive item and illegal use is strictly prohibited. Mugin UAV is not responsible for any consequences arising out of illegal use, or third party responsibility incurred with the product use.

For safety, please read the manual before moving forward with building and operating the product. Please pay attention to all local laws, flight zone restrictions, and ensure the personnel operating the aircraft have proper licensing and approval for flight plans.

Overview

The Mugin VTOL is a hybrid configuration aircraft with fixed wing and multi-copter flight options. This gives the aircraft the ability to take off and land vertically, it also has the ability to transition to forward flight like a fixed wing. This hybrid configuration combines the advantages of VTOL and high speed, long endurance flights of a fixed wing.

Scope of Delivery: Before assembling and building your aircraft, please familiarize yourself with the below listed parts.

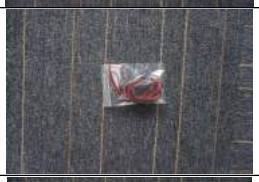
No.	Part	Picture
A1	Left front boom	
A2	Left rear boom	
A3	Right front boom	
A4	Right rear boom	
B1	Left wing	
B2	Right wing	
C	Rear elevator	
D	Fuselage	

No.	Part	Picture
E	Center Wing	
F1	Left landing skid	
F2	Right landing skid	
F3	Forward landing arch	
F4	Rear landing arch	
G1	Main Forward Carbon Spar	
G2	Rear Carbon Spar	

Power System

The Mugin UAV is DIY in nature and it's up to the user to decide the components that they want to use. Below is a power system that we have selected and is available for optional purchase.

No.	Description	Picture
1	Savox SC-1251MG Low Profile Digital Servo x 6	
2	T-motor MN805-S KV170 (VTOL Motors) x 4	
3	T-motor Flame 80A HV ESC x 4	

4	Dualsky XM6352EA 380KV (Forward Motor) x 1	
5	T-motor Flame 100A HV ESC x 1	
6	Motor Mount for Forward Thrust Motor	
7	Motor Mount for VTOL Thrust Motors	
8	Main Power Wires for Electric Motors	
9	Main Power Wires for PDB	
10	22A Silicone power lines	
11	Servo Extension Wires	
12	Servo extension connectors	
13	D-Sub connectors 2x 15pin, 1x 24pin	

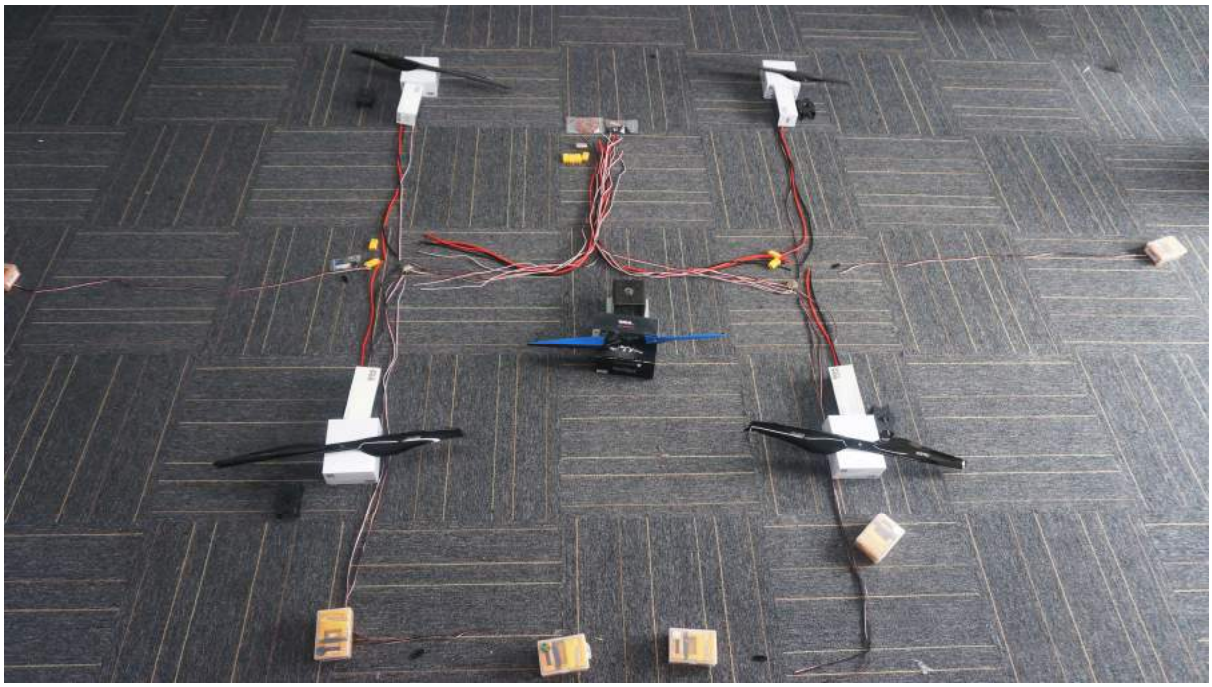
14	Various Heat Shrink Tubing	
15	XT90 Multi-pack for power connections	
16	Power Distribution Board	
17	50.4v Voltage Regulator to 6v	
18	Falcon PAE 24″ Propeller (Pairs) x 2	
19	Falcon C2E 21″ Propeller x 1	

** Due to the stock availability, the listed items are subject to change without prior notice.*

Power System Installation

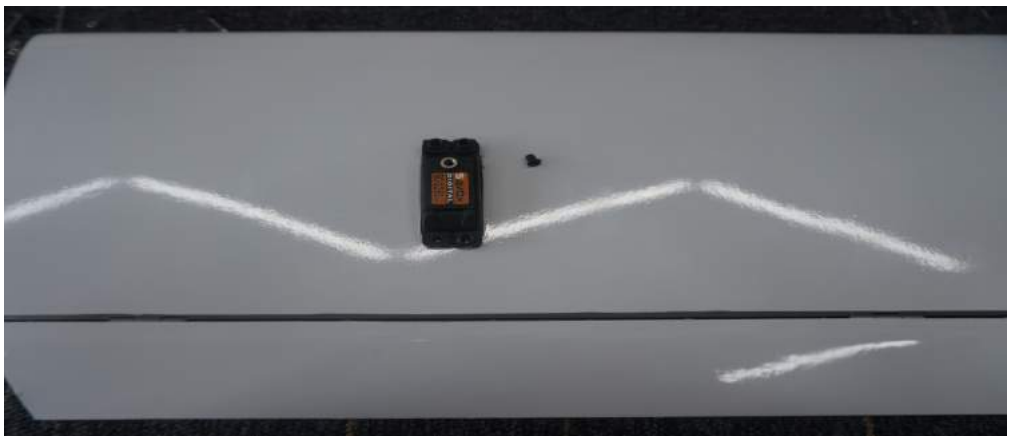
Mugin airframes are very DIY in nature. Before attempting to build, please make certain you and your team have the required experience and skill set that is needed in order to build a model such as this.

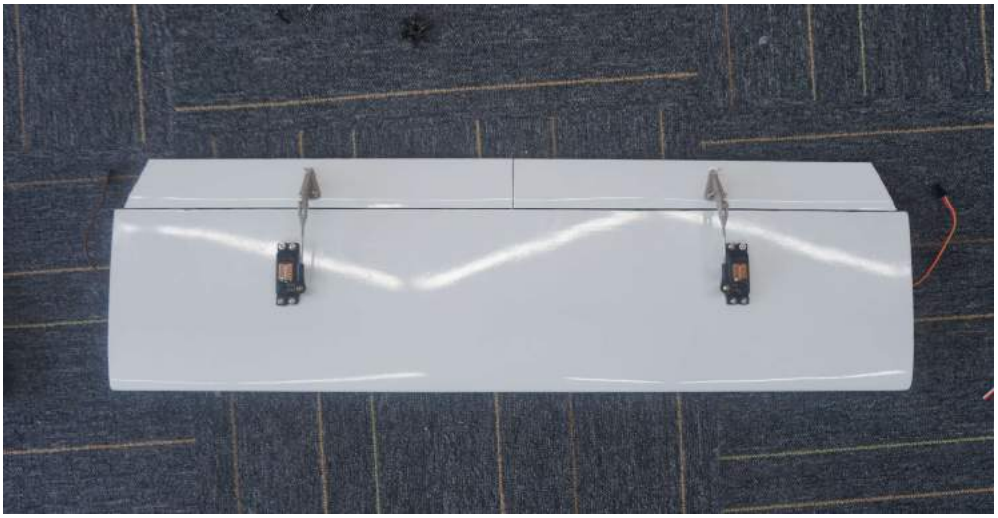
Pictured above is a rough layout for the optional power Package.



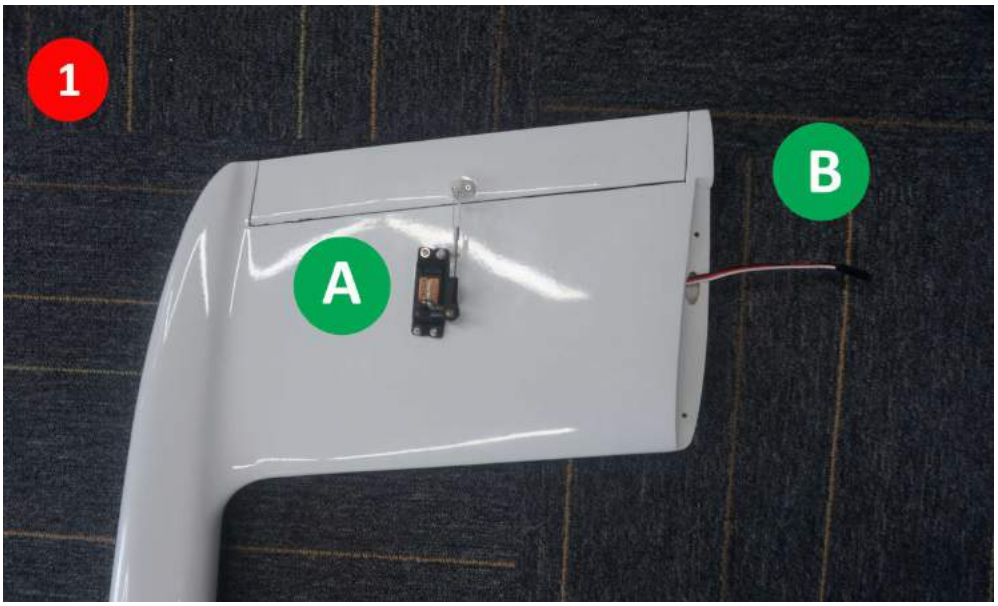
Servo Installation

1. Beginning with servo installation in the elevator. Take two Savox servos and install in the cutouts. Before attempting to install control horns servos should be tested and centered to prepare for proper control placement.

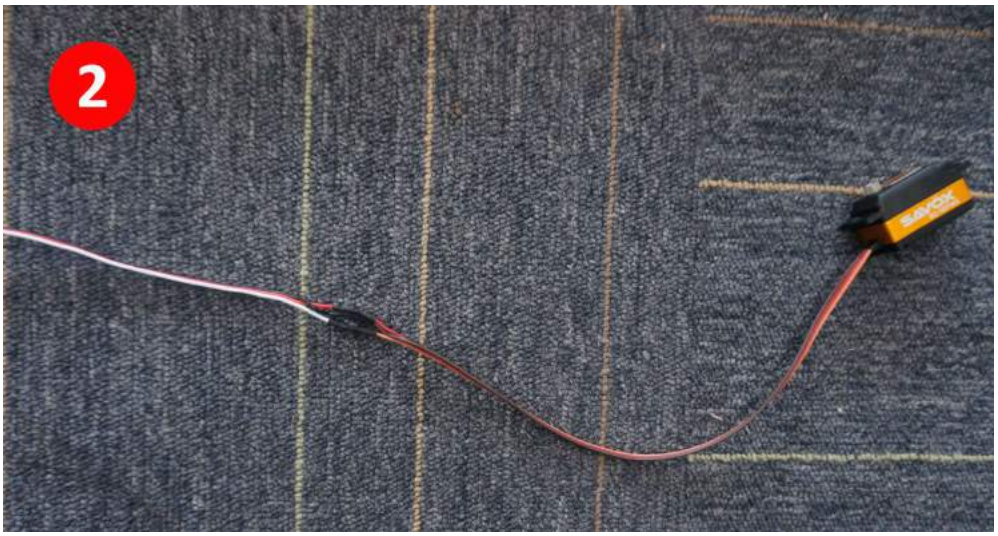




2. When installing servos for the Rudder control make certain to install proper length extension wire first. You will need two sets of extension wire. One is for the rudder servo and extension line will come out at elevator connection.



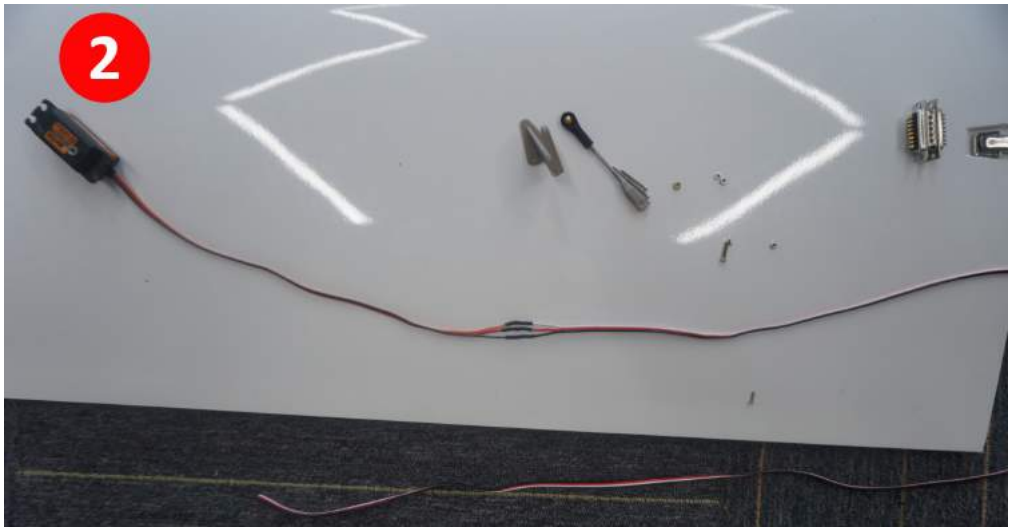
Picture 1 shows the the Rudder Servo (A) and the extension wire for Elevator Servo (B).



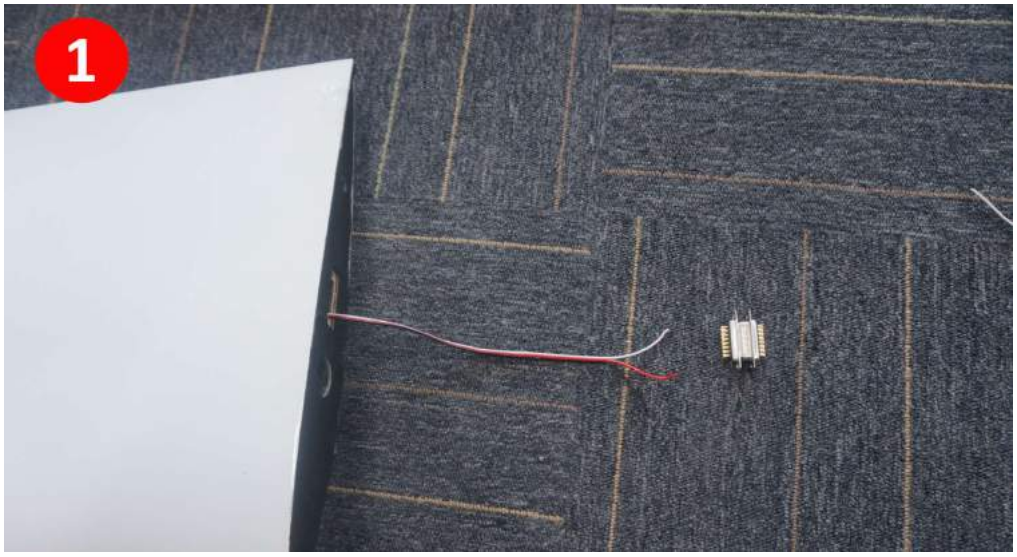
Picture 2 shows the extension wire connected. Remember to give yourself enough wire length to exit the large opening in the center of the boom.

Picture 3 shows the layout of the wiring before servo installation.

3. Aileron Servo Installation: The aileron servo installation is a relatively easy process. If using D-Sub connectors remember proper wiring placement to avoid reverse polarity issues.



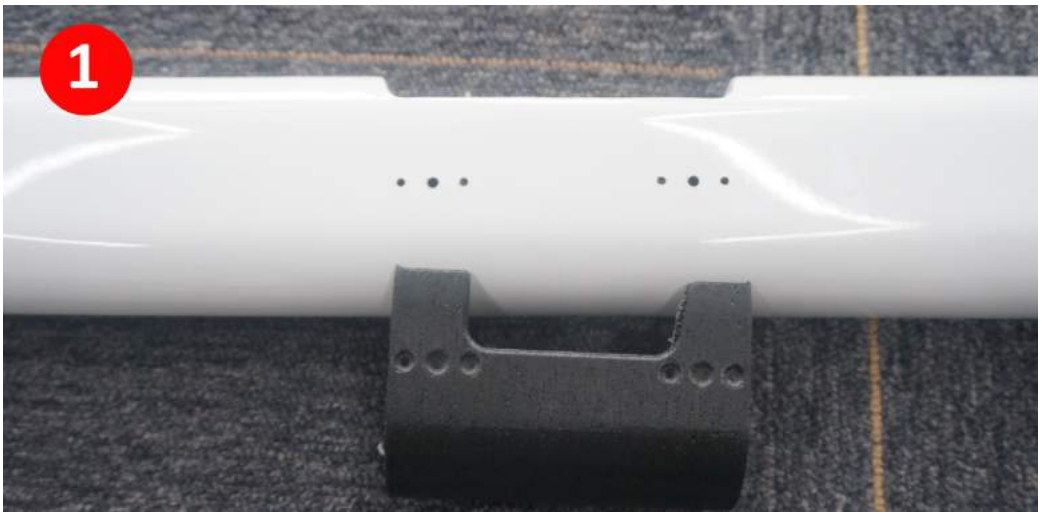
Once again, remembering the wiring sequence of the D-Sub connectors to avoid reverse polarity issues. The D-Sub connectors can be attached using aluminum rivets.(2A).

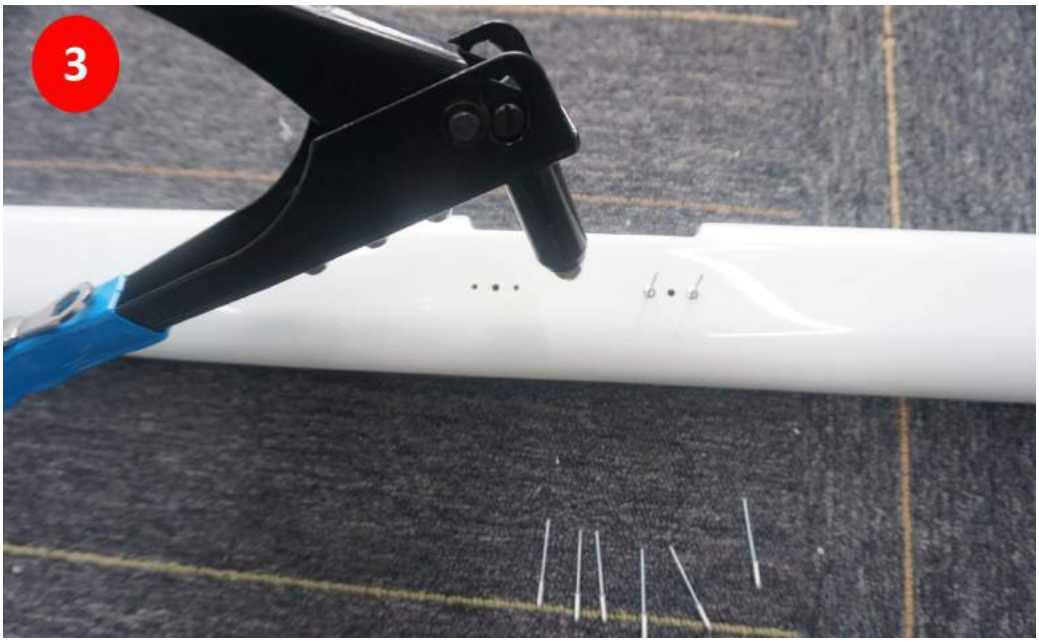


A few key points to remember:
When installing the servos remember to properly center them with a servo tester before installing the control horns. The soldering between the servos and wire extensions should be shiny and firm. Remember to place the heat shrink on the wires before soldering. If using D-Sub connectors remember proper wire mapping to avoid reverse polarity.

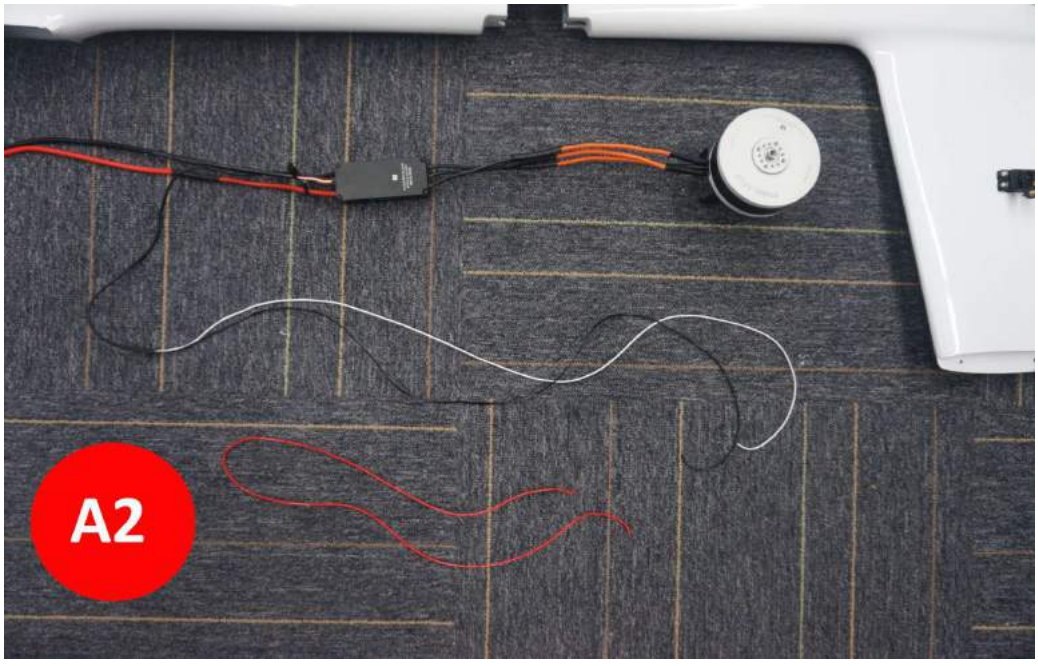
Motor Installation

Build tip: The motor mount has a small angular offset. When installing, make certain the motors lean outward and not inward towards the plane.
Aluminum rivets and floating lock nuts will be used for the motor mounts. At the time of releasing the manual, this cutting process will no longer be required. If you have purchased a Mugin in the past and would like a 3D printed cutting guide, please send us a message to sales@muginuav.com . The process is straight forward and can use the following 5 steps to complete the process.

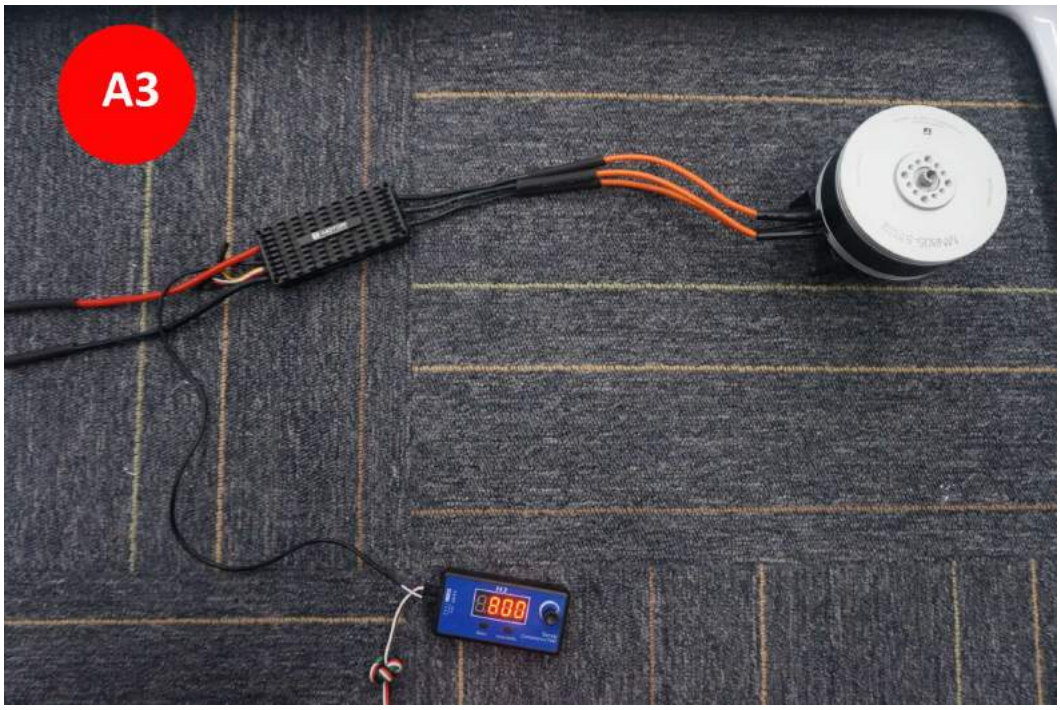




Picture 6(A1): Connect the motor to ESC (A1),ESCs to power extension wires, install extension wires for servo.(A2)



Before Installing motor on the boom, it's good practice to test the motor to make certain all connections are verified to be working properly. (A3)



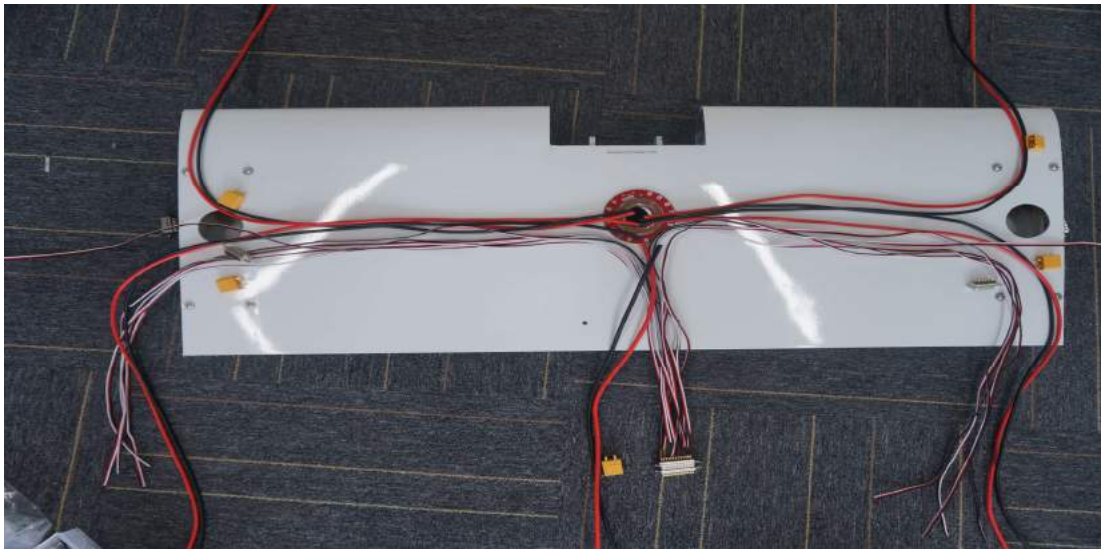
When installing the ESC everyone has their own methods. The one we use is to run the double sided tape down the bottom facing edge of the ESC and use blue foam on the outside surfaces to help with vibrations. Please refer to B1 and B2.

After completing the installation of the ESC, the Motor is now free to be mounted. C1 and C2

With the VTOL motor complete, you will have to complete the same steps for the other three booms.

Center Wing

The center wing wiring needs to be completed with caution and a clear understanding of the wiring. It helps to label each set of wires for each component to not get confused. By this time you will be setting up the wiring for four motors, four ESCs and six servos. Having a clear plan at this point is a must but if you follow the steps above, it won't be too complicated.



Clean Wiring

To make things easier it also helps to run sleeves over each group of wires. At this point you will have 5 sets of sleeved wiring.

1: Main Power Lead for Power Distribution Board.

2: Power Leads out to Left VTOL ESCs (Front and Rear Motors)

3: Power Leads out to Right VTOL ESCs (Front and Rear Motors)

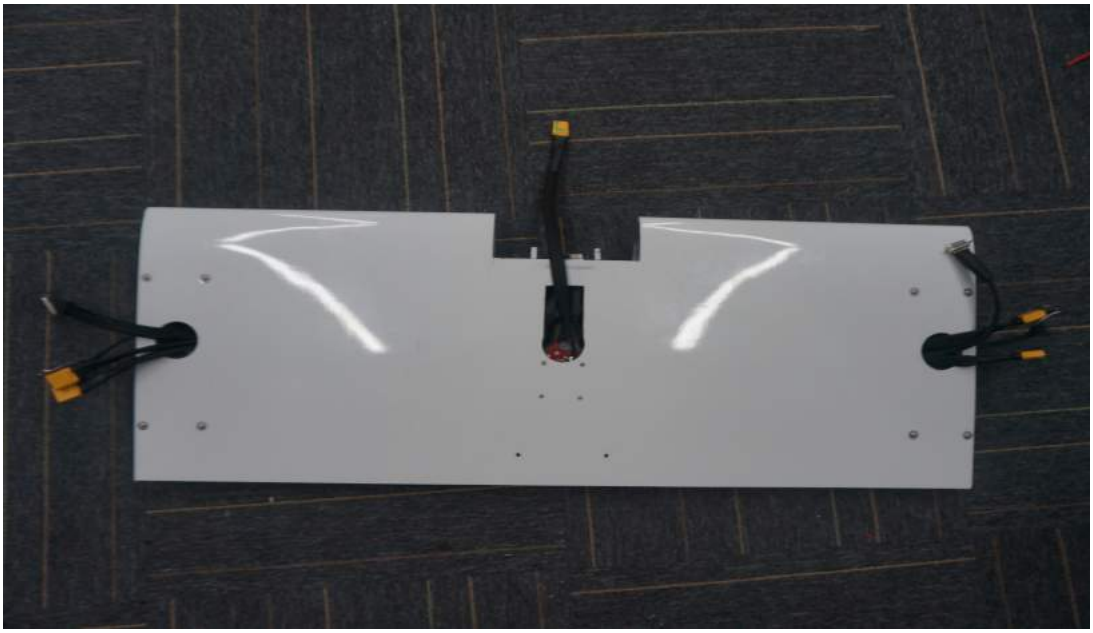
4: D-Sub connectors for Left Side signal, GND, power lines of servos and ESCs.

5: D-Sub connectors for Right Side signal, GND, power lines of servos and ESCs.

Power Distribution Seat

With the main wiring harness complete, special thought needs to go into where to place the power distribution board. With this particular model we are choosing to go with the interior of the center wing. Some clients mount it in the fuselage. You are free to do as you please. We are going with this method on this one by cutting out a slot to mount it to the interior of the center wing.

Once the slot is cut out we've routed the wires through the center of the wing and now have the main wiring harness on the interior.



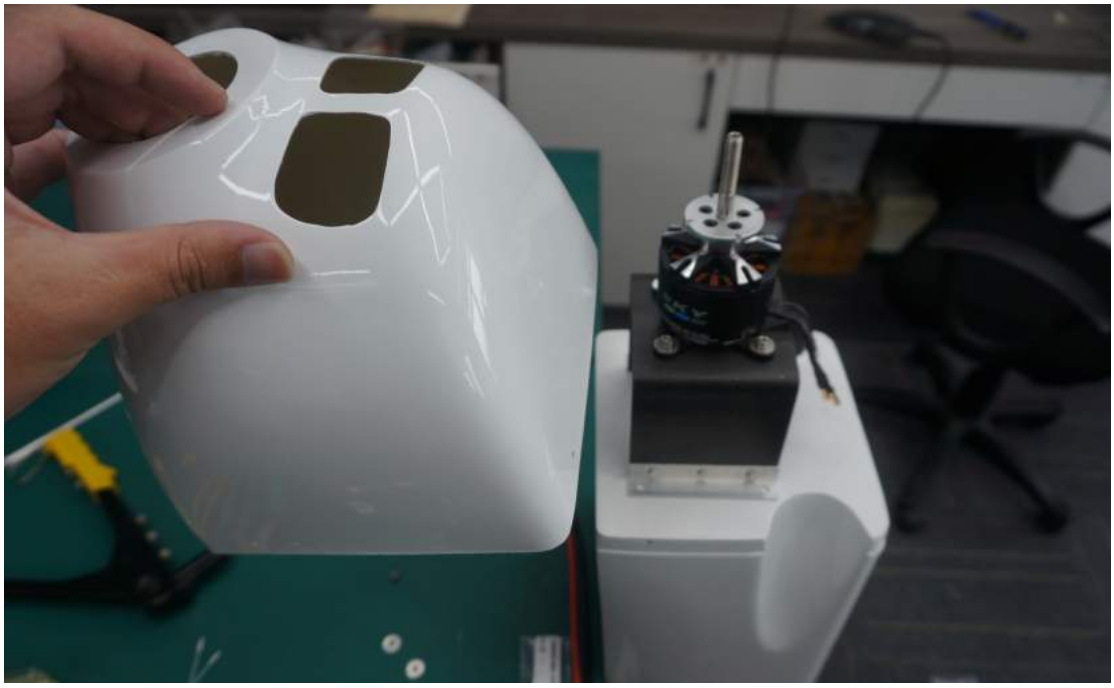
The below picture shows how the 25pin D-Sub connector mounts on the fuselage. The female connector in mounted on the center wing.

Installation of the Forward Thrust Motor

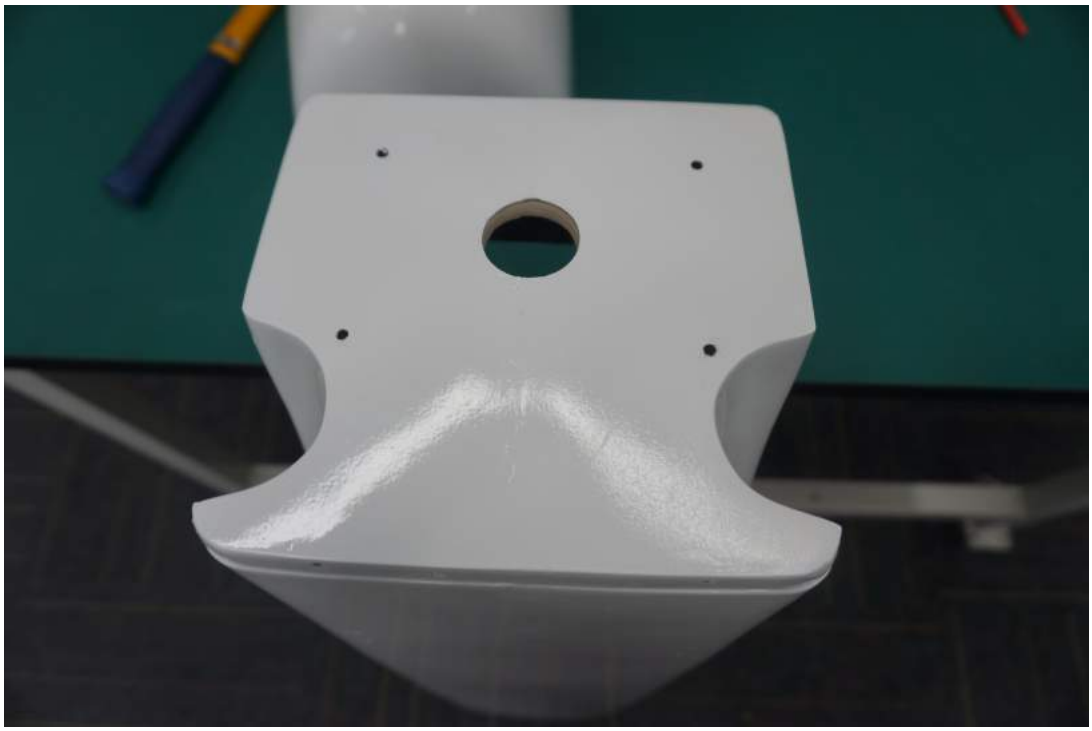
The forward thrust mount consists of three main areas, Motor mount, mounting of the motor, and mounting the ESC.

Mounting the motor to the Motor mount is very straight forward. You will have that accomplished in no time by looking at the below picture.

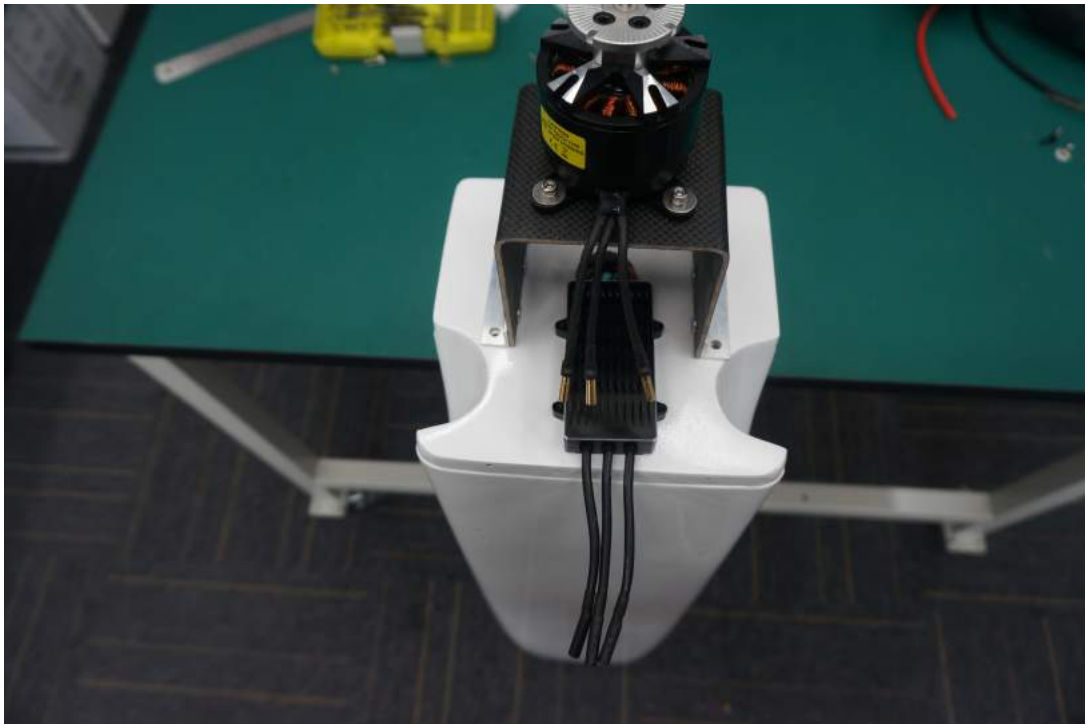
Once the motor is mounted to the motor mount, place the shroud over the motor and determine where the motor is centered.

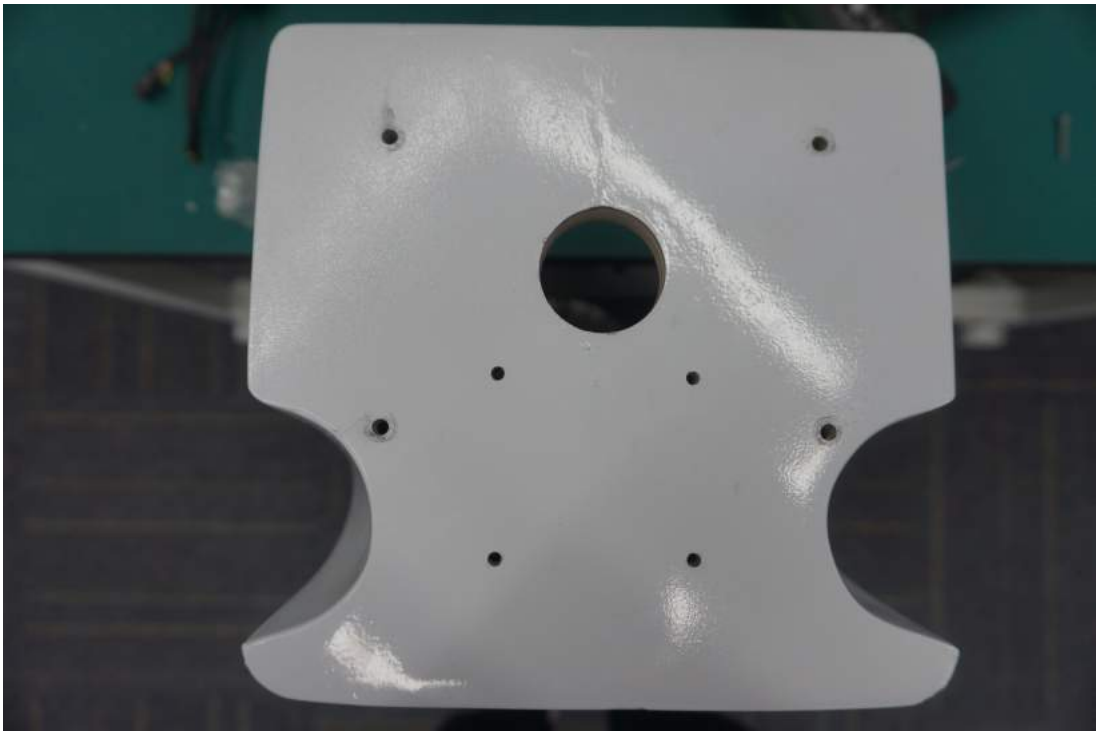


With the motor centered, and allowing for proper clearance of the prop shaft, you'll now have the location set for where to drill holes for the motor mount. Take a moment and mark the locations for drilling with a fine tipped marker.



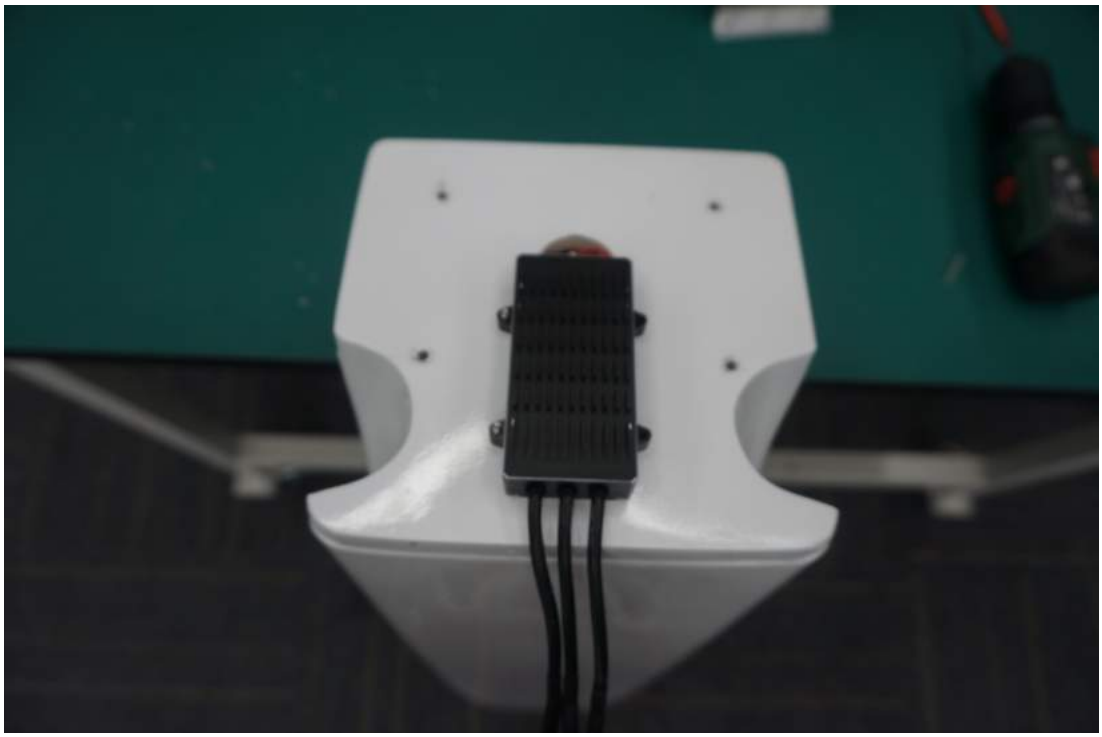
The ESC doesn't have to be as precise but it is nice to have a clean looking build. Take the time to lay the ESC out in a nice looking position and mark holes too.



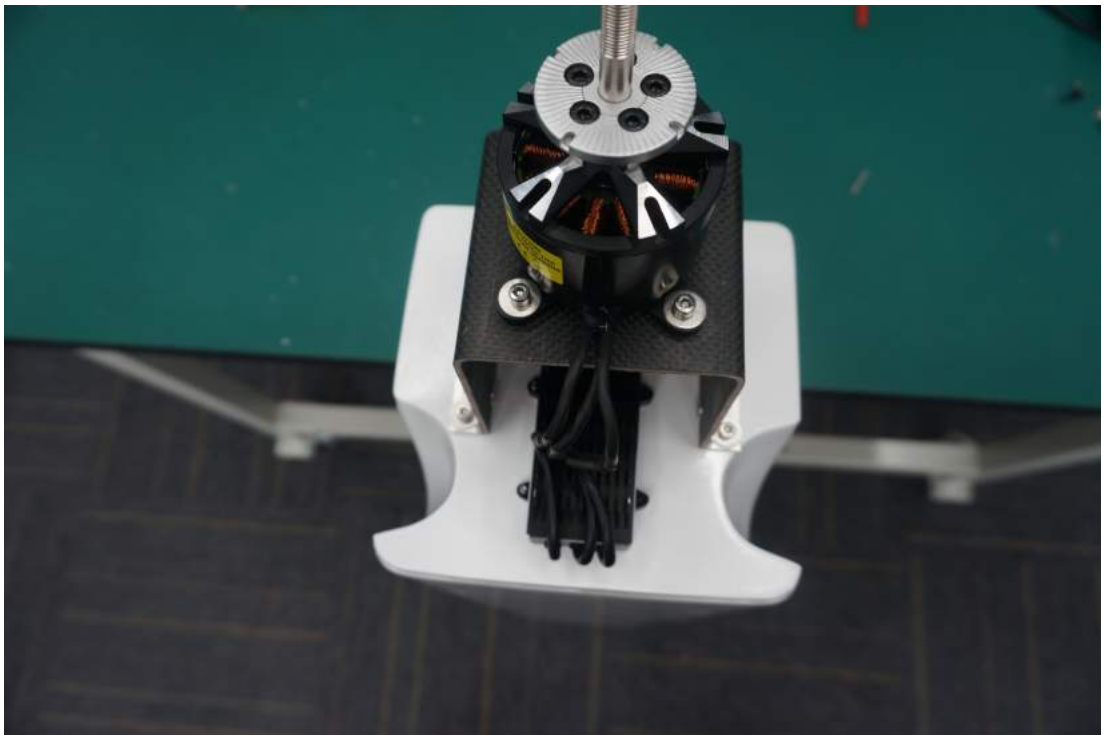


Installing the ESC and Motor

Once you reach this point it's just a matter of drilling the holes and mounting the two devices.



Once that's completed. Just connect the ESC to the motor and route the power and signal lines the main hole of the firewall.



With the forward thrust motor installed. You can move over to the landing skids. These can be installed at any moment you want but it's nice to be able to move the fuselage around with ease when installing the forward thrust motor. In the package you'll find a small bag that has a label on it. This is also a straight forward process.

At this point, the installation of the aircraft power equipment is completed, and the following is to assemble the aircraft. Here is a general overview of the assembly.

Boom Assembly

This will be mounted to the underside once the outer wing is installed.

Overview of Elevator Assembly

The elevator is a dual redundant elevator. The elevator has been split in half, composing of two sections. If one servo fails, the other half of the elevator can still control altitude movements.

Aileron Assembly

There are two spars, the main spar and the secondary spar. These will slide through the center wing.

Final Assembly

At this point, the aircraft was basically assembled, and only the flight control equipment was not installed.

Tips:

1. Servo power supply is powered separately (with 6v buck module)
2. When installing the buck module, connect the servo power cable separately.
3. Do not worry about powering up after all equipment is installed. First, check whether the circuit is normal. In particular, do not connect the positive and negative poles (you can use the meter to detect) to avoid.