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Title of WP: WP2 -Strengthening VET Teacher Competencies for FLIGHT

Activity Reference: 2.2 - Requisites of FLIGHT KIT



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**Co-funded by
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DRONE TRAINING KIT ASSEMBLY GUIDE

In this document, all the necessary information and assembly stages for Drone Training Kit assembly are explained in detail.

General Features

Body size: 500 x 500mm

Drone weight: ~1200g

Flight time ~17min

Control distance: <1500m

Autonomous flight : Yes (3 modes)

Wind resistance: Level 5

GPS : Yes

Type of assembly: Demountable

Software: Open source

All components required for the construction of the Drone Training Kit are included in the kit. Assembly time is approximately 90 minutes.

Tools Required for Assembly



Pliers



Screwdriver



M1.5 Allen Wrench



M2 Allen Wrench



M2.5 Allen Wrench

Points to be considered!

- If the operating instructions for the equipment to be used during assembly are not known, seek help from familiar persons.
- Since it contains small parts, it is not suitable for children **under 7 years of age**.
- During the assembly process, the battery connection must not be made before all connections are completed.
- Scratching and breaking of carbon fibre structures may cause injuries.
- Li-Po batteries should not be **exposed to sunlight** and should be stored in fireproof enclosures when not in use.
- Li-Po batteries should be kept at **50% charge** when not in use.

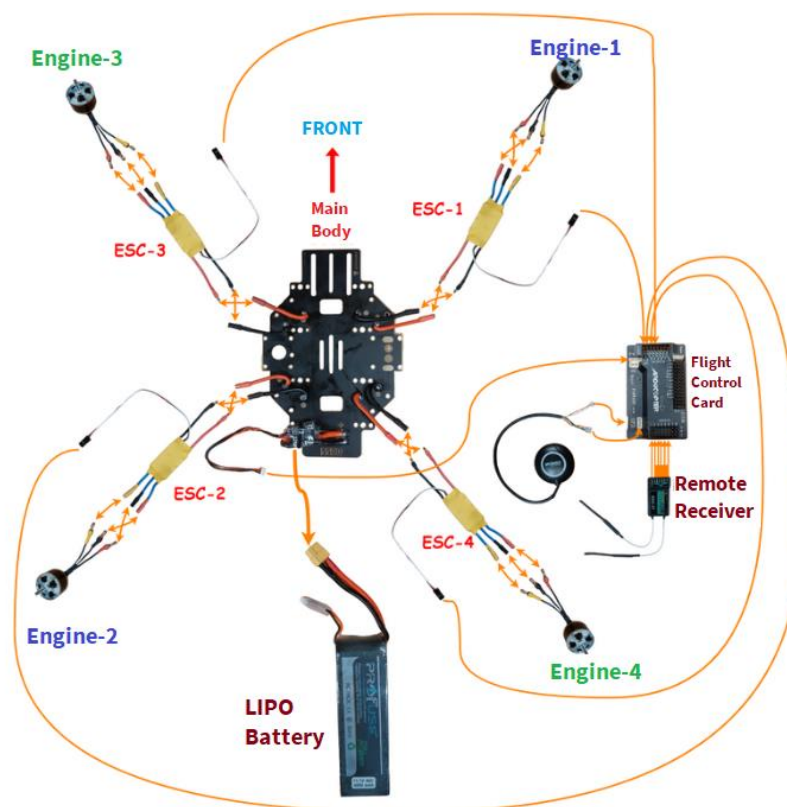


Drone Training Kit Box Contents

PRODUCT	QUANTITY
Body-Hull Equipment*	1
Fuselage-Landing Gear Equipment*	1
GPS Module	1
GPS Holder	1
Flight Control Card (APM)	1
Vibration Damper	1
ESC (Electronic Speed Controller)	4
Engine	4
Li-Po Battery	1
Li-Po Battery Velcro Tape	1
Li-Po Battery Charger	1
2.4 Ghz Controller and Receiver	1
Plastic Propeller (Double)	2
Cable Tie	15

*The fuselage consists of two main parts (Fuselage Equipment and Landing Gear Equipment). Body equipment includes; body chassis, arms, M3x8 screw set, M2.5x6 screw set, landing gear equipment includes; shoe, foot sponges, carbon fibre supports, landing gear body apparatus, landing gear apparatus.

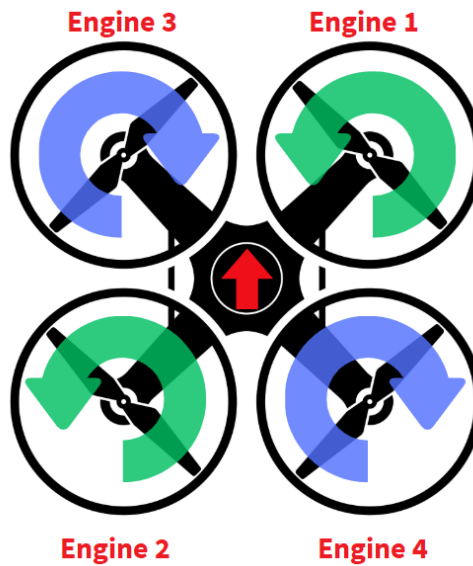
Electronic Connection Diagram



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Engine Arrangement Diagram



Assembly Flow

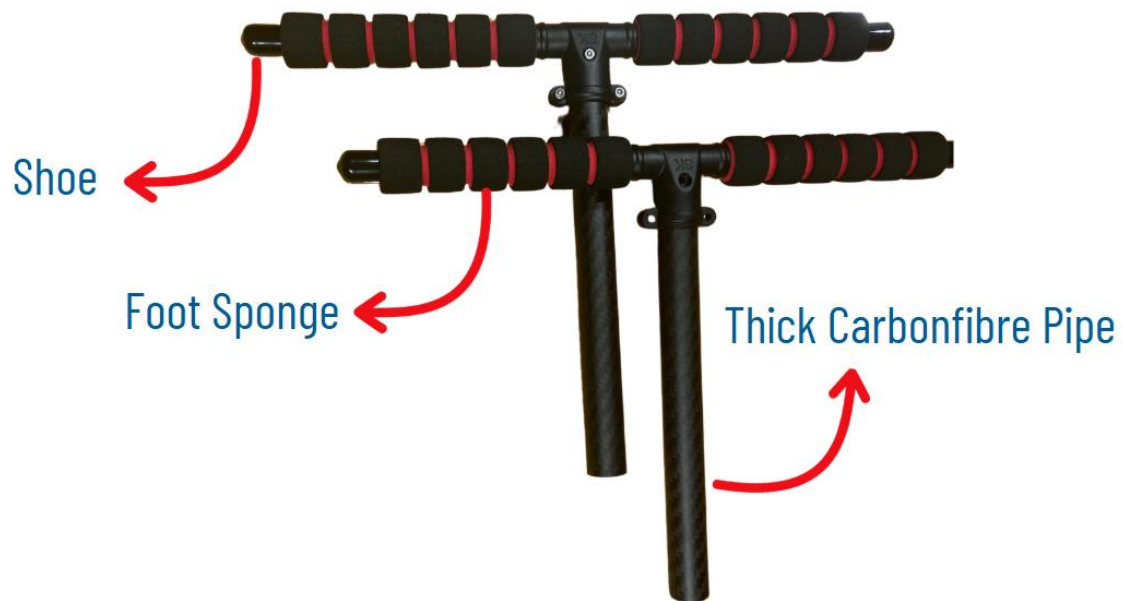
1. Section: Landing Gear

1. The thin carbon fibre tubes in the landing gear equipment package form the landing bases. **Thin carbon fibre tubes** are passed through the landing gear apparatus in the centre.



2. **The thick carbon fibre support pipes** in the landing gear equipment package are placed in the landing gear apparatus. Landing gears are fixed with 3 bolts and nuts from the landing gear apparatus package. Foot sponges and lugs are placed on the ends of the pipes and the landing gear is completed.

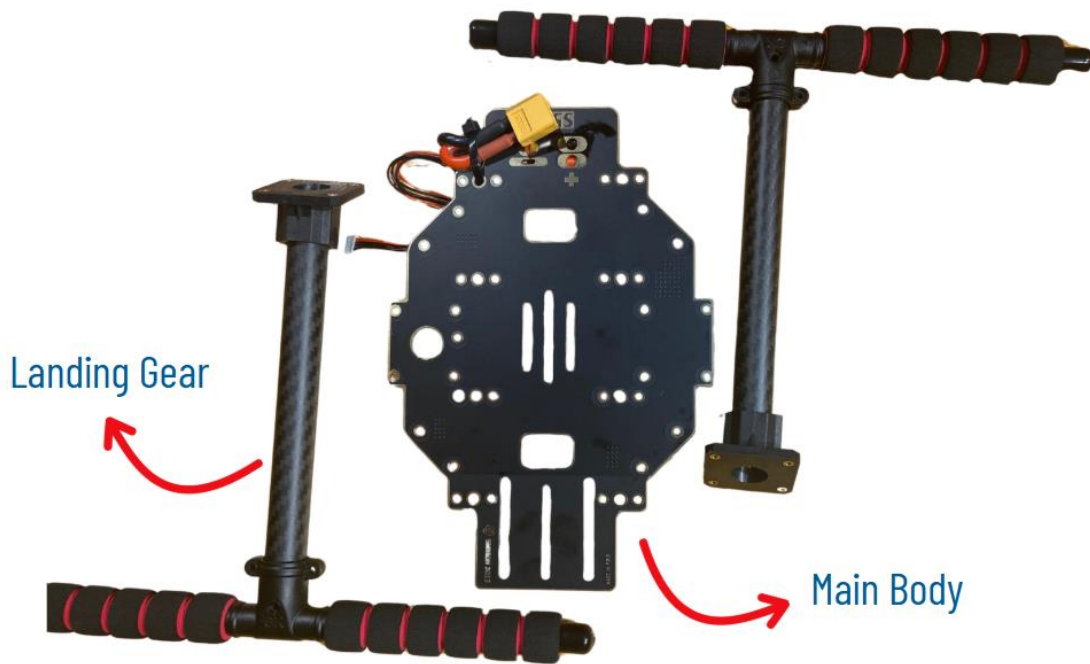




3. After the landing gear is completed, the landing gear body apparatus is attached to the thick carbon fibre pipe ends and assembled with 2 bolts from the package.

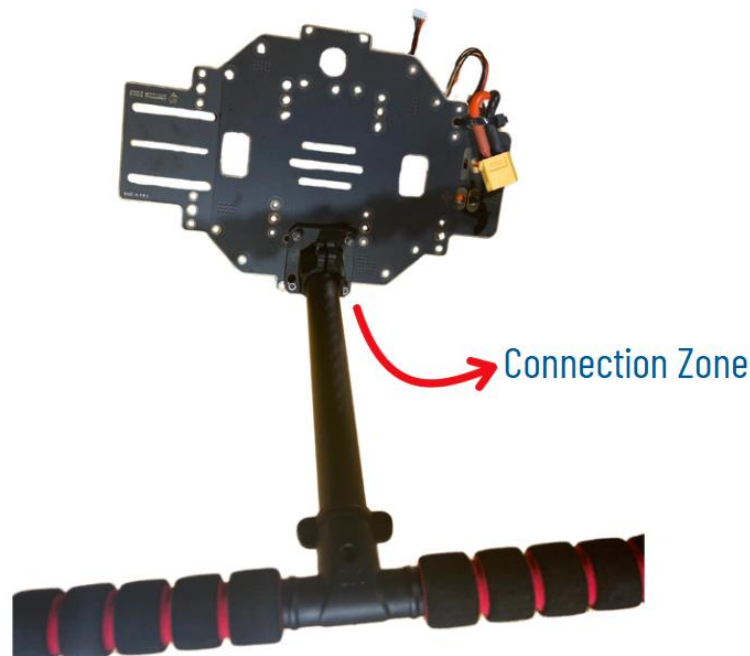


4. The landing gear is ready. At this stage, fuselage assembly is started.



2. Section: Body Assembly

5. The prepared landing gear is fixed to the body with the body apparatus from 4 sections with **M2.5x6** bolts included in the package.

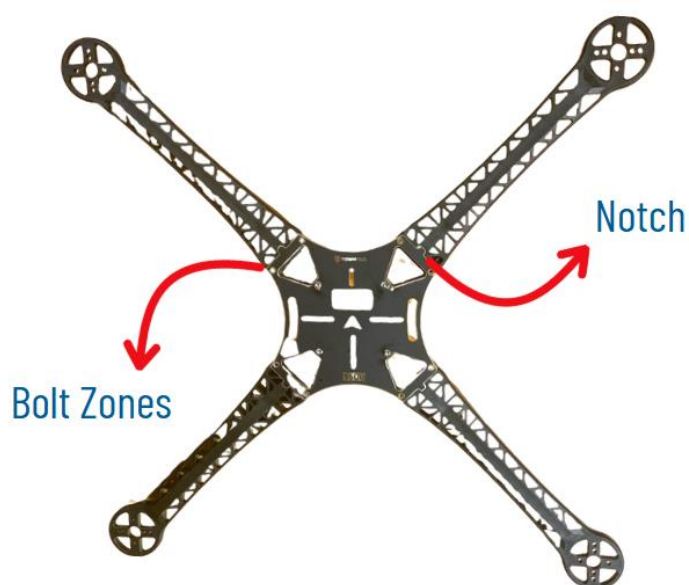


6. The mechanical connections of the main body are completed by fixing the landing gear. Then the connection of the engine arms to the auxiliary fuselage will be realised.





7. The 4 motor arms from the body equipment package must be aligned in the notched section on the auxiliary body. Then the motor arms are fixed to the auxiliary body with M3x8 bolts, 3 for each arm.



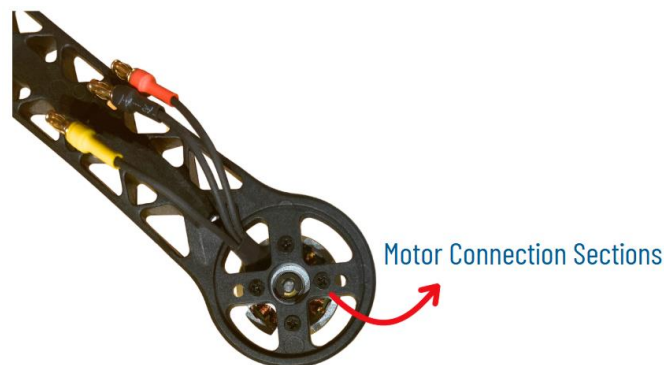


One of the situations to be considered during assembly is the direction of the auxiliary body. This direction actually represents the front side of the drone. **The arrow** in the centre of the auxiliary body indicates the direction of the drone. In parallel with this direction, the placement of the flight card and GPS module will be carried out in the following stages.



3. Section : Avionic and Electronic System Installation

8. On the avionics side, the first step is to fix the motors to the motor arms. The motors are placed in the motor slots and fixed to the arms tightly with **4 star head bolts** from the motor package. Motor cables are passed through the perforated section at the bottom of the arm.

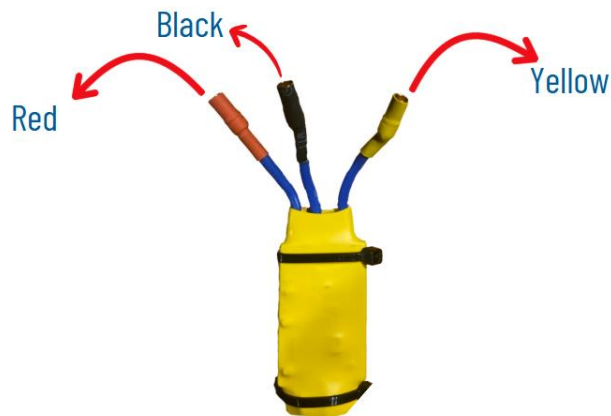


9. The ESC is connected to the engine lever. ESCs should be fixed to the arm with **2 cable ties**, close to the body side of the motor arm, in the lower part of the drone.

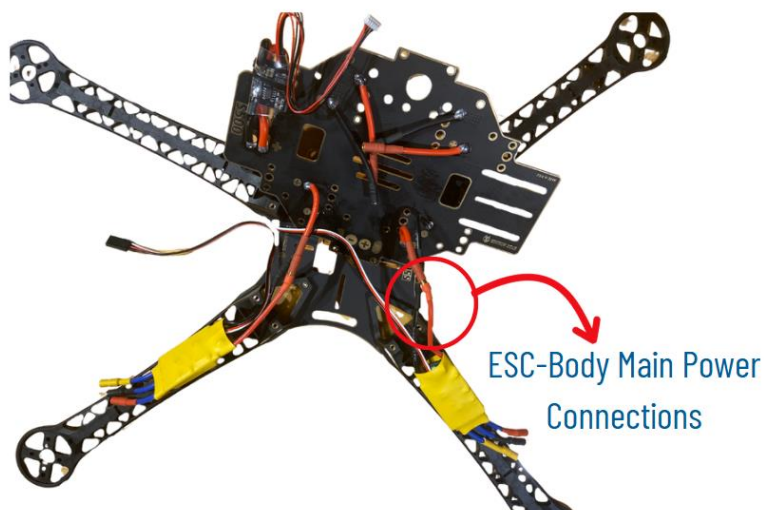




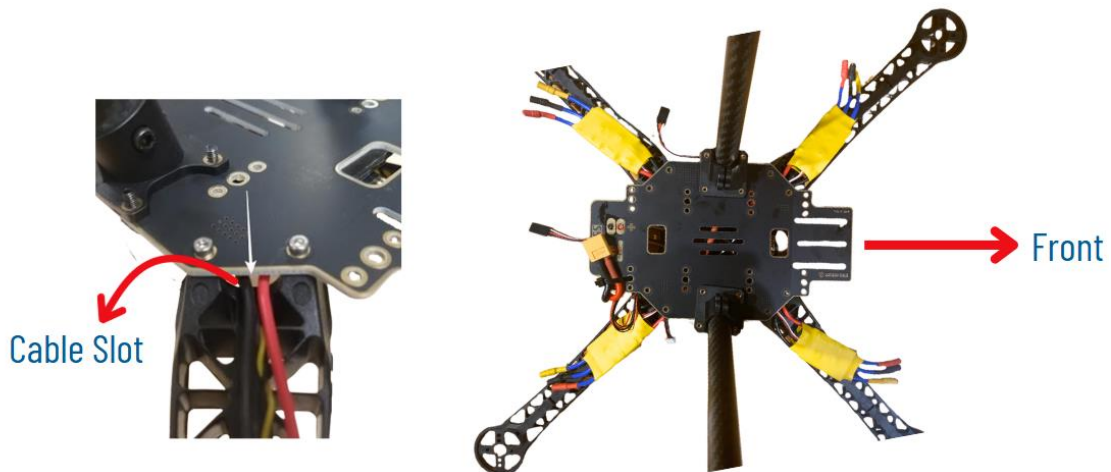
The direction of the ESC is important in ESC installation. ESC cables are listed in 3 colours (red, black, blue). According to these colours, when the engine arm is held vertically downwards, it should be red, black, blue from right to left.



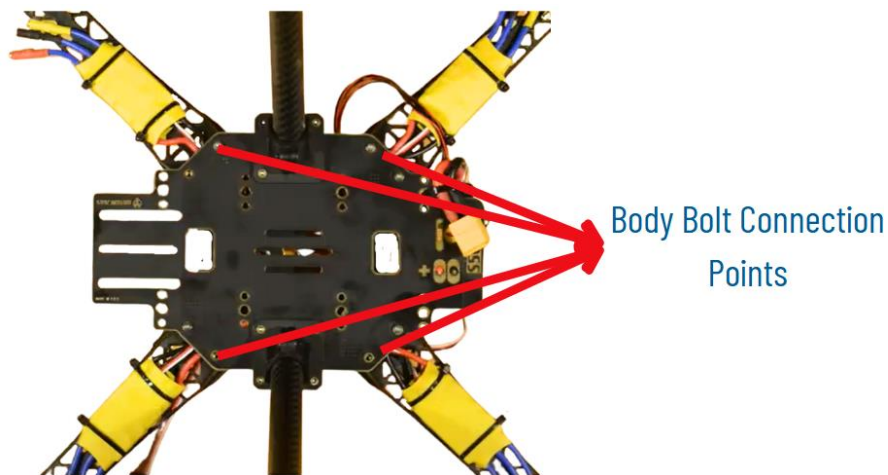
10. After ESC installation, the power connections of the ESCs will be connected on the main body. For this purpose, the red and black power connections on the main body are connected to the red and black power inputs of the ESCs by inserting the sockets.



 When making ESC-Main Body power connections, make sure that all **4 pairs of connections** are made. After this stage, since the main body and auxiliary body will be mounted on top of each other, it is **necessary to check the direction**. The main body direction is designed so that the power module is at the back. The main body and auxiliary body should face the same direction in parallel. ESC power cables and signal cables should be passed into the slot at the end of the motor arm.



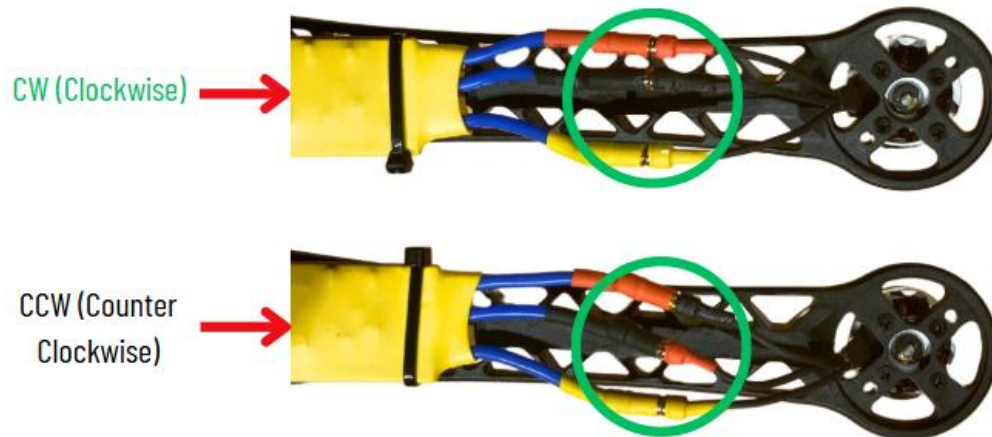
11. After the ESC power connections are completed, the main body is fixed to the auxiliary body with **8 M2.5x6 bolts** at the bottom. In this way, the mechanical assembly of the body is completed.



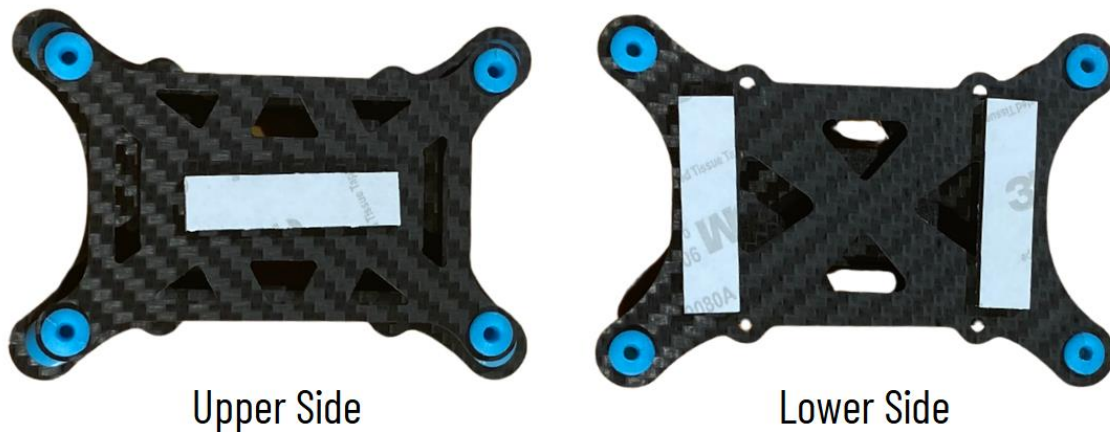
12. In order to make the ESC and motor connection, firstly pay attention to the drone direction. Cable connection will be made according to the motor arrangement diagram on **page 4**. In the table below, the cable connection colours of the ESC and motors are given according to the motor numbers. Motor connections are given in detail in the subsection.

	Engine No	Cable Colours		
CCW (Counter Clockwise)	1-2	ESC	ESC	ESC
		ENGINE	ENGINE	ENGINE
CW (Clockwise)	3-4	ESC	ESC	ESC
		ENGINE	ENGINE	ENGINE

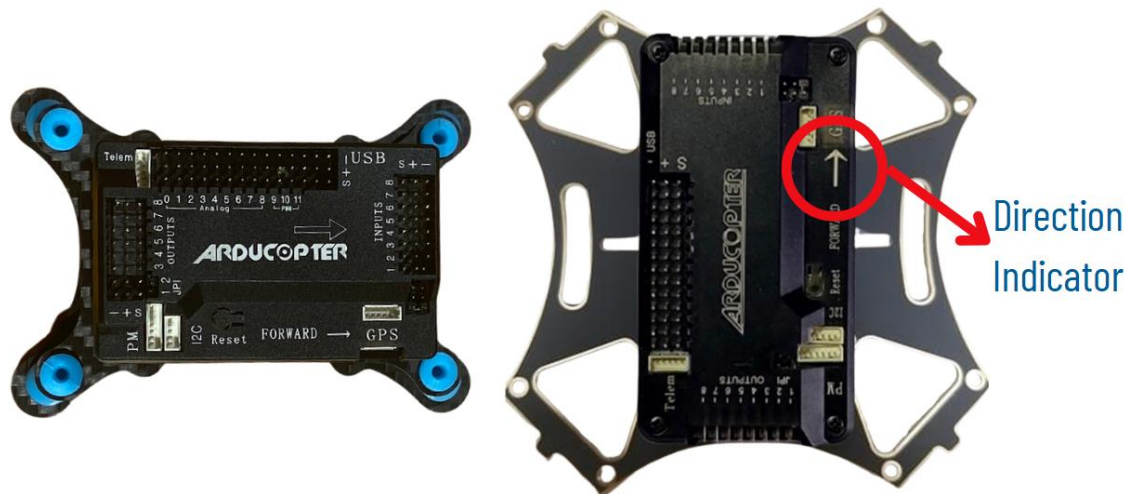
In motor connections, motor colors are changed in response to ESC colors. If the motor rotation direction is CCW, any two colors are reversed and the connection is made.



13. Double-sided tapes are placed on the top and bottom of the vibration dampers where the flight control card will be placed. The flight controller will be placed on the upper side and the auxiliary frame will be placed on the lower side.

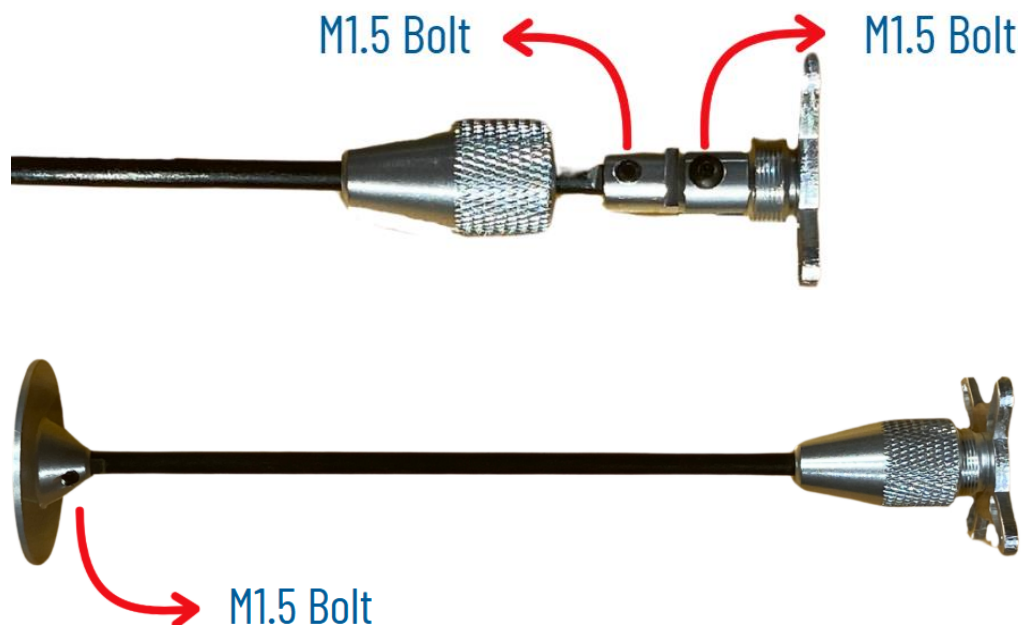


14. The flight control card is placed on the top of the vibration damper and attached from the bottom surface to the center of the auxiliary frame.



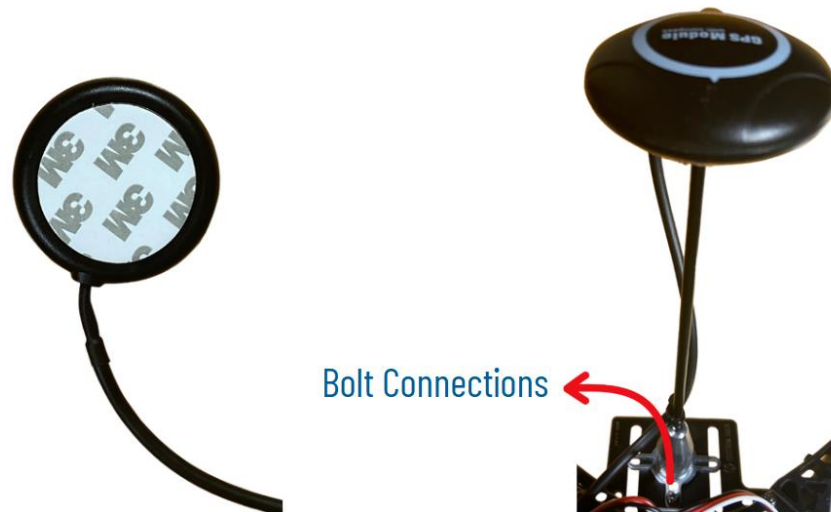
It must be ensured that the flight control card and the frame direction are in the same direction. The direction of the flight control card is determined by the direction indicator on the module.

15. The holder of the GPS module is assembled. For this, the parts included in the package are assembled for the lower part as shown in the image. In the lower part, the first screw is tightened with M1.5 allen key, the remaining screw is tightened with M1.5 allen key and the threaded socket is closed by turning. In the upper part, the GPS bearing is mounted on the rod with M1.5 allen key.



16. The bottom of the GPS module is attached to the top surface of the module holder with the double-sided tape included in the package. After the GPS holder is prepared, it is fixed to the main frame with 2 bolt-nuts from the bolt holes in the lower part.



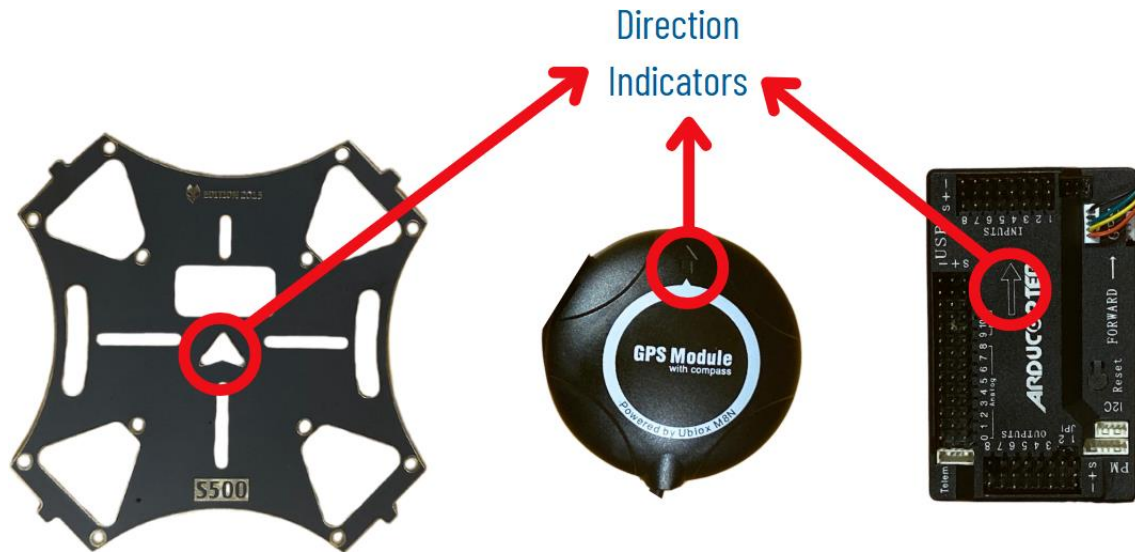


17. The GPS has separate sockets consisting of 4 wires and 2 wires. The 4-wire cable is connected to the GPS input on the flight control card and the 2-wire cable is connected to the input on the bottom of the flight control card. This completes the connection between the flight control card and GPS.

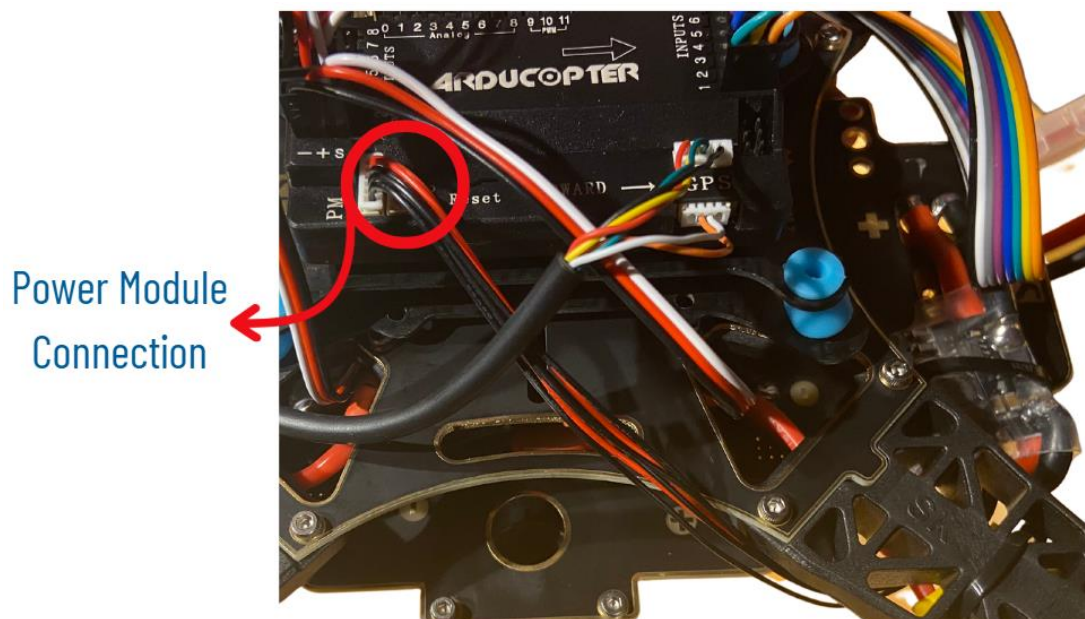


Direction is important in GPS mounting. The direction arrow on the GPS module should be mounted so that it points to the front of the drone. In this case, the flight control card, GPS module and frame orientations should point towards the **front of the drone**. Make sure the 3 units are facing the same direction.

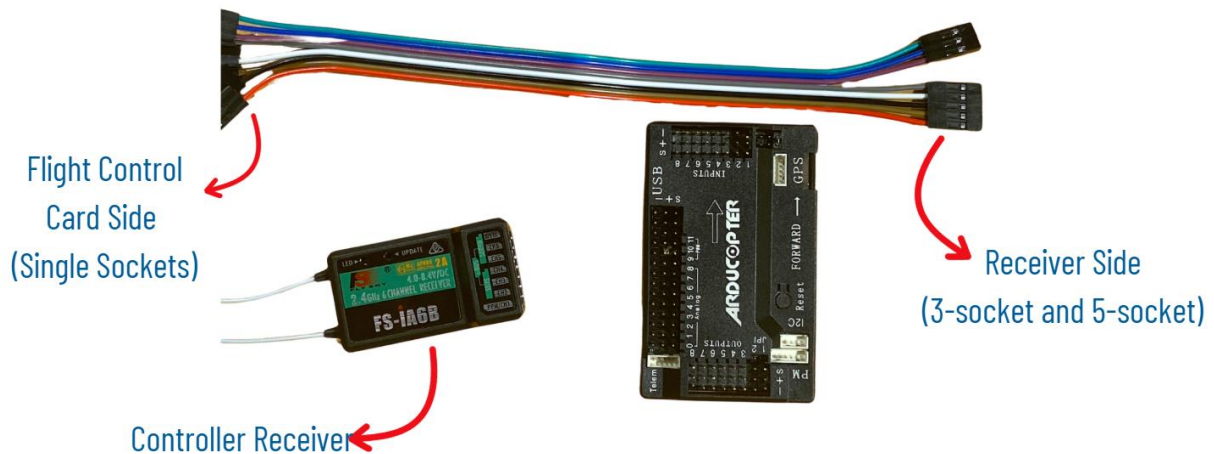




18. After the GPS connection on the flight control card, the power module cable from the main frame is connected to the **PM (power module) input** of the board.



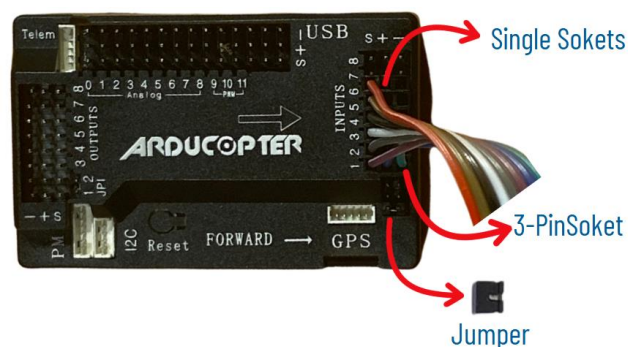
19. For the connections of the control receiver, the cable connection of the receiver must be made on the receiver first.



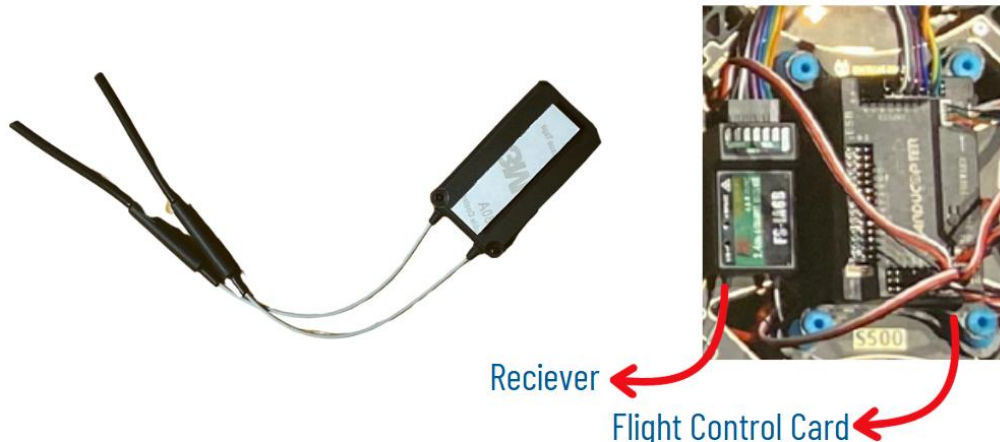
20. The receiver cable is connected on one side to the **receiver inputs** and on the other side to the input inputs of the flight control card. There are two sockets on the receiver side. The one with **3 of these sockets** is inserted **perpendicularly into the first channel of the receiver**. Colors may vary from cable to cable. The top cable of the **3-socket** is the **signal cable**. This cable must be connected to the signal inputs for the receiver and flight control card. The **longer 5-pin socket** is plugged horizontally into the signal inputs in a row on all channels.



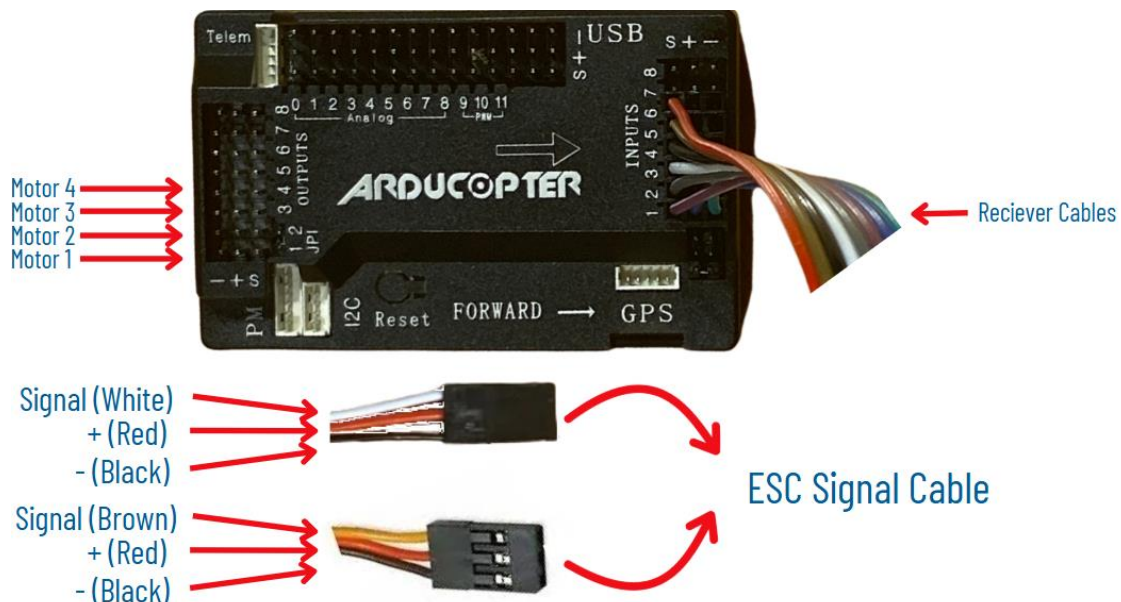
21. The other end of the cable consists of **one 3-socket and 5 single sockets**. The 3-socket of the cable is connected to the **input jack 1** of the flight control card. The remaining single sockets are connected to sockets **2, 3, 4, 5 and 6** on the receiver with the cable ends on the signal input side. This completes the connection. Finally, the jumper next to the GPS socket on the flight control card **must be removed**.



22. In order to mount the control receiver on the frame, double sided tape from the package is applied underneath. The receiver is placed in the appropriate part of the frame next to the flight control card. Antennas are **fixed to 2 separate motor arms** with cable ties.



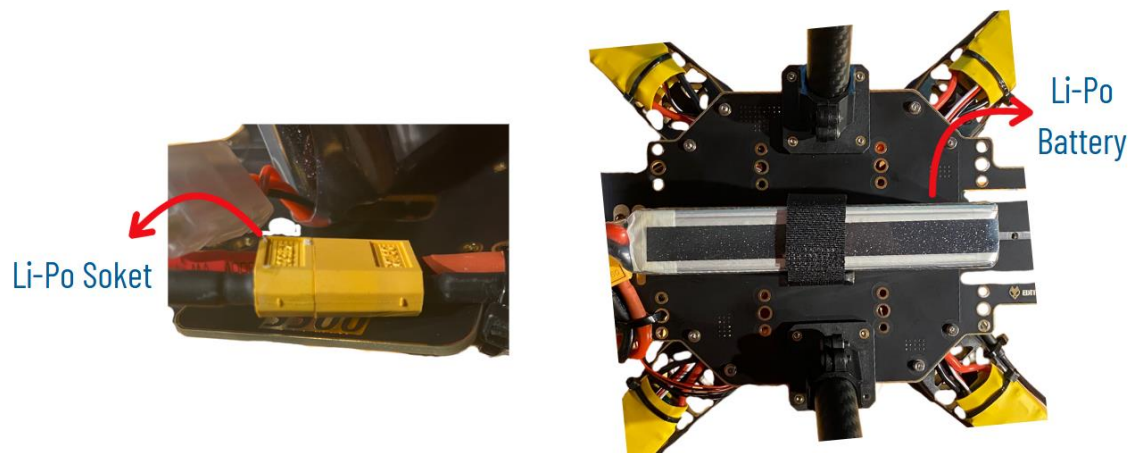
23. ESC signal cables are connected to the flight control card in accordance with the motor configurations. For this, please refer to the motor configurations on [page 4](#). ESC signal cables should be connected to the output inputs on the flight control card according to the motor number. Connections must be made by paying attention to the **signal, positive and negative inputs**. ESC signal cables colors are given below. You can make the connections according to the type of cable that comes out of the box, **cables may vary**.



24. After all connections are completed, the battery should be placed last. In order to fix the battery, li-po velcro tape should be attached to the main frame. It is fixed by passing the velcro tape through the **2 holes at the bottom** of the frame.

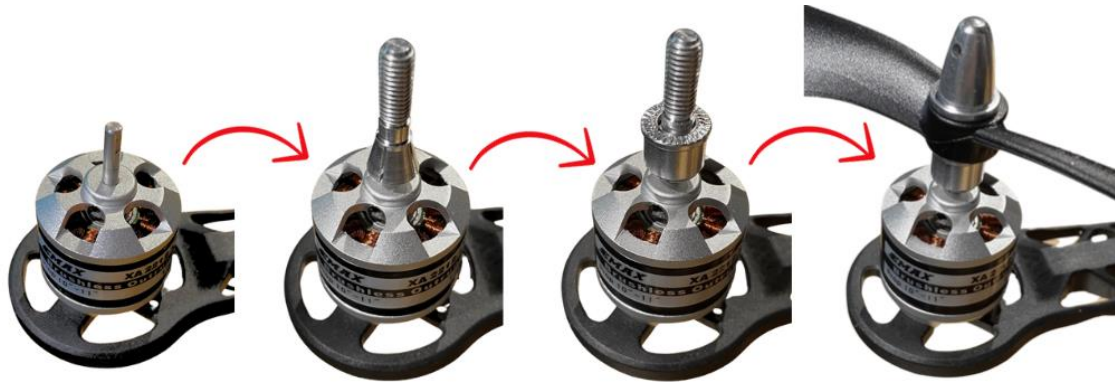


25. The Li-Po battery is passed through the velcro strap and placed vertically with the power connection part facing the front of the drone.



The most important points to be considered when placing the Li-Po battery in the frame are **that the socket is tightly inserted and the battery is in the center of the drone's center of gravity**. If the battery shifts from the center of gravity, the balance of the drone may be disturbed.

26. After all the assembly is done, the propellers should be installed according to the motor configurations on page 4. In propeller assembly, the propellers are connected to the motor shaft with the mounting apparatus included in the motor package.



 In the propeller connections, 2 opposite propellers rotate clockwise, while the other 2 propellers rotate counterclockwise. The propellers with 1045R written on them are CW (clockwise) and the ones with only 1045 written on them are CCW (counterclockwise). All connections must be made in accordance with the motor configurations.



Engine 1 - CCW
Engine 2 - CCW
Engine 3 - CW
Engine 4 - CW

27. To charge the Li-Po battery, plug the charger into the socket and connect the balance socket to the 4-pin of the charger. The red LEDs will turn green when charging is complete.



All mechanical and electronic assembly processes have been completed. After this stage, you can proceed with calibrations, control adjustments and flight preparation. You are so close to flight...

