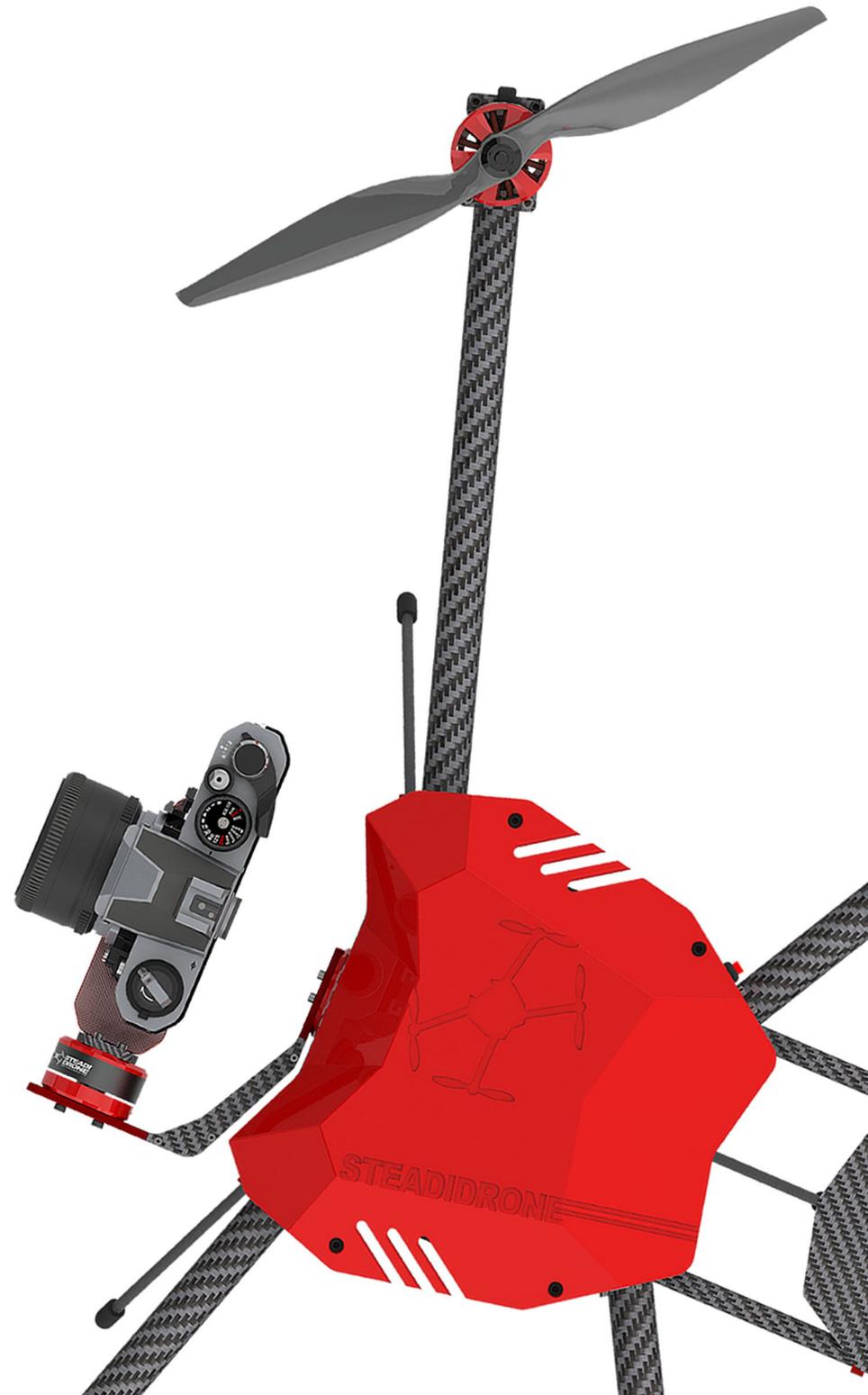
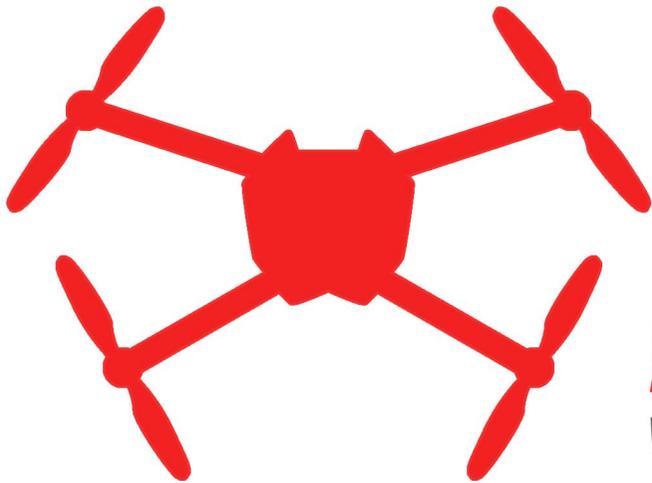


MAVRIK

Assembly Manual



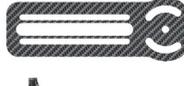


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- 3 Bill of materials
- 6 Assembling the motor mounts
- 9 Assembling the motor mounts - X8
- 10 Assembling the airframe
- 11 Adding the ESC and other electronics
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- 17 Assembling the gimbal rail
- 22 Attaching the gimbal rail to the drone
- 23 Fitting the landing gear
- 24 Adding the gimbal controller
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- 27 Adding the flight controller
- 28 Gimbal setup
- 29 Preparing and attaching the dome
- 31 The MAVRIK completed

BILL OF MATERIALS

4		Inner mount - ABS
6		Outer mount - ABS
16		Motor mount - ABS
4		Tube end cap - ABS
2		Side cover - ABS
1		Dome - ABS
1		Landing gear holder - ABS
4		23mm Spacer - ALU
4		Battery bay clamp - ALU
1		Camera plate - ALU
1		Gimbal mount - ALU
1		Gimbal roll - ALU

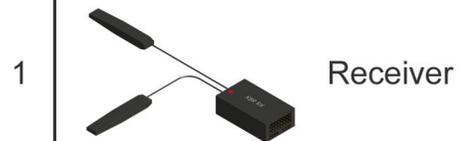
4		Hatch thumb screw - ALU
3		Landing gear mount - ALU
3		Thumb screw - ALU
4		Vibration Tube Clamp - ALU
1		Battery bay - Carbon
1		GPS mount - Carbon
1		Gimbal pitch mount - Carbon
2		Gimbal roll support - Carbon
1		Hatch - Carbon
1		Main plate top - Carbon
1		Main plate bottom - Carbon
8		Motor mount top - Carbon

BILL OF MATERIALS

12		Motor mount spacer - Carbon	2		M2 nut
2		Vibration mount top - Carbon	10		M2 6mm cap screw
2		Vibration mount bottom - Carbon	8		M2.5 washer
3		Rod 5x150mm - Carbon	8		M2.5 8mm cap screw
2		Tube 10x300mm - Carbon	14		M3 washer
4		Tube 20x350 - Carbon	24		M3 nut
14		Dampener ball	20		M3 6mm cap screw
8		Silicone O-ring	24		M3 8mm cap screw
3		Rubber feet	4		M3 12mm cap screw
1		Velcro strap	9		M3 16mm cap screw
2		GB36-1 Gimbal motor	10		M3 35mm cap screw
1		Gimbal switch	8		M3 40mm cap screw
			8		M3 45mm cap screw

BILL OF MATERIALS

You will also need



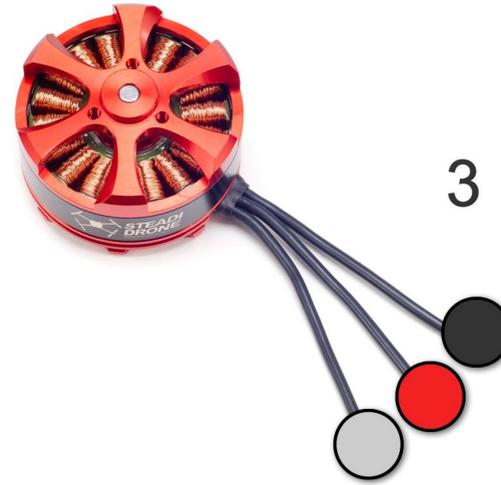
MOTOR MOUNTS

1. Tap the end cap into the tube until it is flush with the end of the tube. Be careful not to damage the tube.

2. Hot glue the inner mount onto the other end of the tube and remove any excess hot glue with a blade and benzene.

3. Colour code the bullets on the motor wires as shown here.

4. Heat shrink the motor wires with a 6cm piece of 8mm heat shrink. Make sure the wires are neatly next to each other.



1

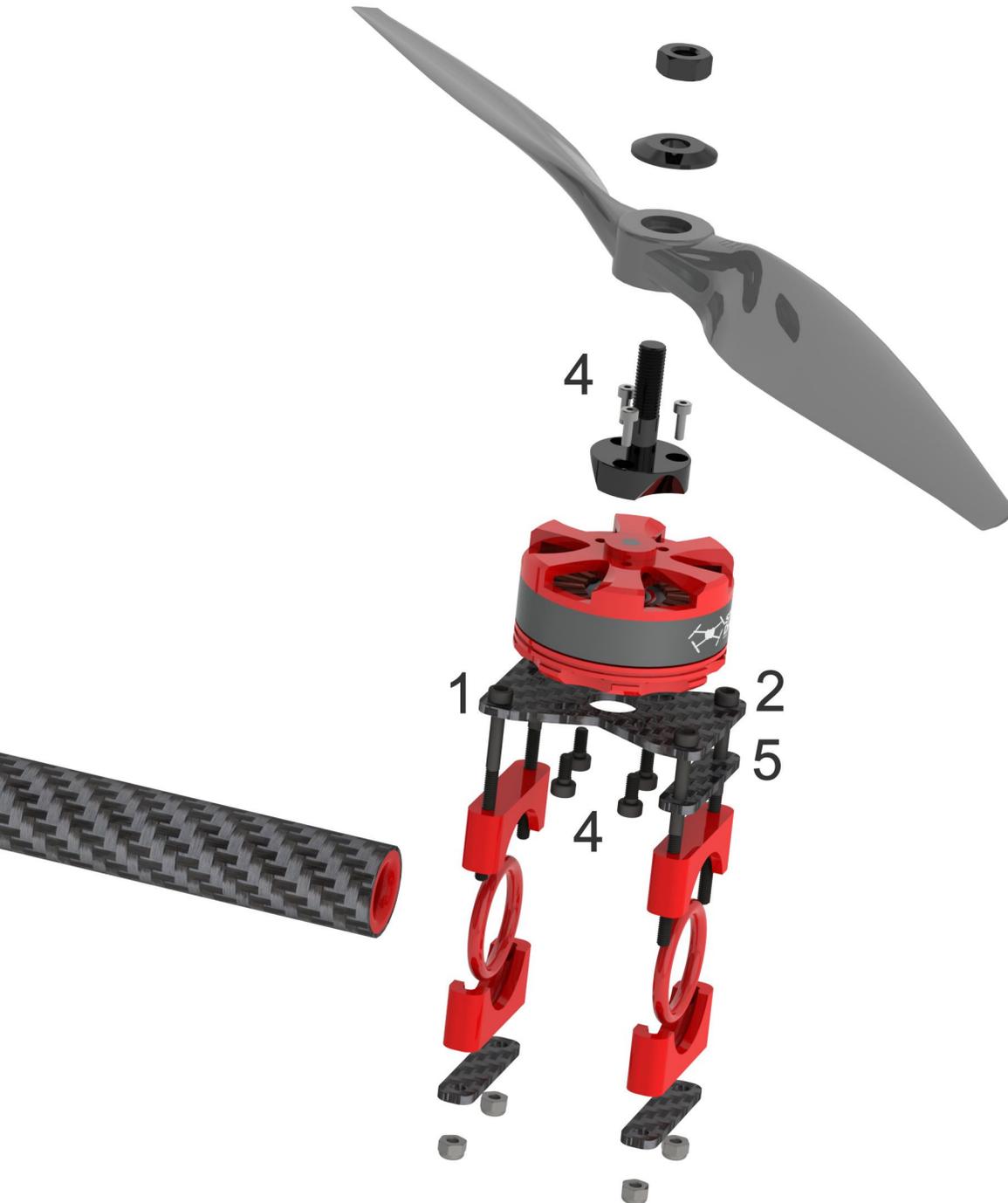


2



4

MOTOR MOUNTS



Assemble the motor mount as shown on the left.

1. Use two 40mm cap screws on the inside.

2. Use two 45mm cap screws on the outside.

3. Attach the motor to the motor mount only after the 40mm and 45mm cap screws have been threaded through.

4. Use Loctite on the screws that hold the prop holder onto the motor and the screws that attach the motor to the motor mount.

5. Note that the extra carbon fiber spacer is on the outside of the motor mount at the end of the tube.

MOTOR MOUNTS



1. Tighten the motor mount until the gaps between the ABS parts are 4mm. Make sure the motor is upright on the tube and the motor mount is flush with the end of the tube.

2. Assemble the motor mount onto the tubes with the outer mount in these positions, two pointing one way and two the other.



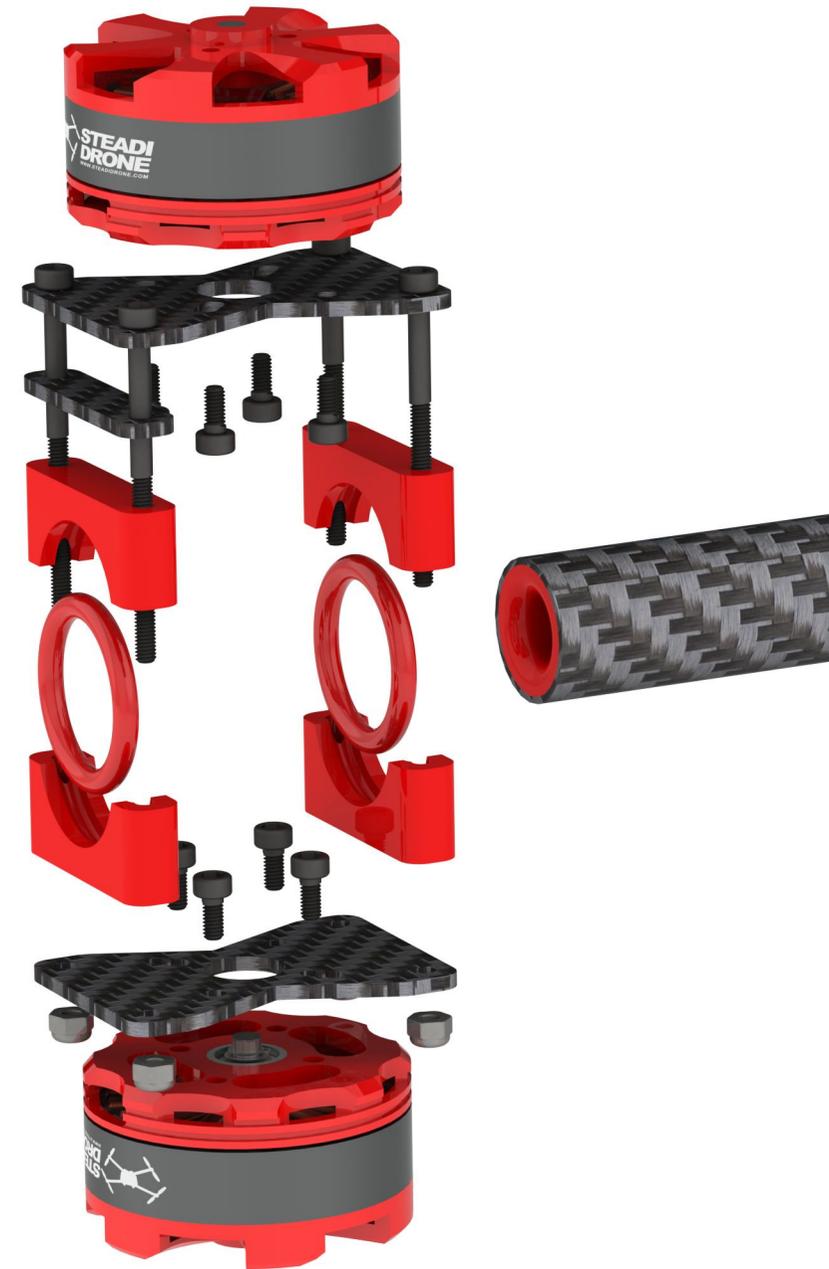
3. Attach the prop holder onto the motor. You need to have two CW (normal thread) prop holders and two CCW prop holders. Use some LOCTITE on the prop holder's screws. In the case of X8 setup, the top and bottom prop holder will have the same thread.

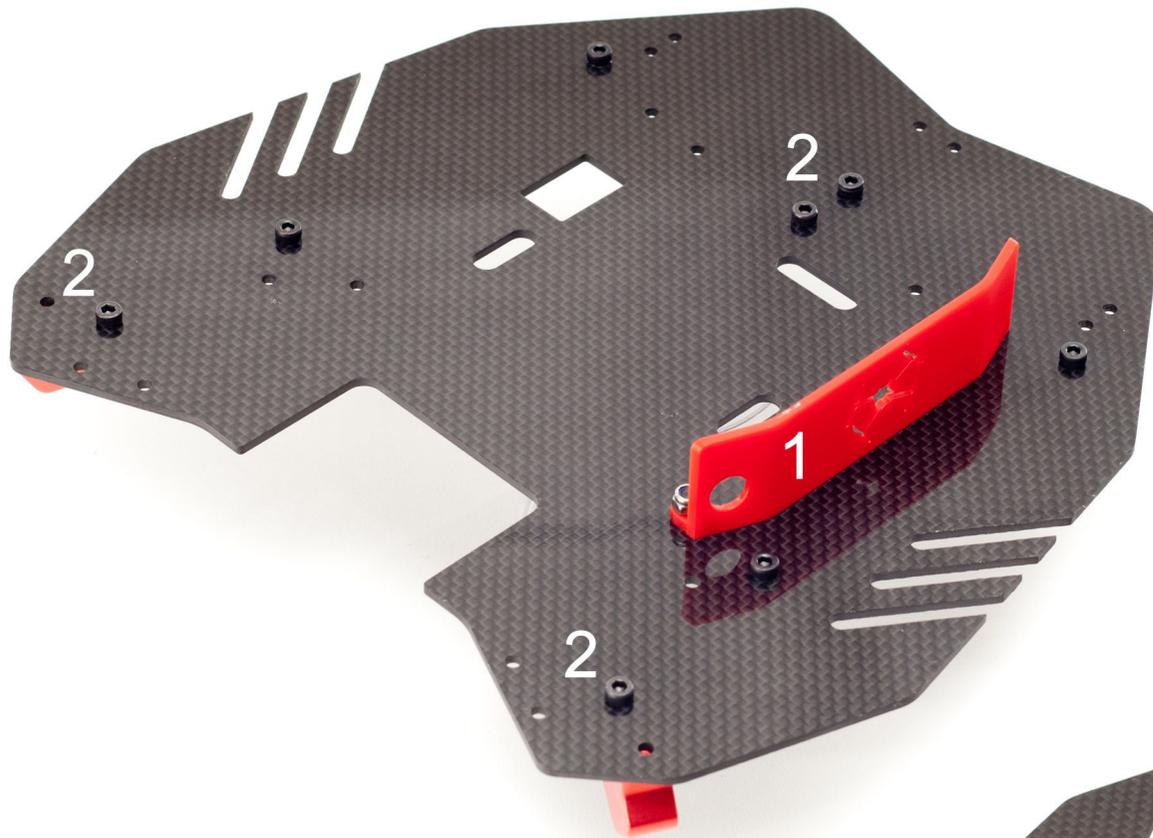


X8 MOTOR MOUNTS



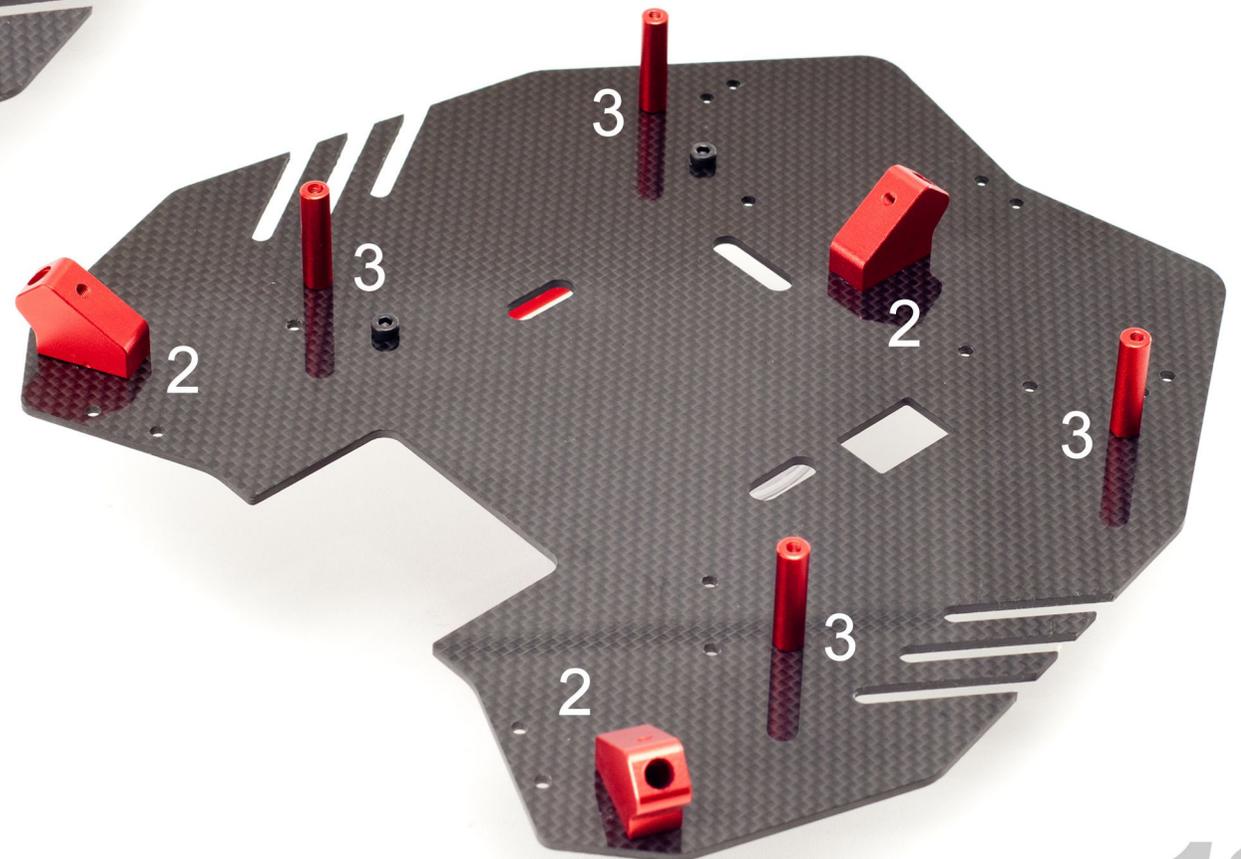
For X8 configuration replace the two motor mount bottom pieces with a motor mount top and attach the bottom motor the same as the top motor. For the rest of the motor mount assembly the same applies as with the standard motor mount assembly.





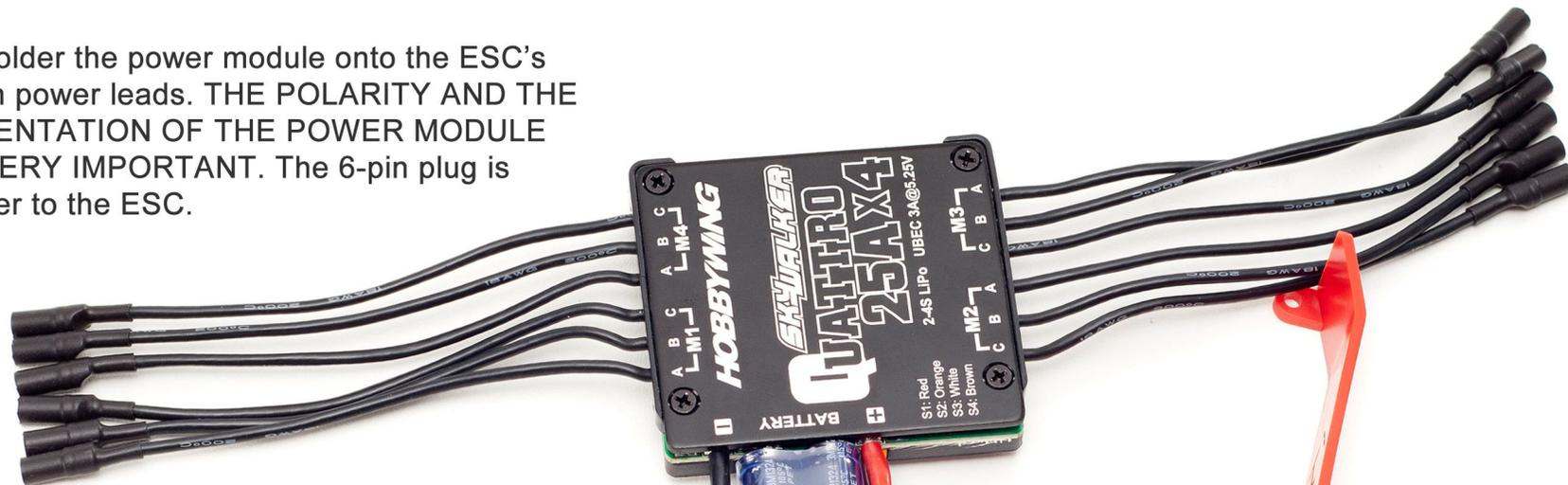
1. Fit the left side cover to the bottom main plate with M3 8mm cap screws and nylock nuts. Note the orientation of the bottom main plate.

2. Fit the landing gear mounts to the bottom of the bottom main plate with M3 6mm cap screws. Note that the front two mounts are only attached with one screw each for now. Use LOCTITE to secure these.



3. Attach the 23mm aluminium spacers with M3 8mm cap screws and LOCTITE.

1. Solder the power module onto the ESC's main power leads. THE POLARITY AND THE ORIENTATION OF THE POWER MODULE IS VERY IMPORTANT. The 6-pin plug is closer to the ESC.



2. Lengthen the Power module's wires with 6cm of 14AWG wire. The pieces cut from the ESC works great here.

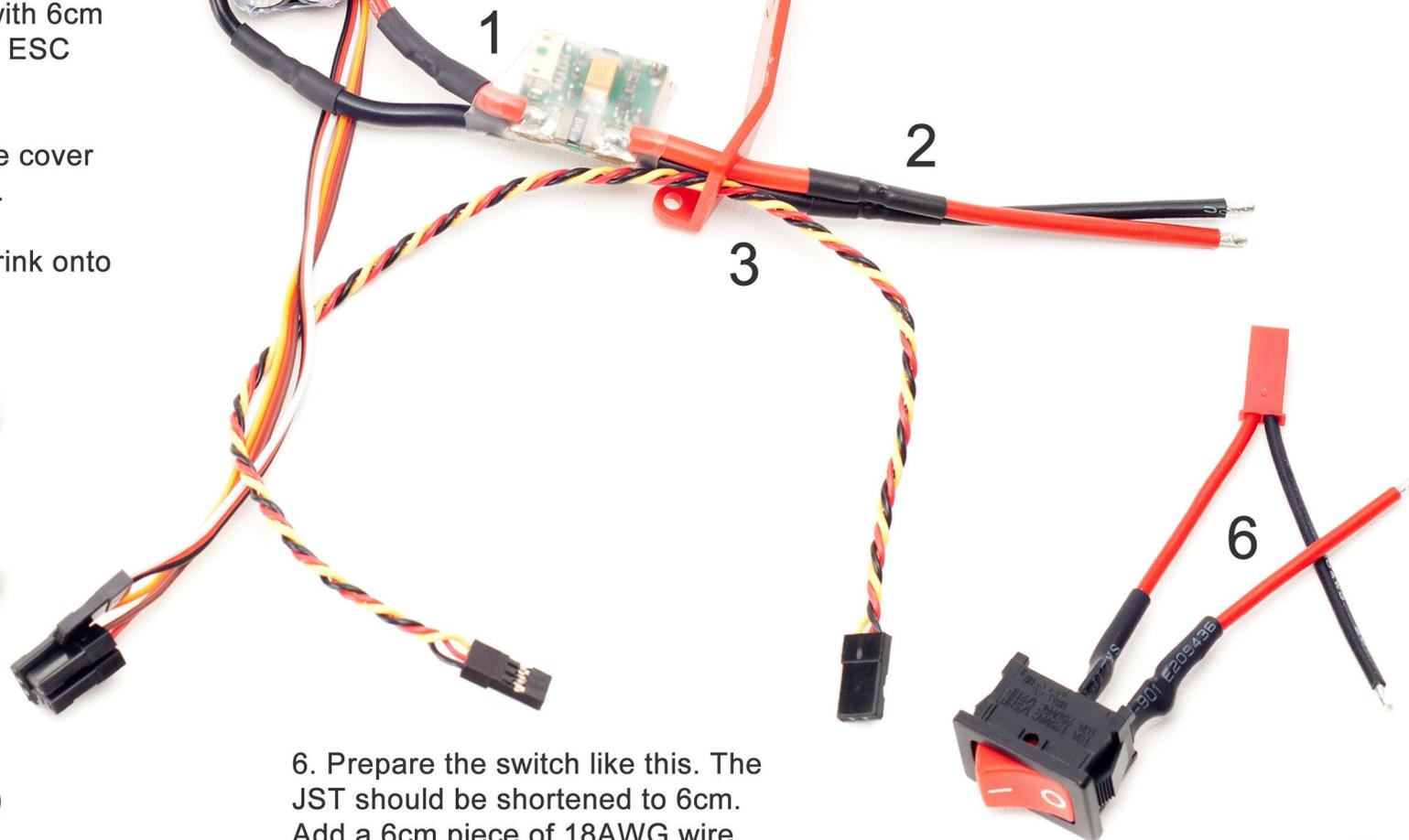
3. Feed the FLVSS wire through the side cover first and then the main power wires also.

4. Slide a 4.5cm piece of 10mm heat shrink onto the power and FLVSS wire.

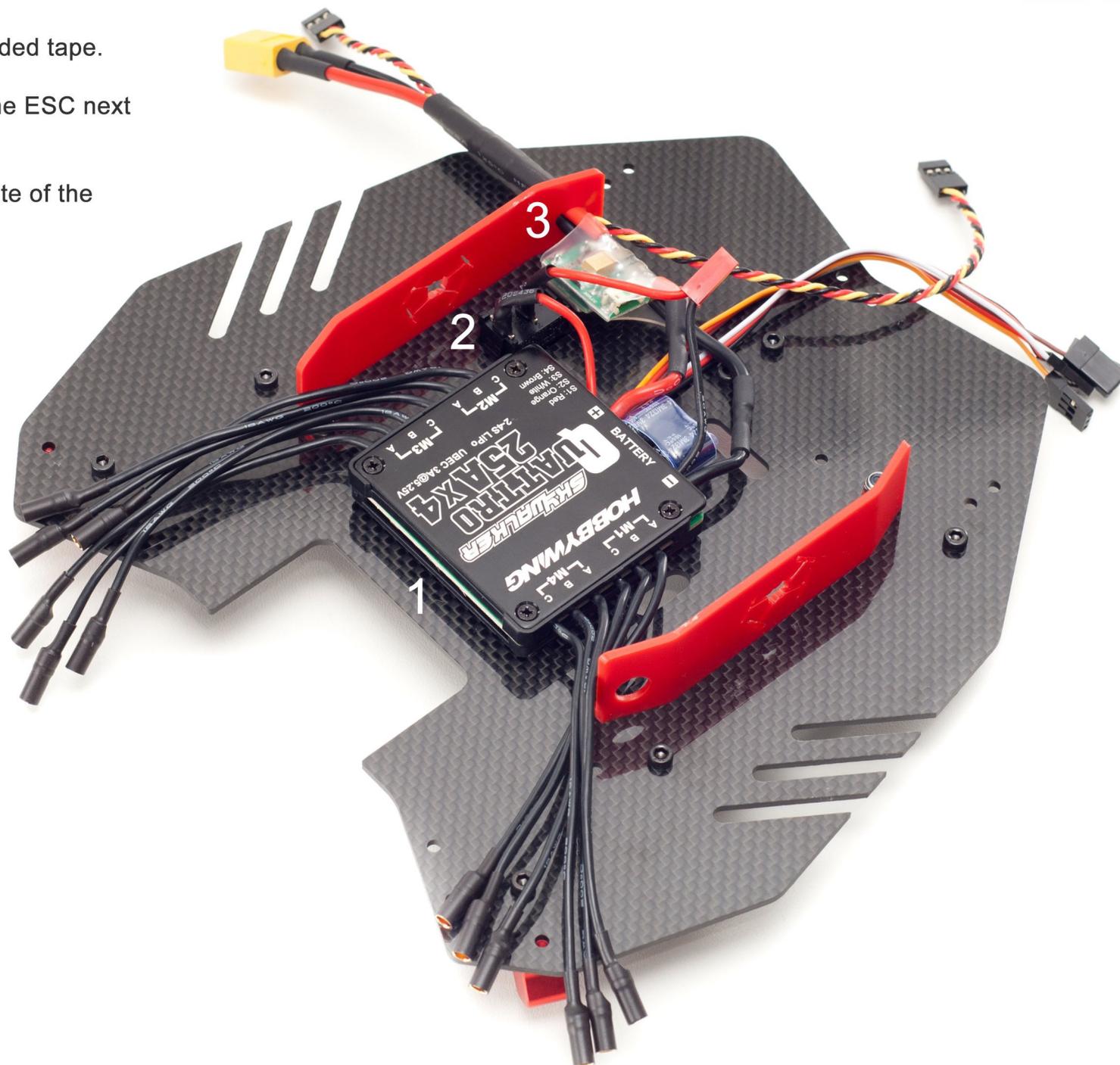


5. Put some 6mm heat shrink onto the power wires and solder the female XT60 onto the wires. Check the polarity!

6. Prepare the switch like this. The JST should be shortened to 6cm. Add a 6cm piece of 18AWG wire to the other pin of the switch.



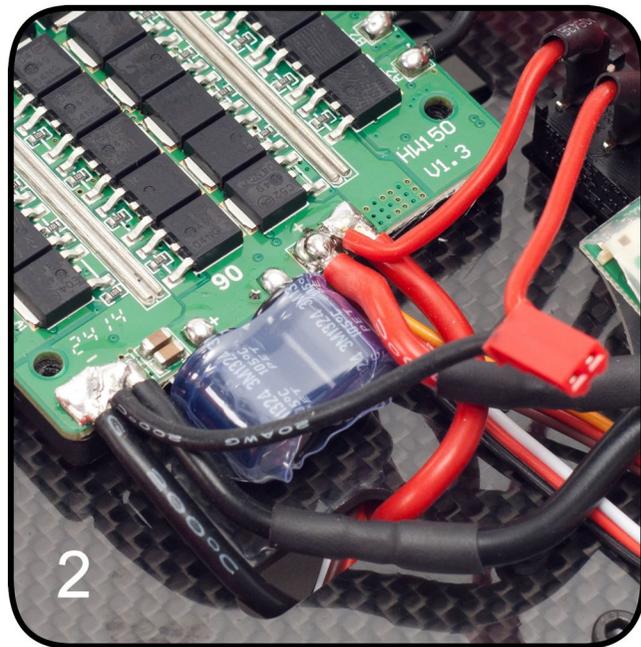
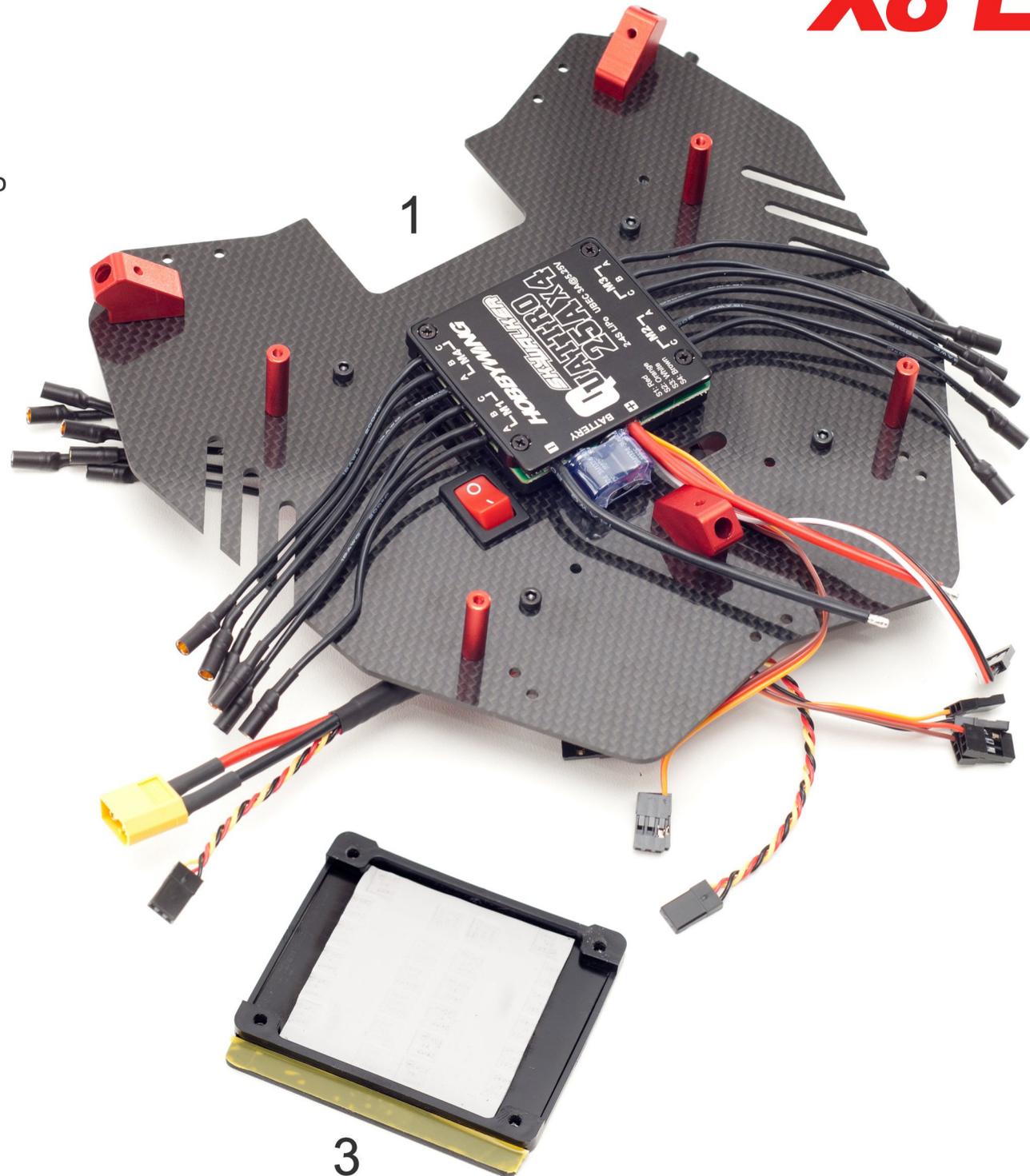
1. Fit the ESC with 2mm double sided tape.
2. Fit the switch and solder it to the ESC next to the main power wires.
3. Fit the right side cover. Take note of the position of the power module.

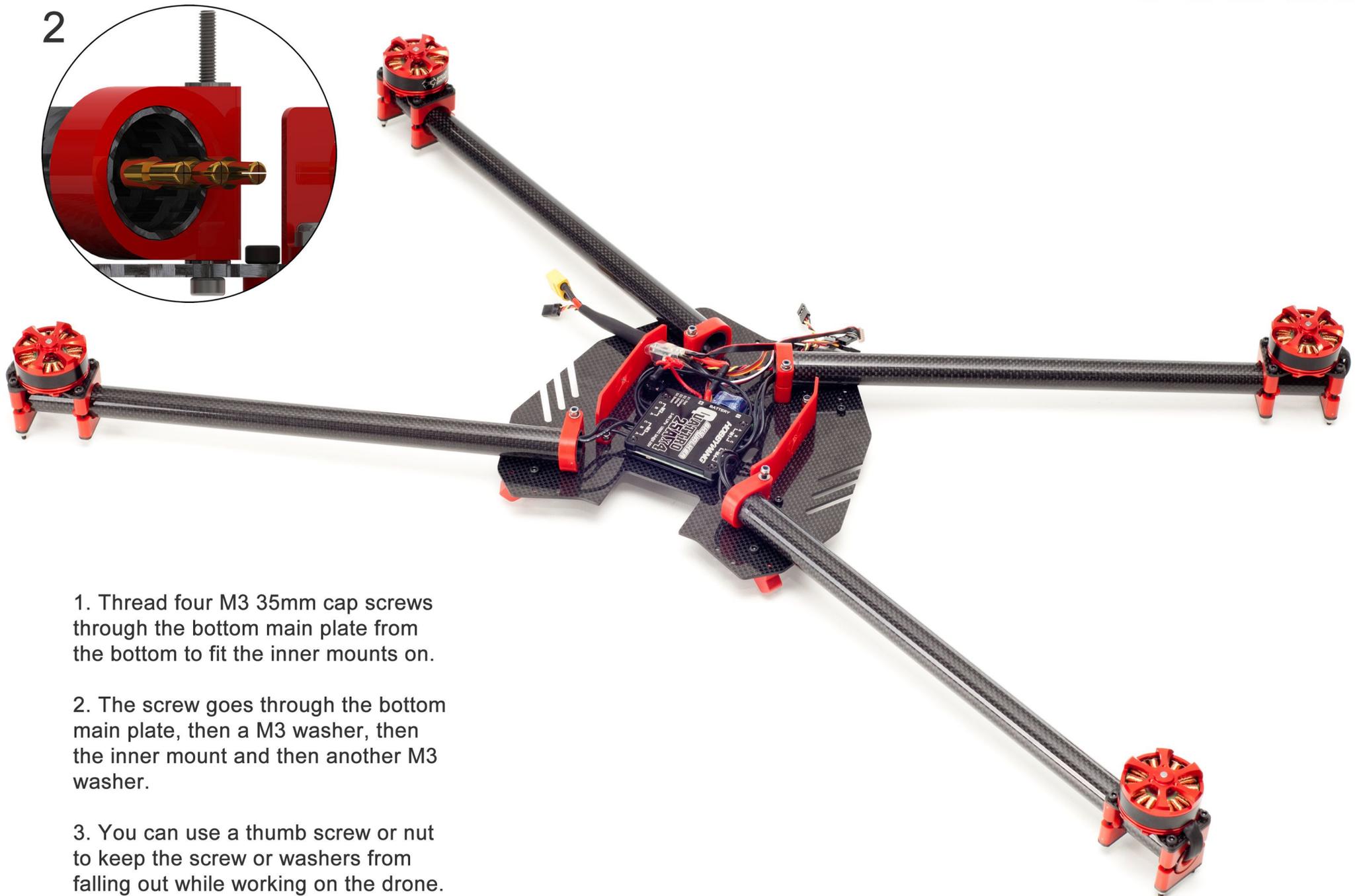


1. Fit the ESC with 2mm double sided tape on the bottom of the unit. Look at the placing on the right. Feed the wires through the provided grooves.

2. Solder the power wires of the bottom ESC to the open contacts on the top ESC along with the wires from the JST/switch. Make sure the solder joint is not too high and touching the ESC's cover. Be careful not to overheat the ESC. Check polarity.

3. Insulate the ESC cover with insulation tape.





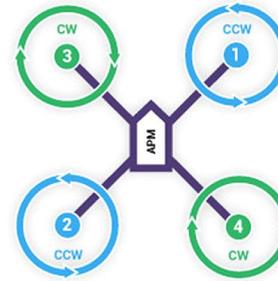
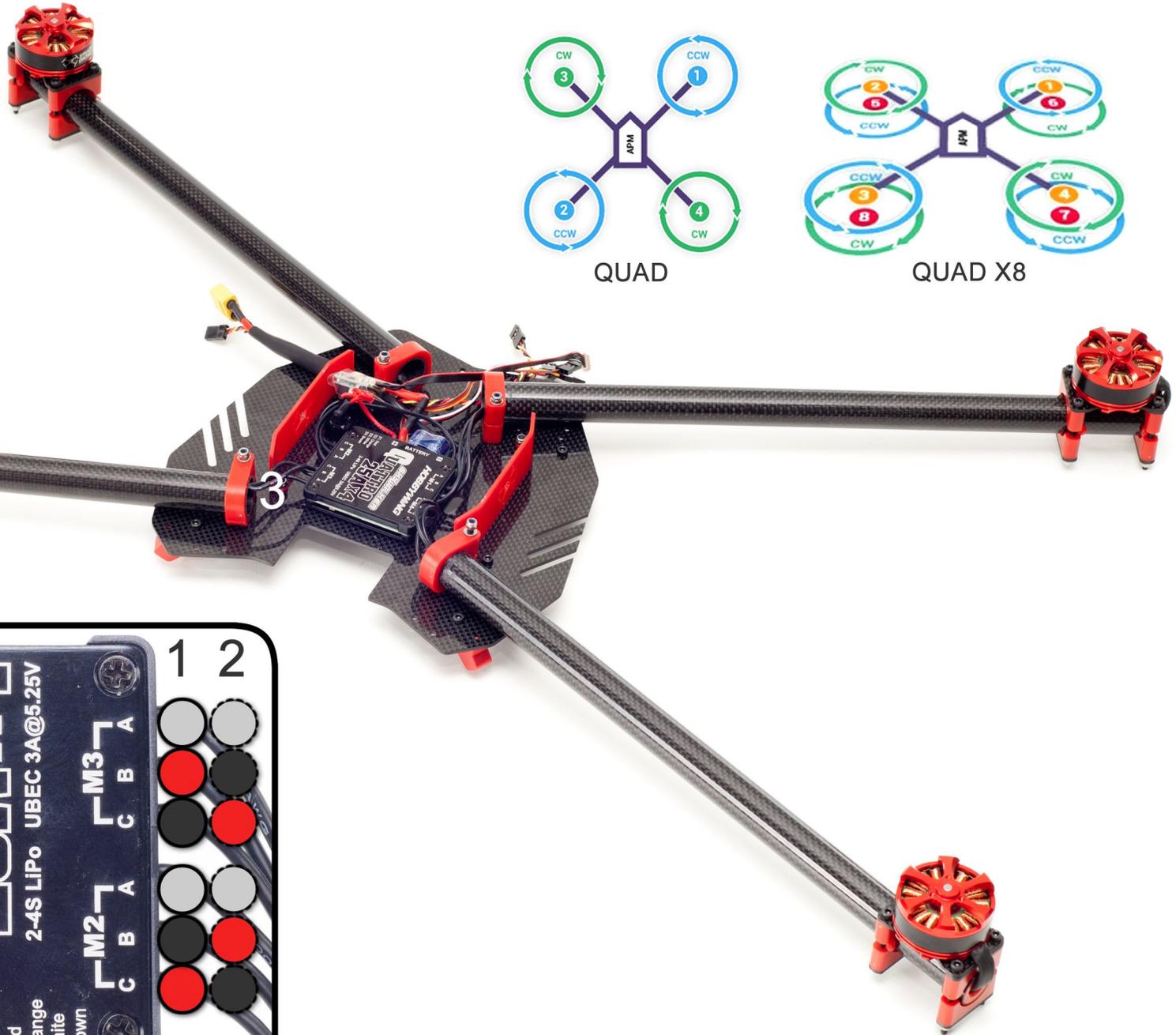
1. Thread four M3 35mm cap screws through the bottom main plate from the bottom to fit the inner mounts on.

2. The screw goes through the bottom main plate, then a M3 washer, then the inner mount and then another M3 washer.

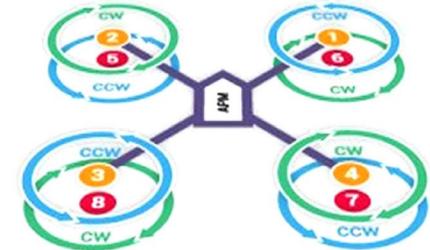
3. You can use a thumb screw or nut to keep the screw or washers from falling out while working on the drone.

MOTORS > ESC

1. Connect the motors to the ESC as shown below.
2. The dashed circles show the connection for X8 configuration.
3. Hide the excess wire in the tubes when done.



QUAD



QUAD X8





1. Fit the top main plate onto the screws through the inner mounts. Screw these screws into the embedded nuts in the top main plate.

2. Make sure the top main plate is the right way round, note these embedded nuts.

GIMBAL RAIL

1. Fit the carbon tubes into the gimbal mount and fasten with M3 16mm cap screws and LOCTITE. Put a M3 washer on the cap screw.



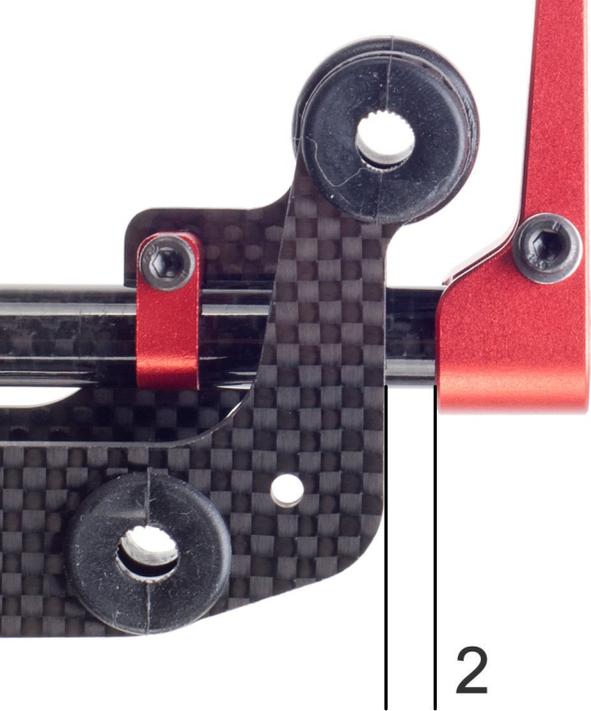
Assemble the vibration reduction part of the gimbal rail system with the silicone dampener balls. Do not fit all the balls as shown here.

2. For the average camera size (400-600g) we suggest only fitting these.

3. Note that these embedded nuts must be at the top of the plate.



GIMBAL RAIL



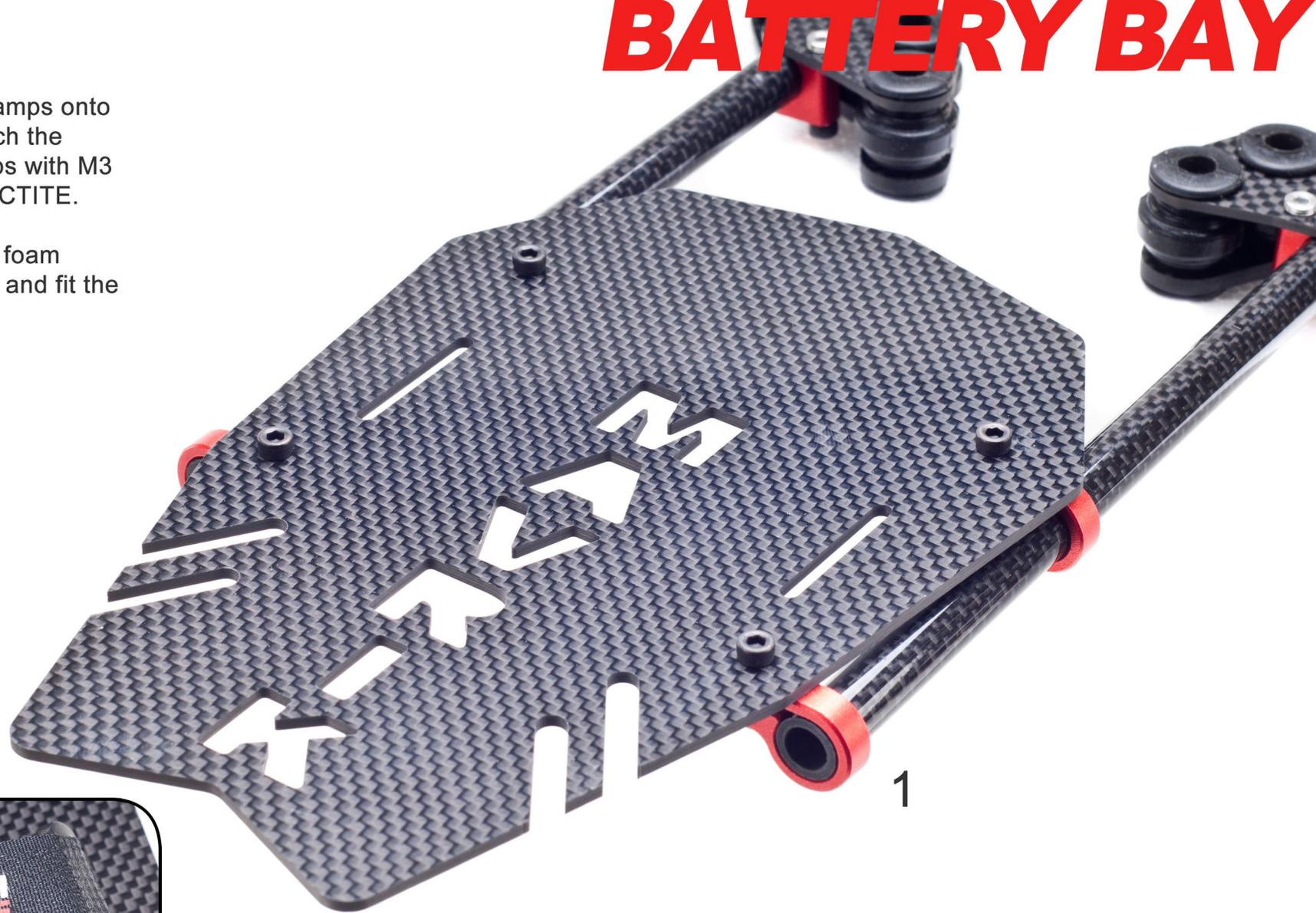
1. Slide the assembled vibration reduction mounts onto the carbon rail tube.
2. The gap between the carbon part and the gimbal part should be 5mm.
3. Secure the vibration reduction mount to the tube with the vibration tube clamps and M3 16mm cap screws. Apply some LOCTITE.

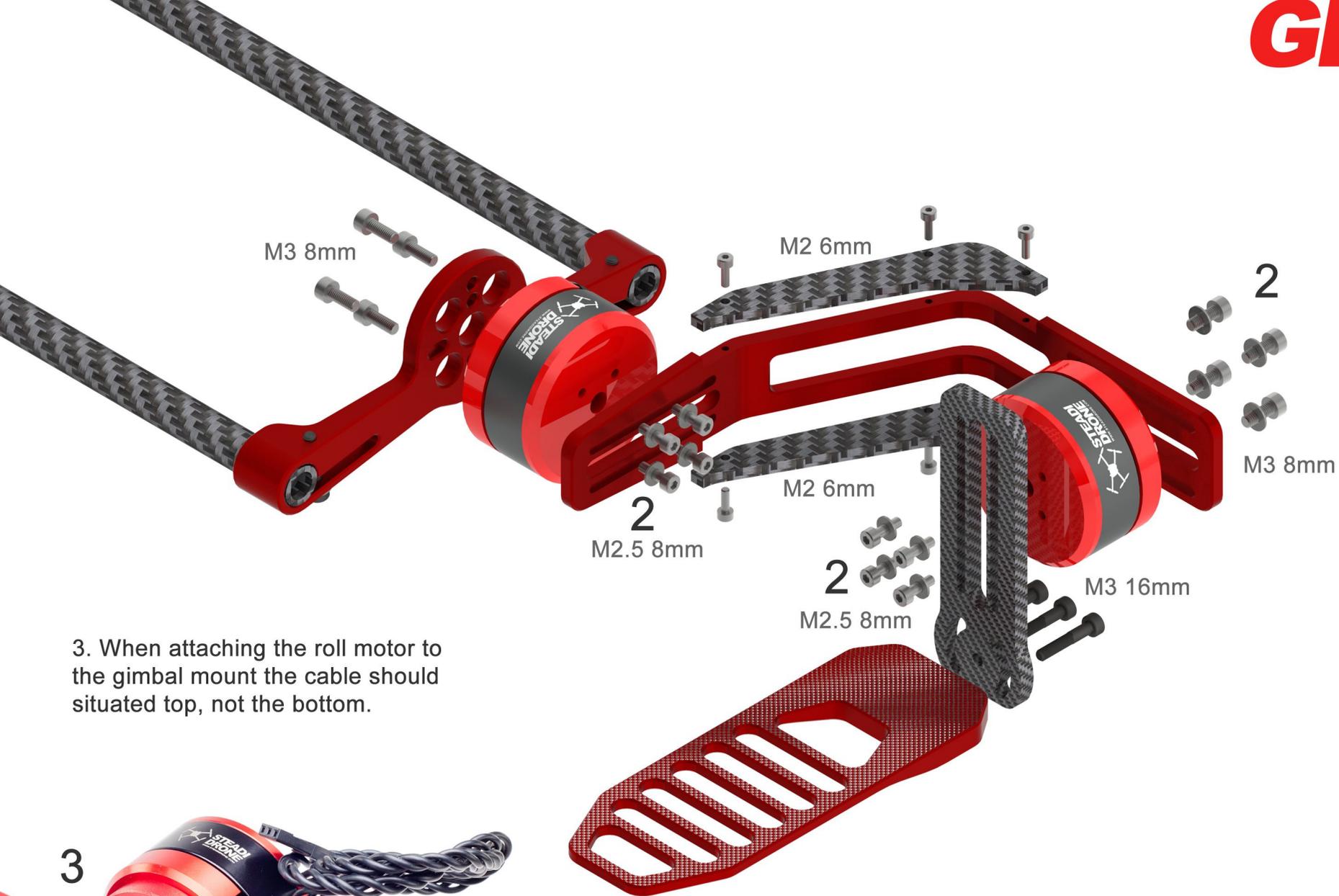


BATTERY BAY

1. Slide the battery bay clamps onto the gimbal rail tubes. Attach the battery bay onto the clamps with M3 12mm cap screws and LOCTITE.

2. Stick two 4.5cm battery foam strips onto the battery bay and fit the 300mm Velcro strap.





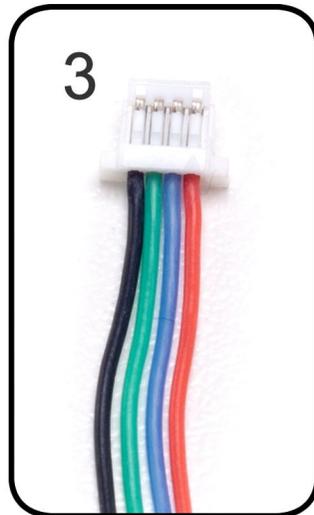
3. When attaching the roll motor to the gimbal mount the cable should be situated top, not the bottom.

1. Assemble the gimbal as shown here.

2. Make sure you include all the washers.

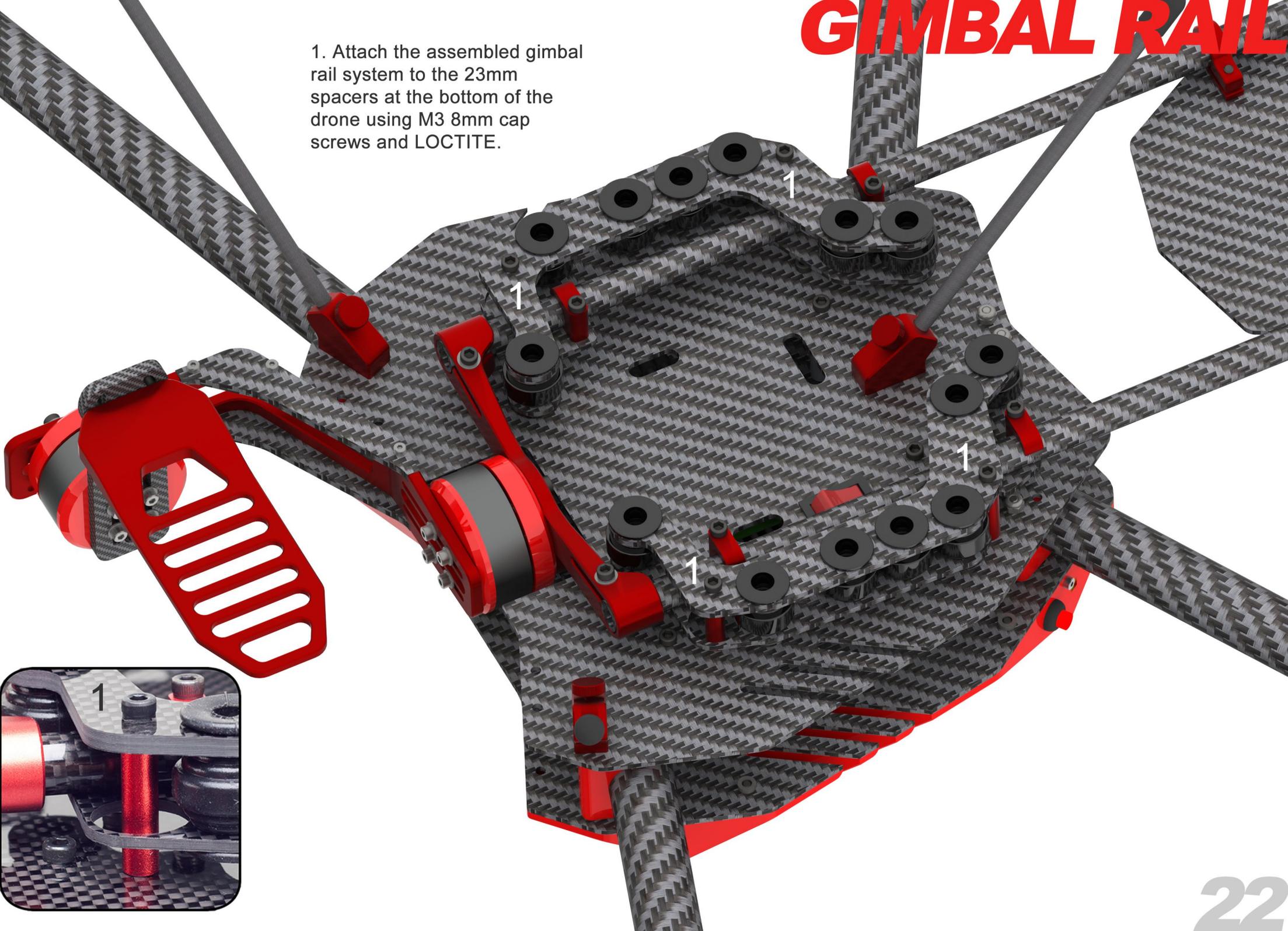
Use a little bit of LOCTITE on all the screws.

1. The IMU cable needs to be sleeved and then threaded through the gimbal pitch mount, the pitch motor and the roll mount.
2. Both the IMU cable and the pitch motor wires should be threaded through the gimbal roll bracket and roll motor.
3. Carefully remove the Molex plug on the IMU cable with a scalpel. Make sure you have the correct order in the IMU cable wires when replacing the plug.



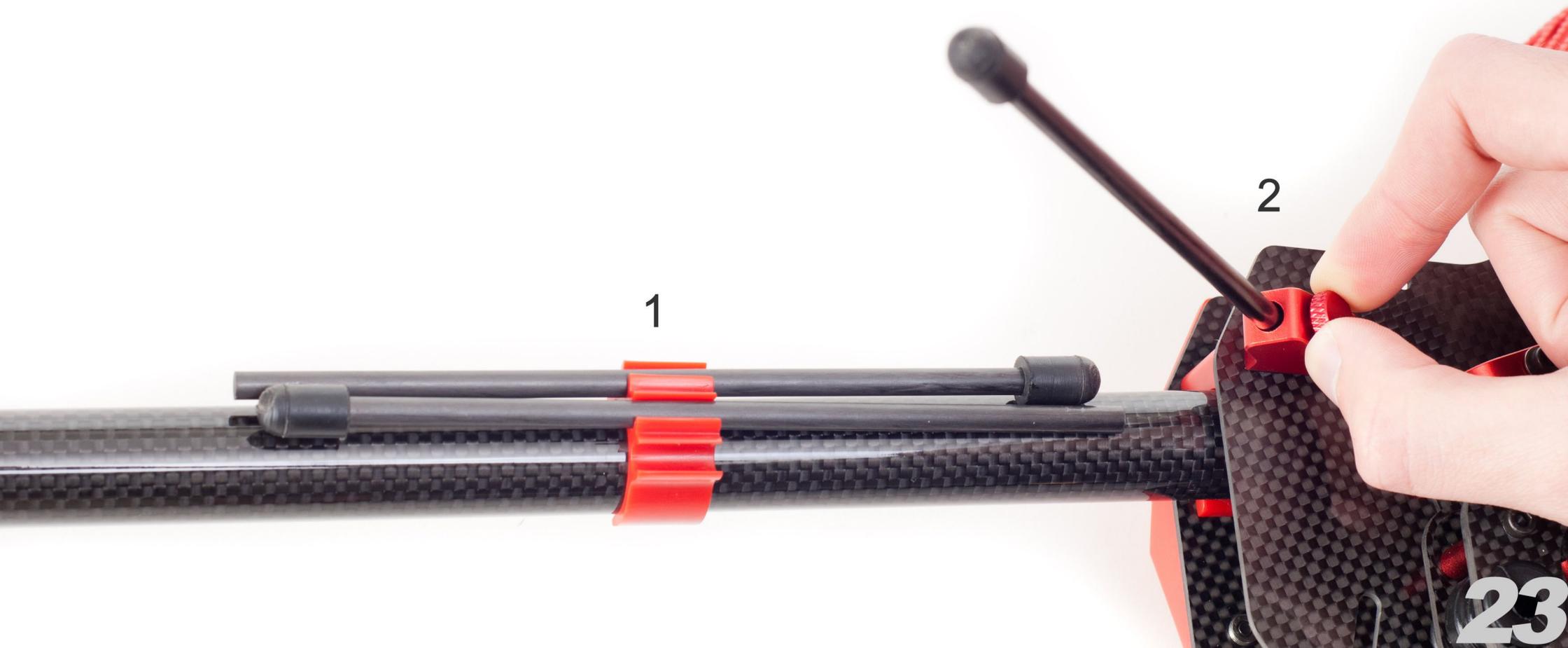
GIMBAL RAIL

1. Attach the assembled gimbal rail system to the 23mm spacers at the bottom of the drone using M3 8mm cap screws and LOCTITE.



LANDING GEAR

1. Unclip the landing gear from the landing gear holder.
2. Insert the landing gear into the landing gear mount and secure with the thumb screw.



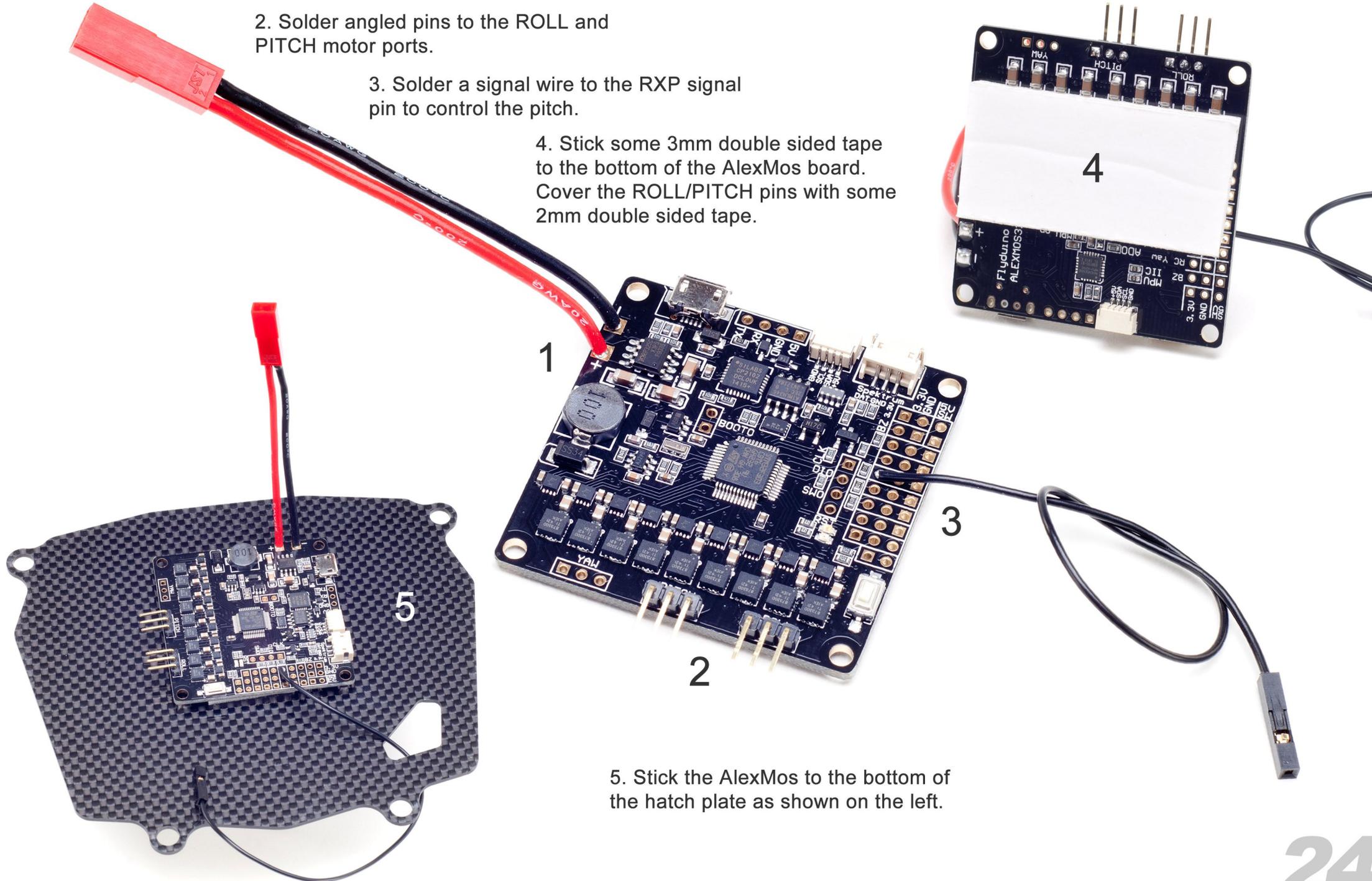
INSTALL ALEXMOS

1. Take a female JST and shorten the wires to 5cm. Solder the JST to the AlexMos board. Check the polarity!

2. Solder angled pins to the ROLL and PITCH motor ports.

3. Solder a signal wire to the RXP signal pin to control the pitch.

4. Stick some 3mm double sided tape to the bottom of the AlexMos board. Cover the ROLL/PITCH pins with some 2mm double sided tape.

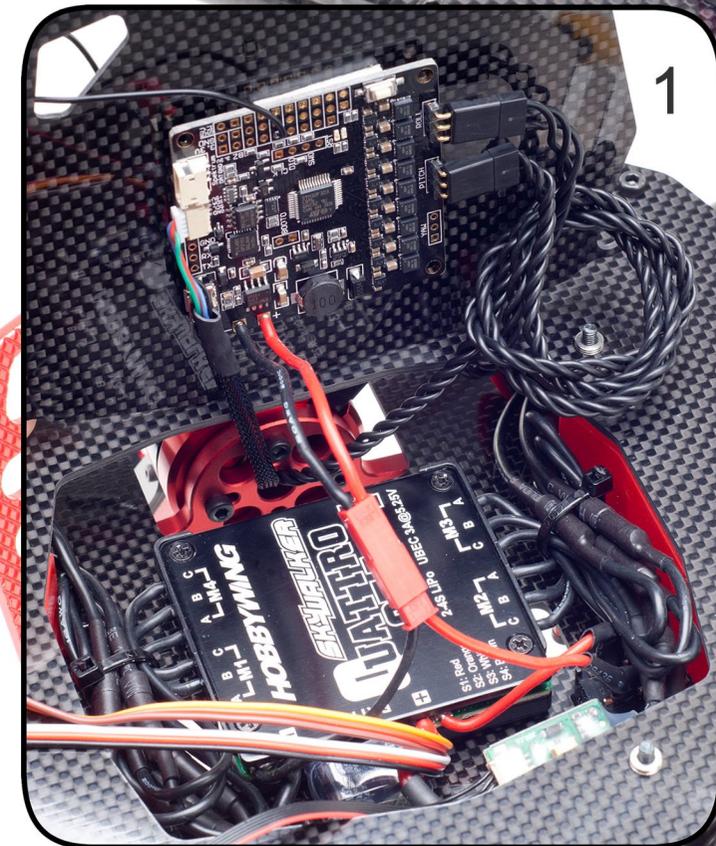


5. Stick the AlexMos to the bottom of the hatch plate as shown on the left.

1. Plug all the following plugs into the AlexMos board: JST (power), IMU cable & the motor wires. Make sure the motor wires are plugged into the correct ports.

2. Thread the ESC signal wires, the power module's cable and the gimbal pitch signal cable through the hatch plate.

3. Fit the hatch plate and secure with the thumb screws.



Program ESC With Transmitter (4 Steps)

Note: Please make sure the throttle volume is set to 0 when the throttle stick is moved to the bottom position and 100% at the top position

1. Enter program mode
2. Select programmable items
3. Select options (Programmable value)
4. Exit program mod

1. Enter program mode

- 1) Switch on transmitter, move throttle stick to top position, connect the battery pack to ESC
- 2) Wait for 2 seconds, the motor should emit special tone like "beep-beep"
- 3) Wait for another 5 seconds, special tone like "♪ 56712" should be emitted, which means program mode is entered



2. Select programmable items:

After entering program mode, you will hear 8 tones in a loop with the following sequence. If you move the throttle stick to bottom within 3 seconds after one kind of tones, this item will be selected.

- | | | |
|--------------------------|--------------------|------------------|
| 1) "beep" | brake | (1 short tone) |
| 2) "beep-beep" | battery type | (2 short tone) |
| 3) "beep-beep-beep" | cutoff mode | (3 short tone) |
| 4) "beep-beep-beep-beep" | cutoff threshold | (4 short tone) |
| 5) "beep-----" | startup mode | (1 long tone) |
| 6) "beep-----beep" | timing | (1 long 1 short) |
| 7) "beep-----beep-beep" | set all to default | (1 long 2 short) |
| 8) "beep-----beep-----" | exit | (2 long tone) |

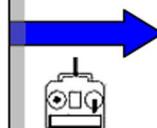
Note: 1 long "beep-----" = 5 short "beep-"



3. Select option (Programmable value):

You will hear several tones in loop. Set the value matching to a tone by moving throttle stick to top when you hear the tone, then a special tone "♪ 1515" emits, means the value is set and saved. (Keeping the throttle stick at top, you will go back to Step 2 and you can select other items; or moving the stick to bottom within 2 seconds will exit program mode directly)

Items	Tones		
	"beep-" 1 short tone	"beep-beep-" 2 short tones	"beep-beep-beep" 3 short tones
Brake	Off	On	
Battery type	Lipo	NiMH	
Cutoff mode	Soft-Cut	Cut-Off	
Cutoff threshold	Low	Medium	High
Start mode	Normal	Soft	Super soft
Timing	Low	Medium	High



4. Exit program mode

There are 2 ways to exit program mode:

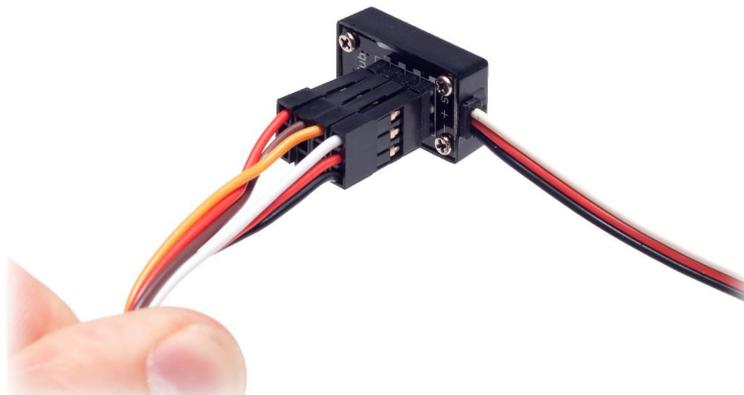
- 1) In step 3, after special tone "♪ 1515", please move throttle stick to the bottom position within 2 seconds.
- 2) In step 2, after tone "beep-----beep-----"(That is: The item #8), move throttle stick to bottom within 3 seconds.

2. ESC Setup
Connect all the ESC signal wires to the throttle channel of the receiver (ch3) via the ESC's hub. Power the radio and move the throttle to MAX. Power the ESC, after 2 seconds the ESC will emit two beeps, wait another 5 seconds and the ESC will play another tone. Now proceed to setup the ESC as described on the left. Make sure you set all the options to the first column marked in RED. After completing the setup exit the setup menu and test the ESC. Throttle up all the way to full throttle to make sure that the motors all spin up equally and along a smooth curve.

1. Throttle MIN/MAX

Connect all the ESC signal wires to the throttle channel of the receiver (ch3) via the ESC's hub. Power the radio and move the throttle to MAX. Power the ESC, after a few seconds the ESC will emit two beeps, drop the throttle to zero and the ESC will emit the usual boot up tone. Power down the ESC.

Make sure all the signal wires line up on the hub and the receiver.



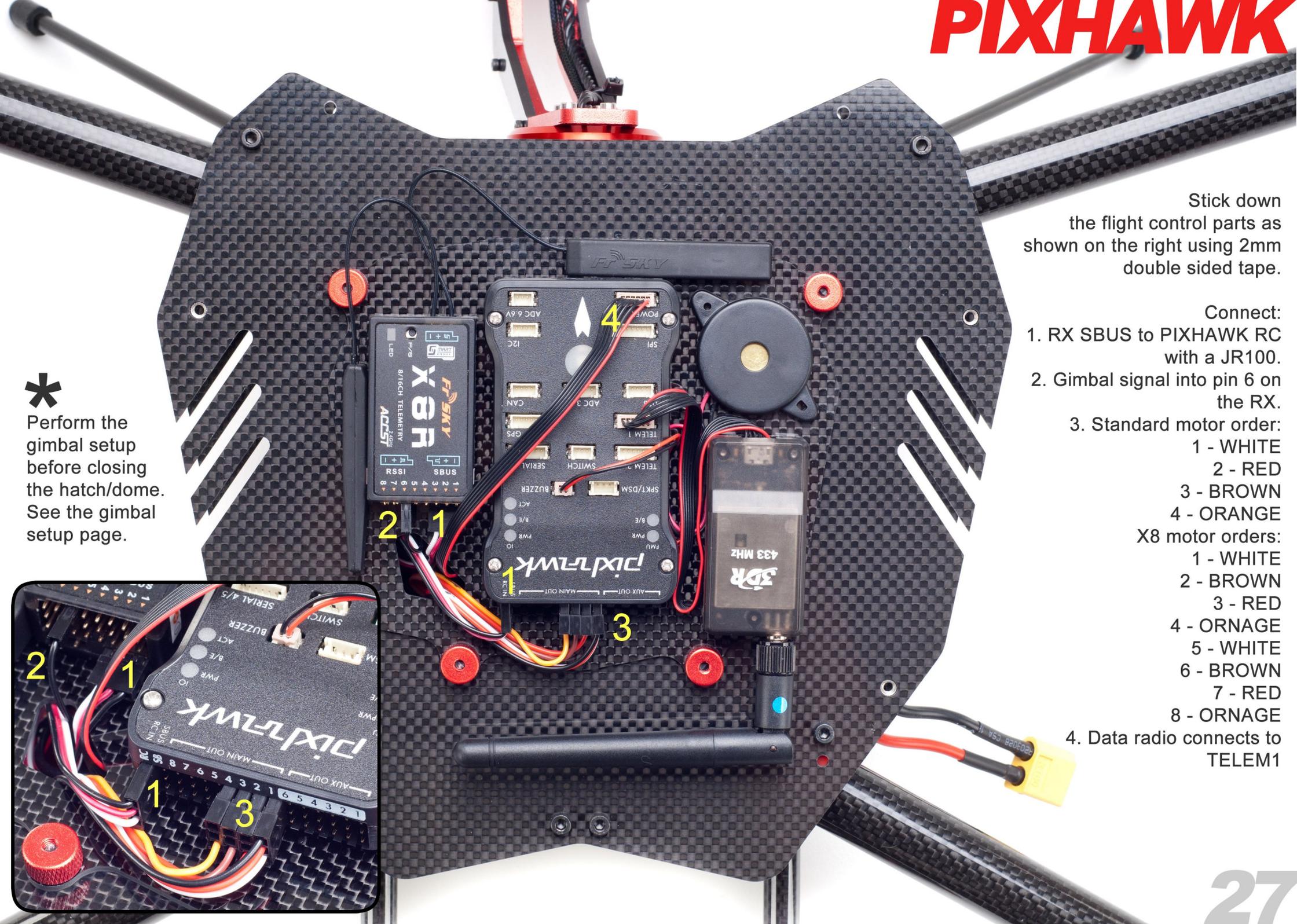
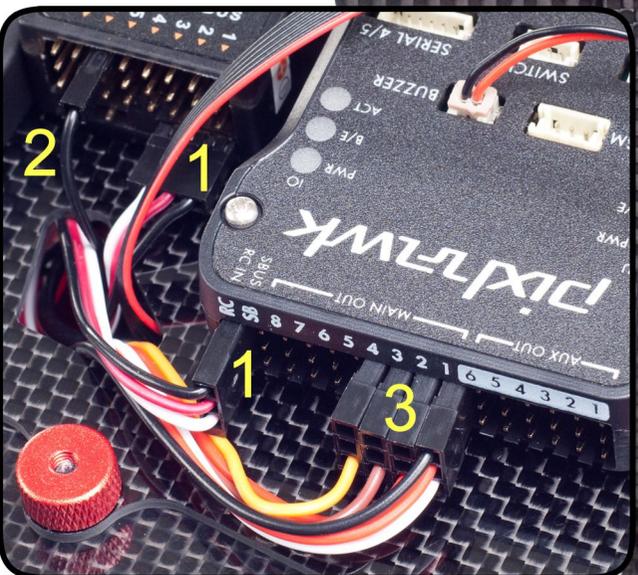
***** Remember to check that your trims are centred and that you do not have any other settings set that will effect the stick readings. The best is to start with a clean model on the radio.

Stick down the flight control parts as shown on the right using 2mm double sided tape.

Connect:

1. RX SBUS to PIXHAWK RC with a JR100.
2. Gimbal signal into pin 6 on the RX.
3. Standard motor order:
 - 1 - WHITE
 - 2 - RED
 - 3 - BROWN
 - 4 - ORANGEX8 motor orders:
 - 1 - WHITE
 - 2 - BROWN
 - 3 - RED
 - 4 - ORANGE
 - 5 - WHITE
 - 6 - BROWN
 - 7 - RED
 - 8 - ORANGE
4. Data radio connects to TELEM1

Perform the gimbal setup before closing the hatch/dome. See the gimbal setup page.



GIMBAL SETUP



Before you can set up the gimbal you need to balance the gimbal for your camera. Please see the MAVRIK Quick Start Guide for more information on balancing.

After the gimbal has been balanced you can perform the gimbal setup. Please visit www.basecamelectronics.com for the newest GUI, firmware and manual.

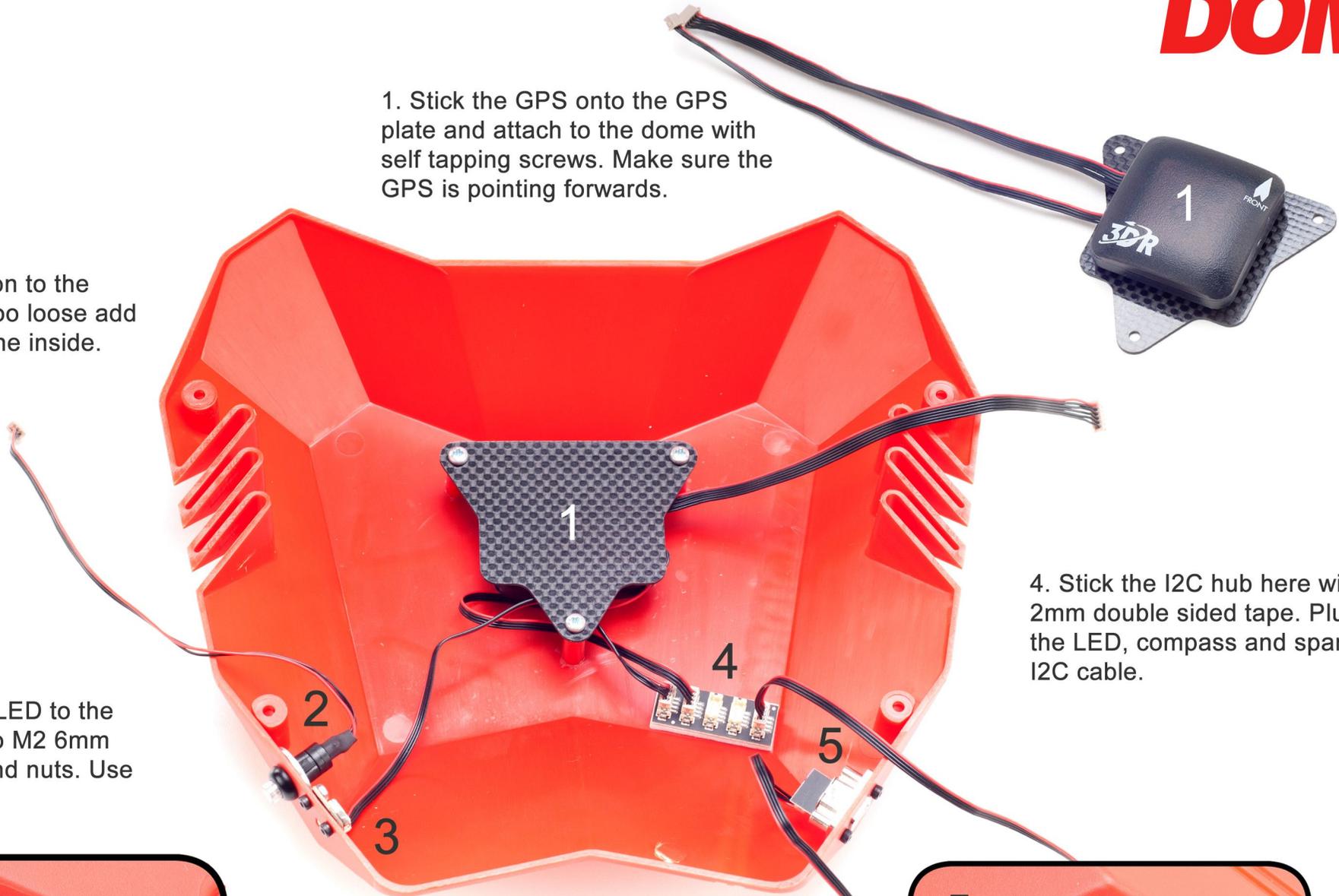
1. Stick the GPS onto the GPS plate and attach to the dome with self tapping screws. Make sure the GPS is pointing forwards.

2. Fit the button to the dome, if it is too loose add a washer on the inside.

3. Attach the LED to the dome with two M2 6mm cap screws and nuts. Use LOCTITE.

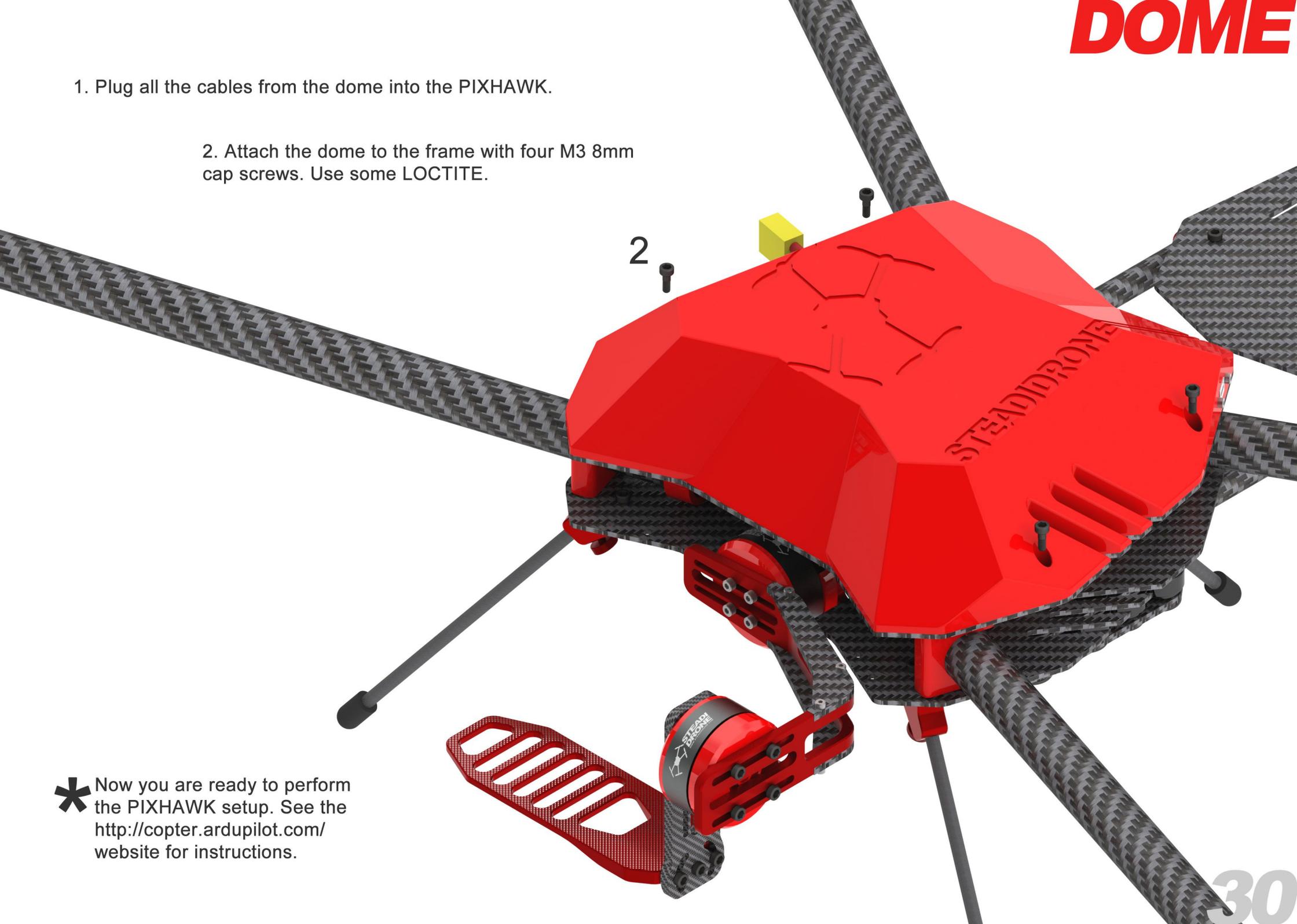
4. Stick the I2C hub here with 2mm double sided tape. Plug the LED, compass and spare I2C cable.

5. Attach the USB port to the dome with two M2 6mm cap screws.



1. Plug all the cables from the dome into the PIXHAWK.

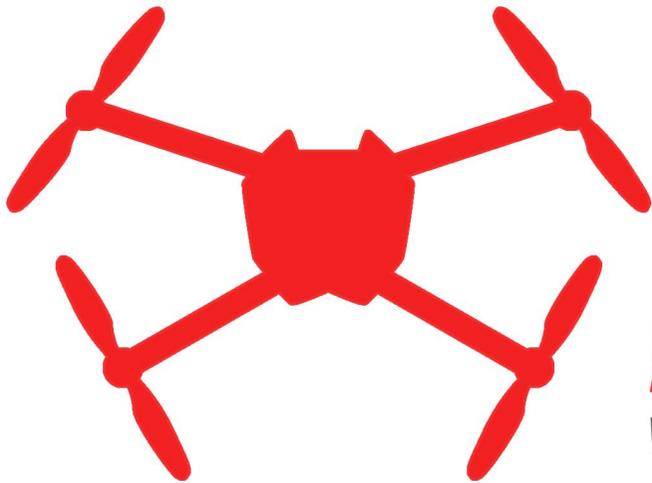
2. Attach the dome to the frame with four M3 8mm cap screws. Use some LOCTITE.



* Now you are ready to perform the PIXHAWK setup. See the <http://copter.ardupilot.com/> website for instructions.

COMPLETE





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