

Synerduino Shield , Quad Frame , FlywiiGUI

QUICK BUILD and FLY GUIDE



THIS GUIDE IS IDEAL FOR QUICK BUILD USING THE 250MM FRAME OF SYNERDUINO PAIRED WITH CORRESPONDING GPS AND 2300KV MOTOR



Tools needed

Screwdriver / Hex sets



Cutter Knife



Tape Double sided and Electrical



Zip Ties



Soldering Set



PVA Glue



Thread Lock , Purple



Battery



Lipo Charger 5A – to recharge select Battery type Lipo >> Balance Voltage 11.1V 3s - 1.3Ah charge current

For Storage – select Battery type Lipo >> Storage at 1Ah , this would charge/Drain battery to 3.80V per cell

Plug the JST balance connector and the XT60 plug to the charger

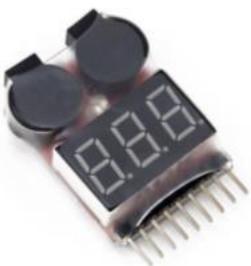


Lipo Battery 3s 11.1V 1300mah To 1500mah

Fully Charge is 12.4V or 4.20V per cell

Storage is 11.1V or 3.80V per cell – Battery not in use for a long time

Do not drain the battery pass 3.3V Per cell

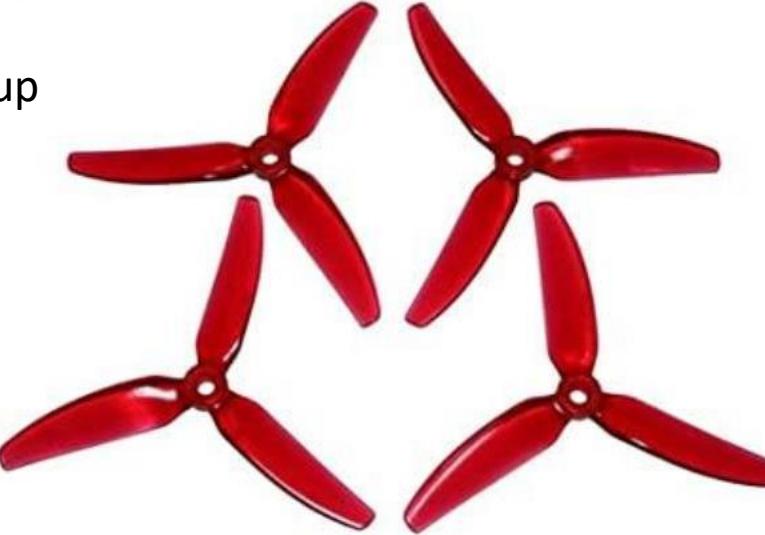


Voltage alarm Button on top sets the Alarm Voltage and it can be attach to the drone while in flight given its secure to the frame

Set voltage to 3.6V under load

Hardware

Synerduino Kit + 250mm frame setup



5x4.5 3 or 5x4 3 bladed propellers (Stiff Plastic)

5x45x3 (5045 3) or 5x40x3 (5040 3)

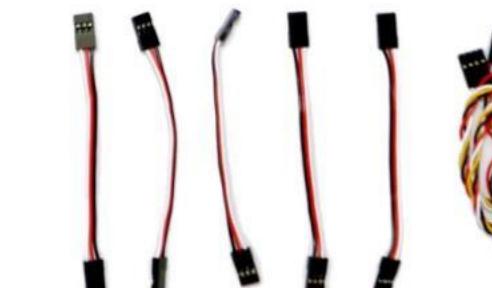
Counter rotation CCW & CW



Bluetooth HC05 and GPS



XT60 Plug



Servo Wires



ESC OPTO Standard PWM or BL Heli or
BL Heli-S 20A-30A 3s-4s

ESC With BEC if you needed to run extra
servos ,sensors or accessories

5V 3A UBEC – for those who needs to run extra
servos or sensor components

Recommend 2200 Series 2300kv motors those with 22mm Stator size average rate of 1000g thrust

Arduino Board Preparation

Ensure insulation from the Arduino board add tape on these areas



2560 MEGA



UNO 328

Firmware/sketch upload

Download and unzip the Xloader and Synerduino Firmware

XLoader

[Download](#)

[Unzip the Xloader and open Xloader.exe](#)

Name	Date modified	Type	Size
avrdude.conf	18/03/2012 4:49 PM	CONF File	408 KB
avrdude.exe	18/03/2012 4:49 PM	Application	1,878 KB
devices.txt	18/03/2012 4:50 PM	Text Document	1 KB
libusb0.dll	18/03/2012 4:49 PM	Application extens...	43 KB
license.txt	18/03/2012 5:03 PM	Text Document	1 KB
X XLoader.exe	18/03/2012 4:44 PM	Application	271 KB

Download and Unzip the Synerduino Firmware files

Synerduino Firmware-Multirotor

[Download](#)

[Synerduino Neo6 GPS use NMEA GPS file](#)

[Synerduino V1.1 BN220 GPS use UBLOX GPS file](#)

 GY91-NMEA GPS

 GY91-UBLOX GPS

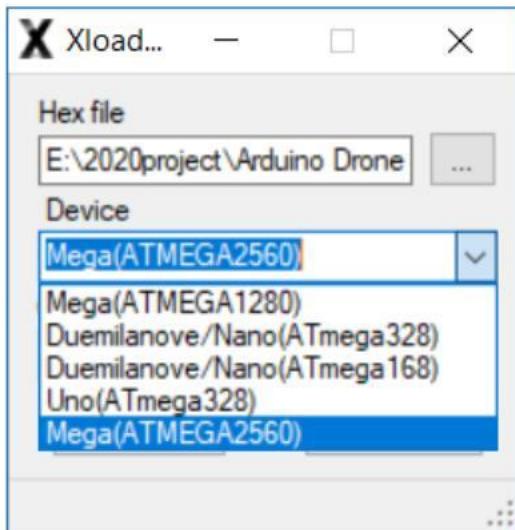
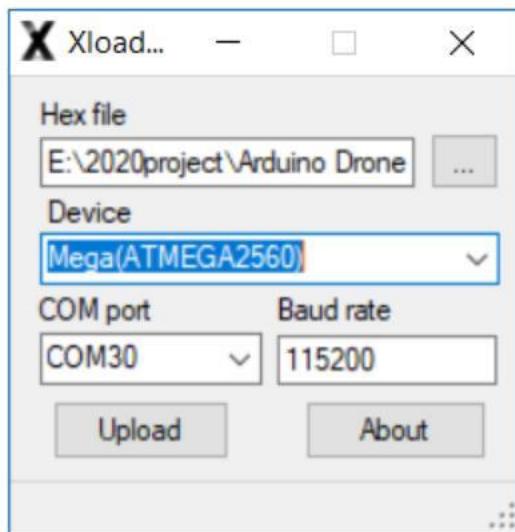
 GY801-NMEA GPS

 GY801-ULOX GPS

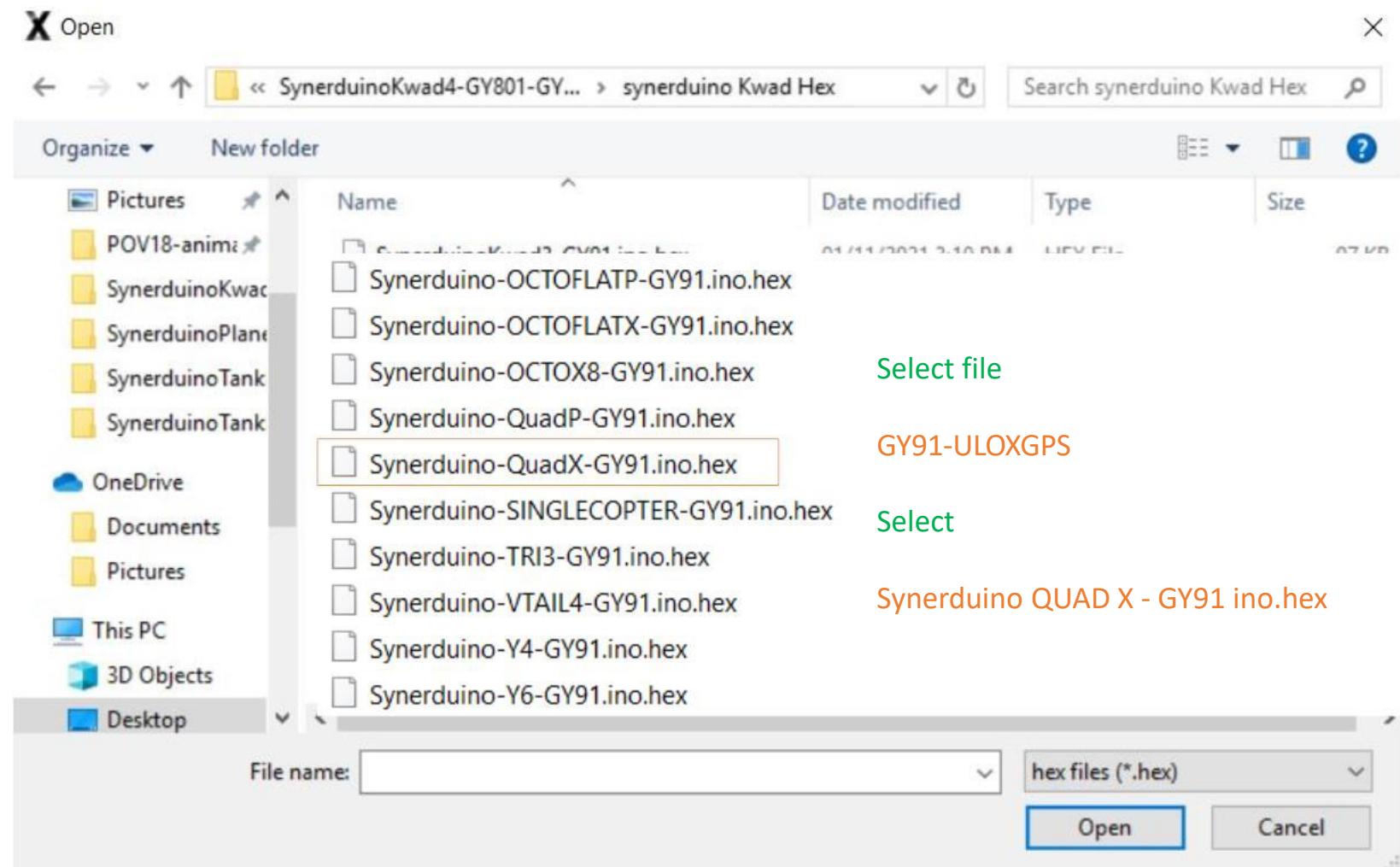
Connect your Arduino USB to the computer

- 
- Synerduino-QuadP-GY91.ino.hex
 - Synerduino-QuadX-GY91.ino.hex
 - Synerduino-SINGLECOPTER-GY91.ino.hex
 - Synerduino-TRI3-GY91.ino.hex
 - Synerduino-VTAIL4-GY91.ino.hex

Select the matching Model Arduino Device to Mega2560



Select ATMega 2560

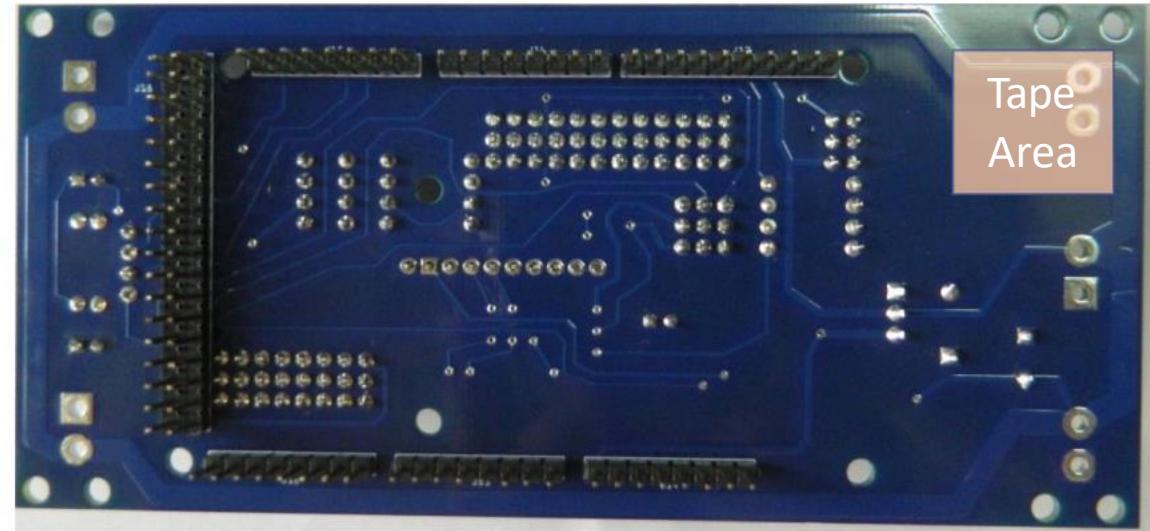
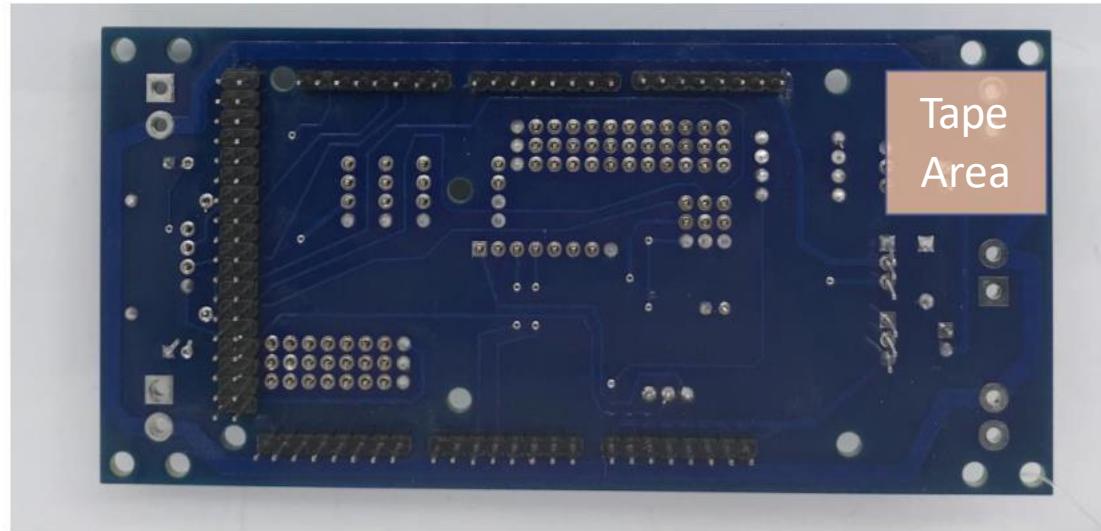


1. Open the Synerduino-QuadX-GY91.ino.hex
2. Plug in your Arduino USB and look for the COM Port of your Arduino Mega 2560
3. Click upload

Synerduino Kwad Shield Preparation

Ensure insulation from the Arduino board add tape on these areas

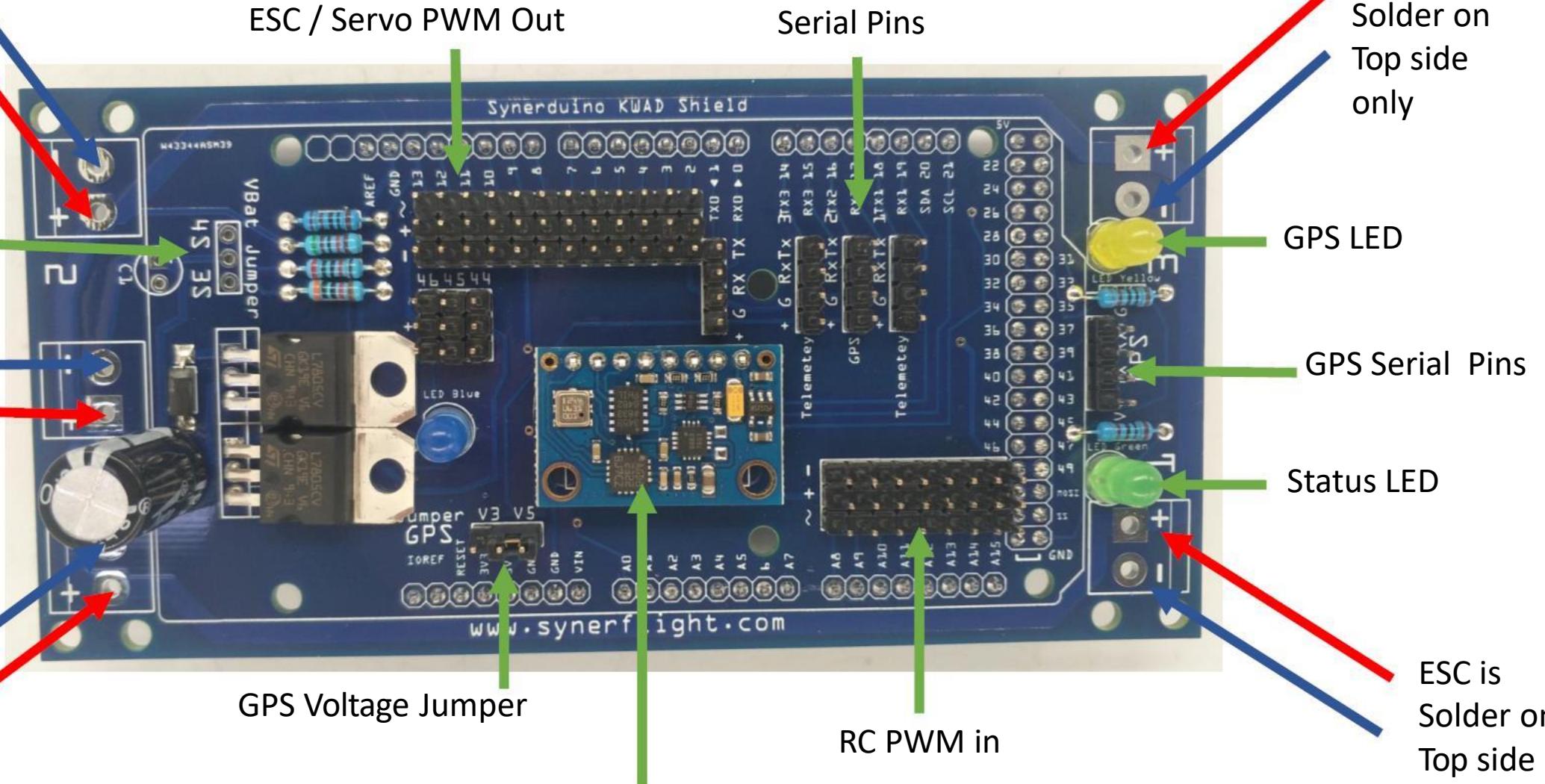
BETA GY801 & V1.1 GY91



Synerduino Kwad Shield

ESC is
Solder on
Top side
only

Note : surface mount your solder ESC wire make sure it doesn't penetrate to the bottom of the board



ESC is
Solder on
Top side
only

GPS LED

GPS Serial Pins

Status LED

ESC is
Solder on
Top side
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Set jumper to the
Battery Cell
count (Soldered)

Power
input
3s 11.1V

ESC is
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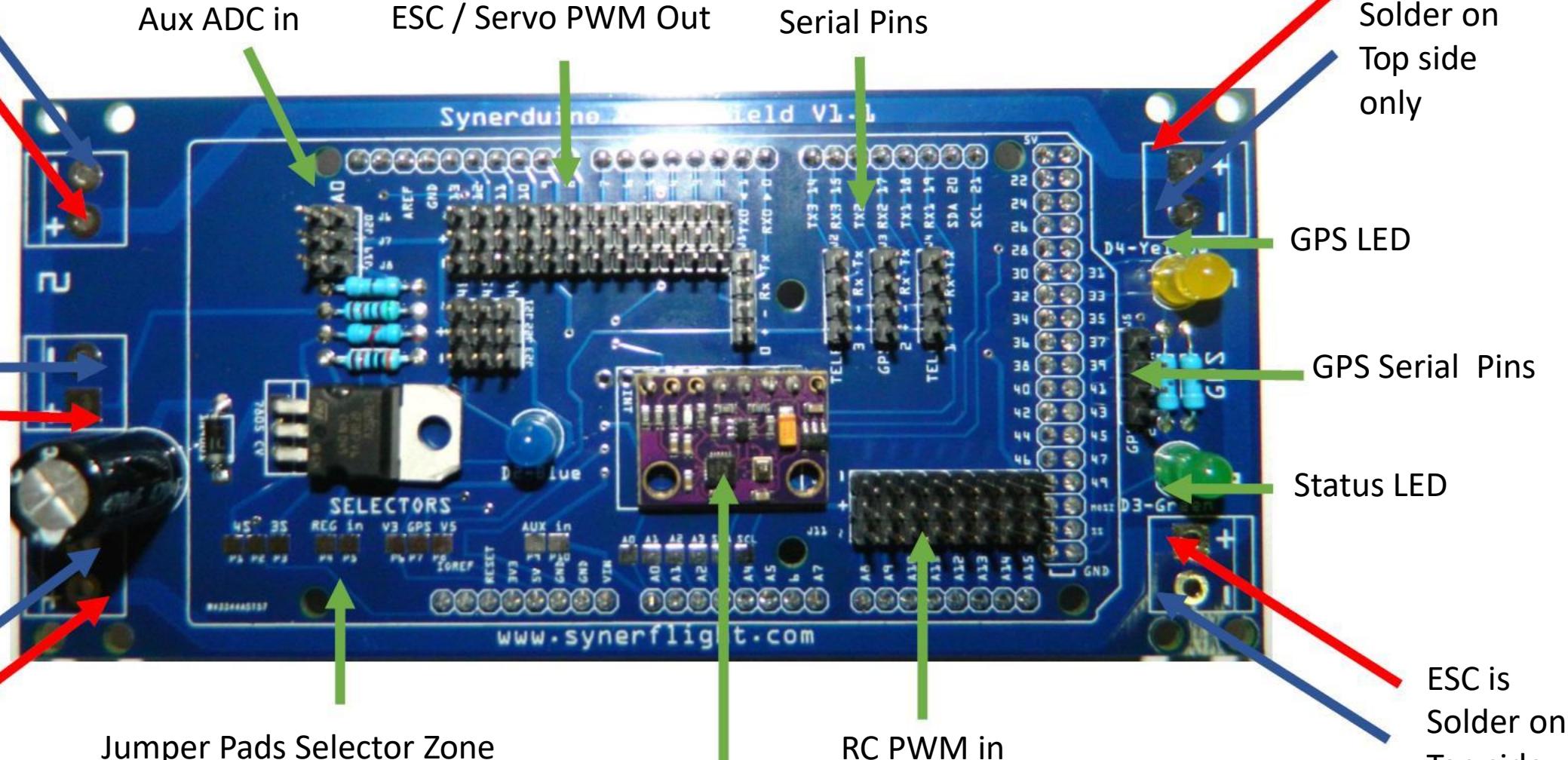
For improve performance IMU must be protected from the Environment

IMU : L3G4200D Gyro / ADXL345 Accelerometer / BMP180 – 85 Baro / MMC5883 Mag

Synerduino Kwad Shield V1.1 GY91

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Note : surface mount your solder ESC wire make sure it doesn't penetrate to the bottom of the board



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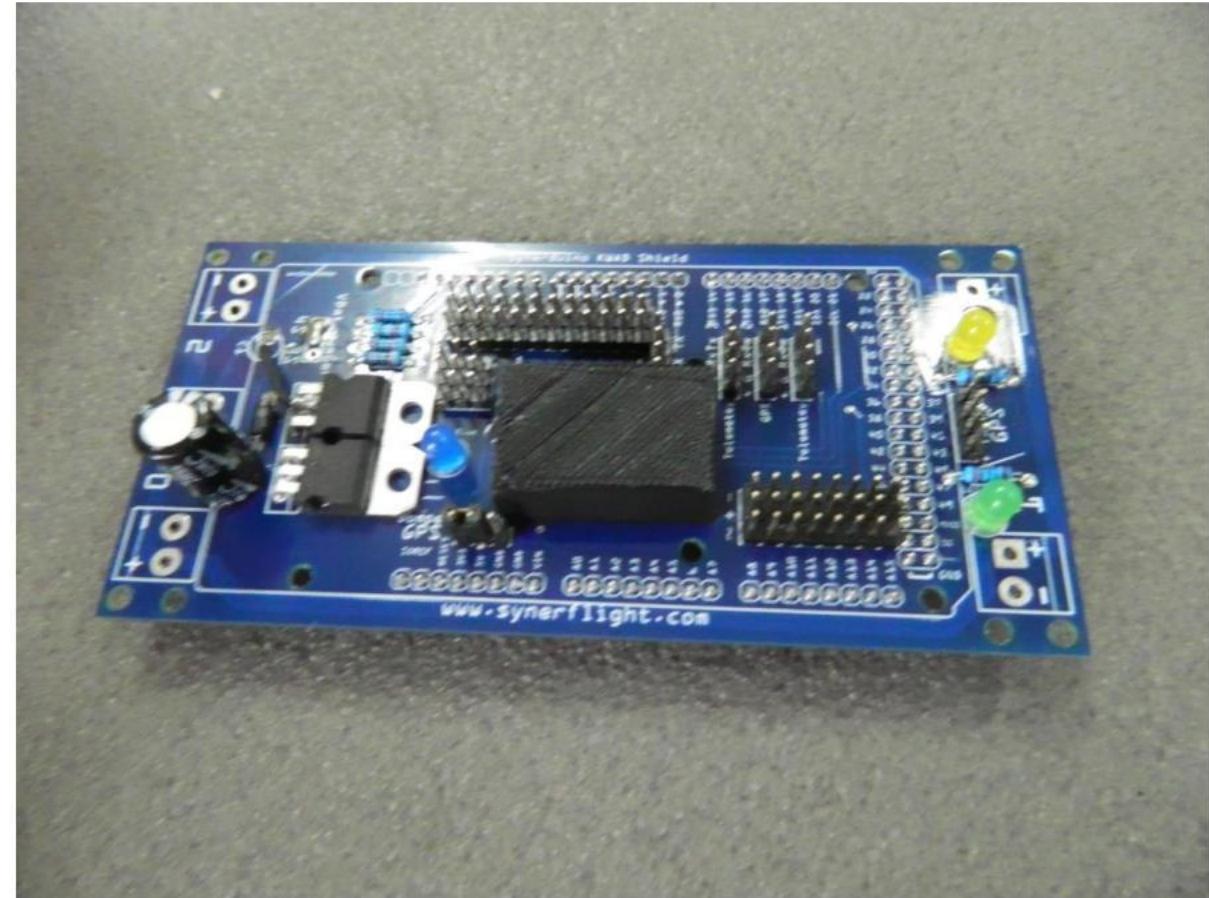
For improve performance IMU must be protected from the Environment

IMU : MPU-9250 & BMP280

ESC is
Solder on
Top side
only

Synerduino Kwad Shield Preparation

Seal the cover on to the sensor using PVA glue and let it dry



Same time Use small amount of PVA white Glue to Thread Lock the bolt in place Preventing it from going loose



2560 MEGA



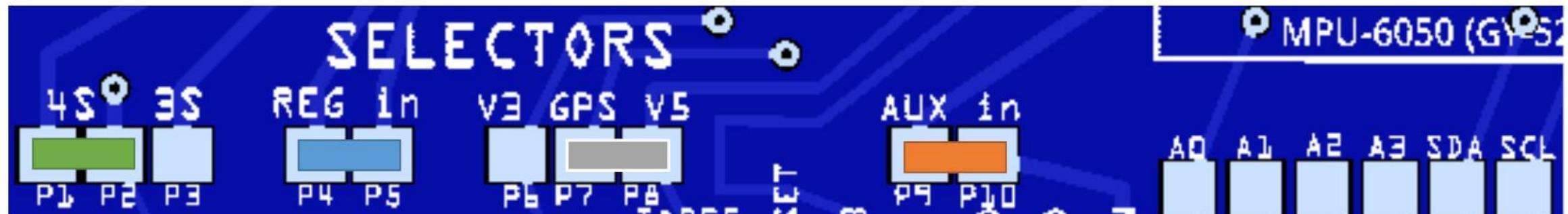
UNO 328

Synerduino Kwad Shield V1.1 (GY91) Power selector

Added the Selector Jumper Pads to the main board

Require you only put a small blob of solder to join the selected Pads





Battery cell monitoring
4s or 3s

5V Regulator from battery

GPS Pins V+ voltage in front of the board

AUX in

Analog 0 pin Auxin / Battery monitor

A0 A1 A2 A3 SDA SCL

Analog 0-3 & I2C external sensors

To use onboard battery monitoring with Aux in Set to 3s if your running 1s-3s battery / set to 4s if your running 4s battery / **Leave it open** when using Aux in as External sensors or using 5s to 6s

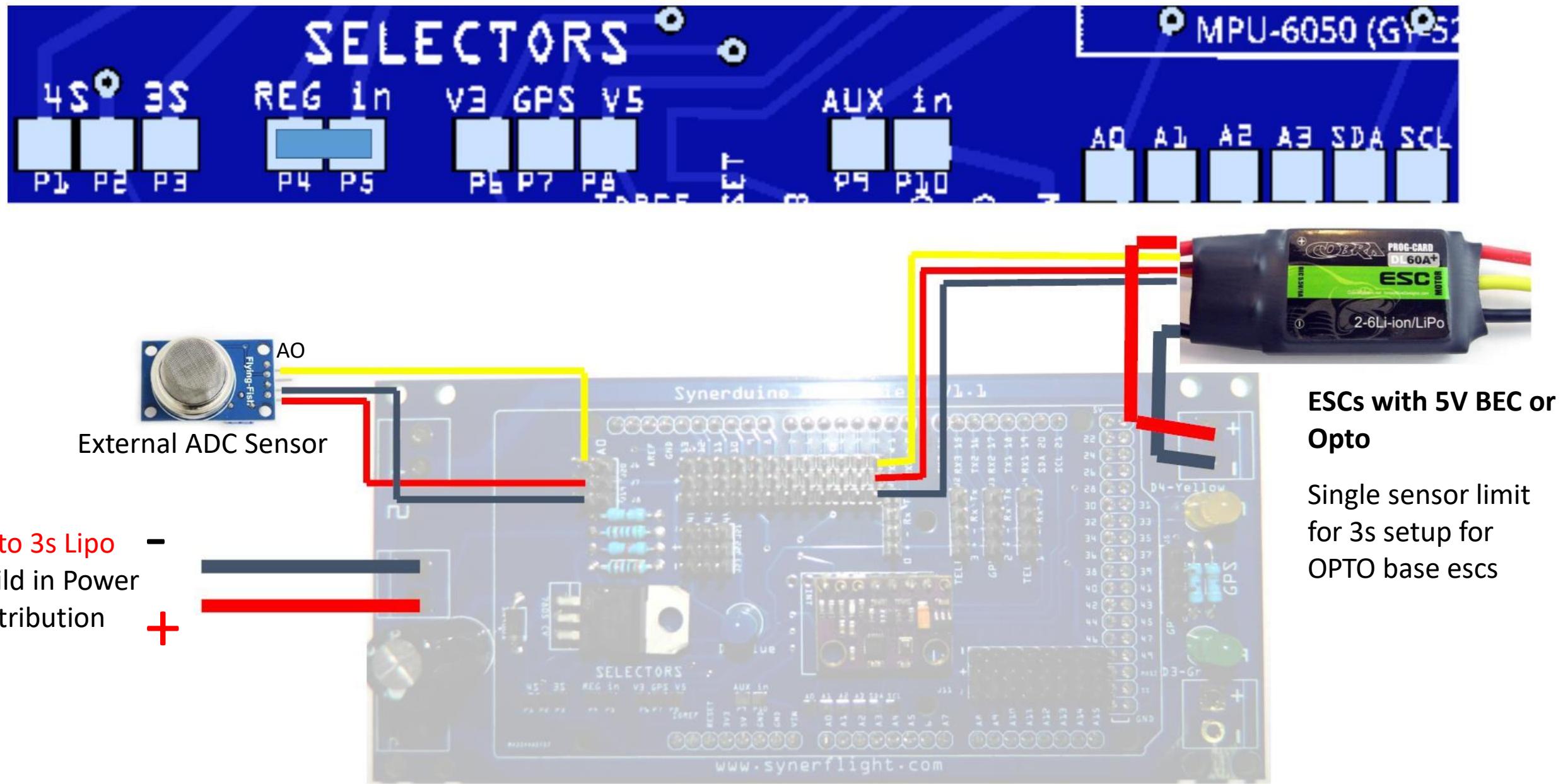
Reg In – short the Pads for using regulator to power and build in power distributor the synerduino and Arduino board

2nd GPS pin with voltage selector 5V for Regular GPS / 3V for external I2c sensor such as Magnetometer

Aux in- **leave it open** for utilizing the A0 Pins for External ADC sensors / Short the Pads to use build in battery monitoring . Cell Selector must be set to 4s or 3s

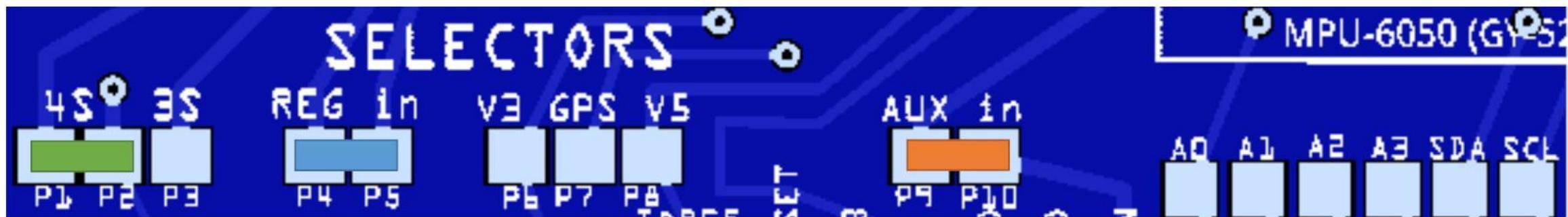
SDA SLC - I2C input for external sensors such as GPS with build in Magnetometer

Reg in only - A0 External ADC sensor , ESC BEC or OPTO applied to the 5V PWM pins

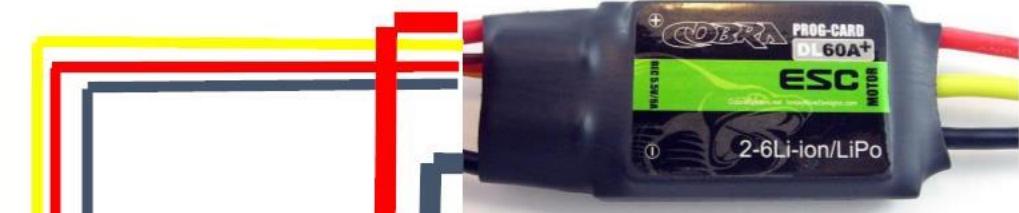


Recommended setup for beginner

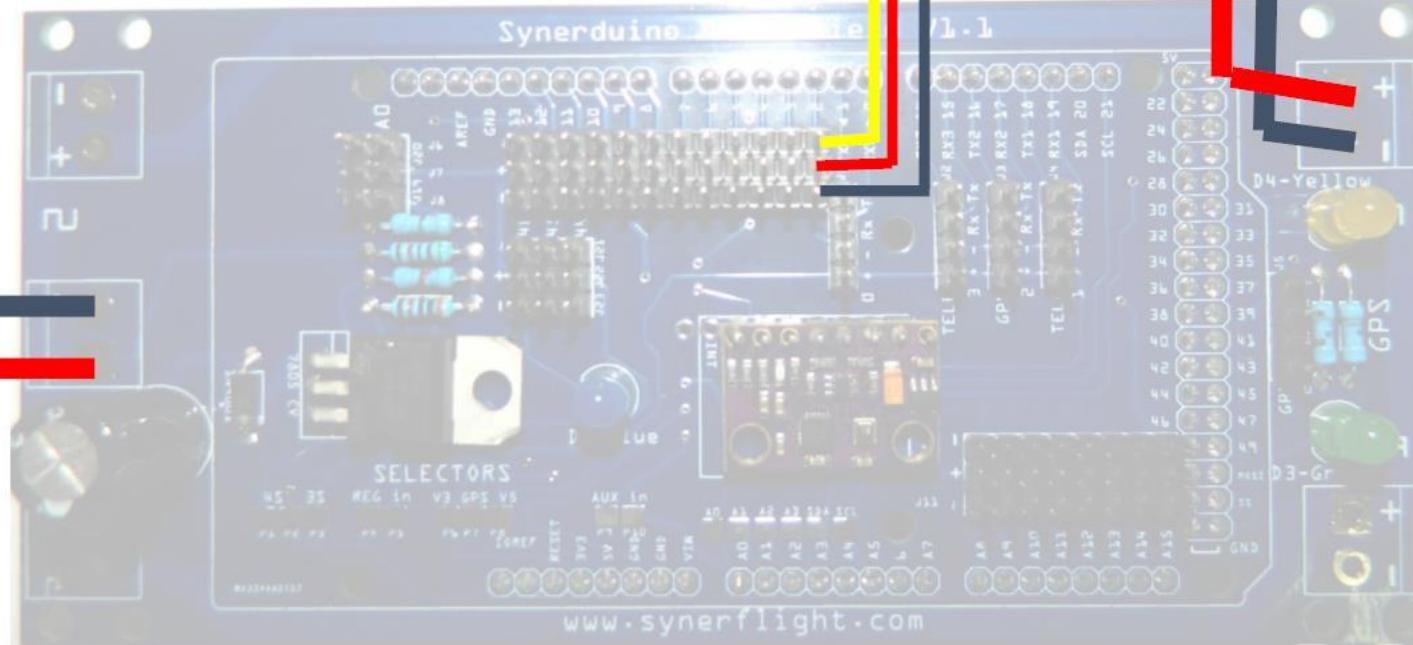
Reg & Vbat - A0 as Battery voltage monitor , ESC BEC or OPTO applied to the 5V PWM pins



For those who would use the build in battery monitoring circuit upto 4s lipo ensure the Cell Count and Aux in is jumped before powering up



ESCs with BEC or Opto



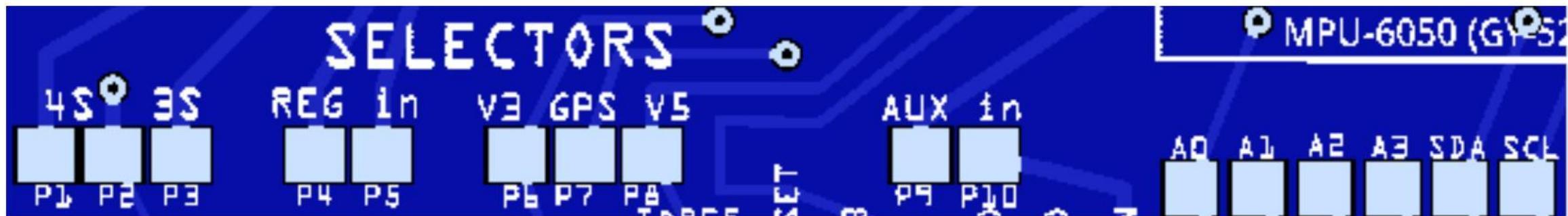
This option is possible if your not hooking anything else to the board apart from GPS and bluetooth

2s to 4s Lipo
Build in Power distribution

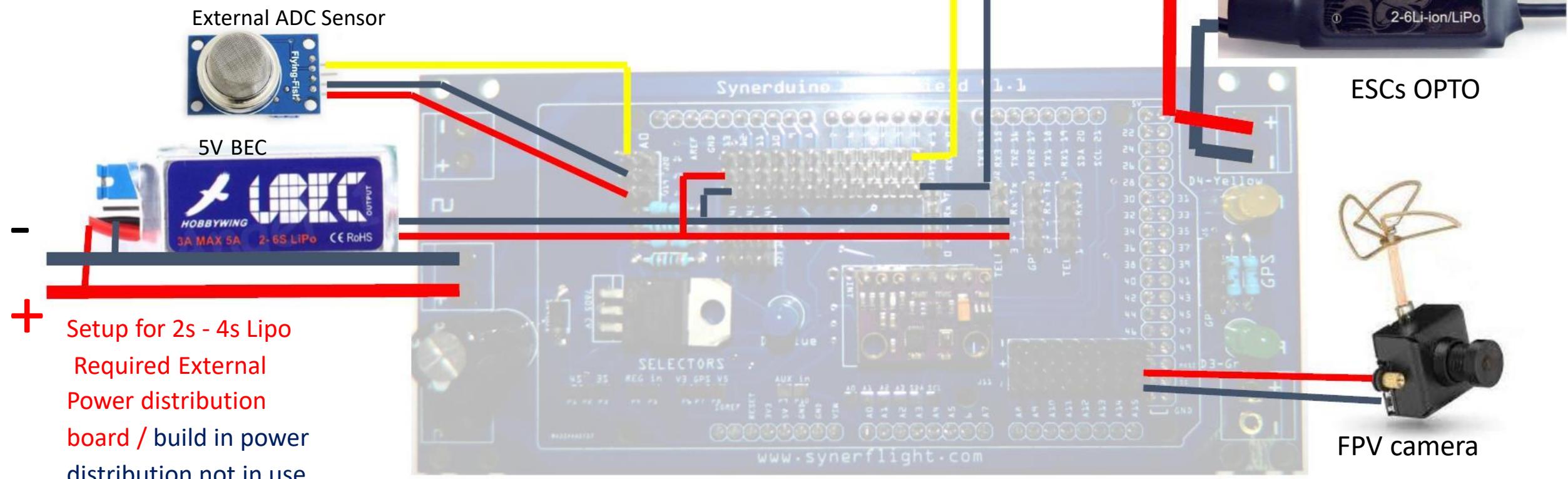
-
+

Recommended setup for beginner

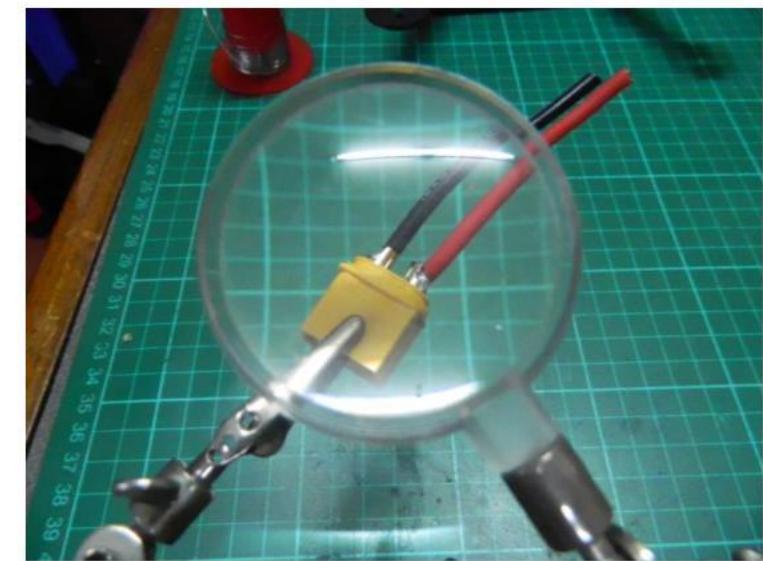
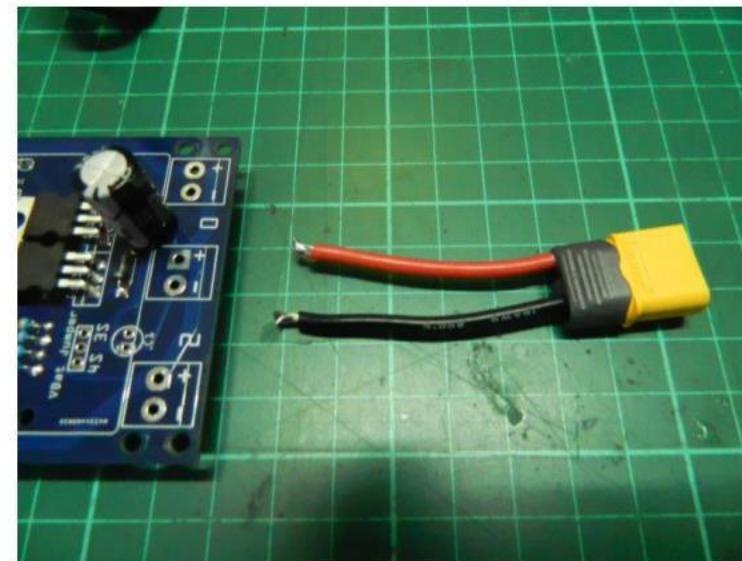
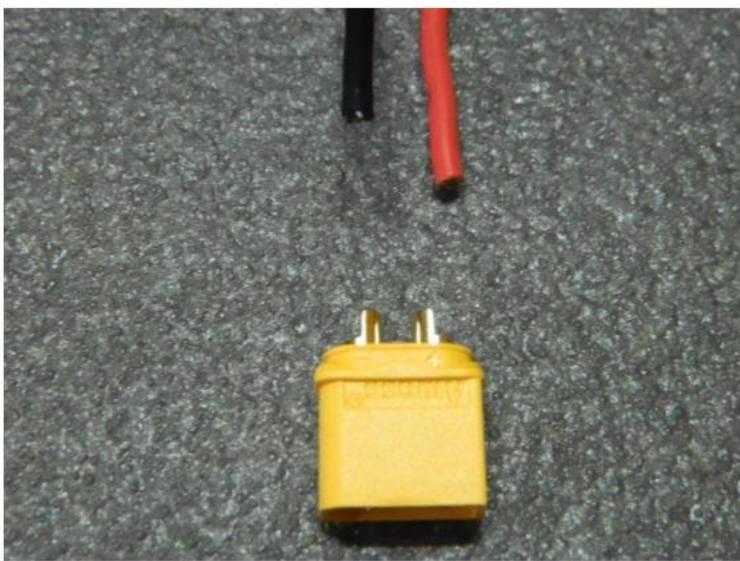
Default - A0 External ADC sensor , Require 5v UBEC applied to the 5V Serial pins & for OPTO ESC

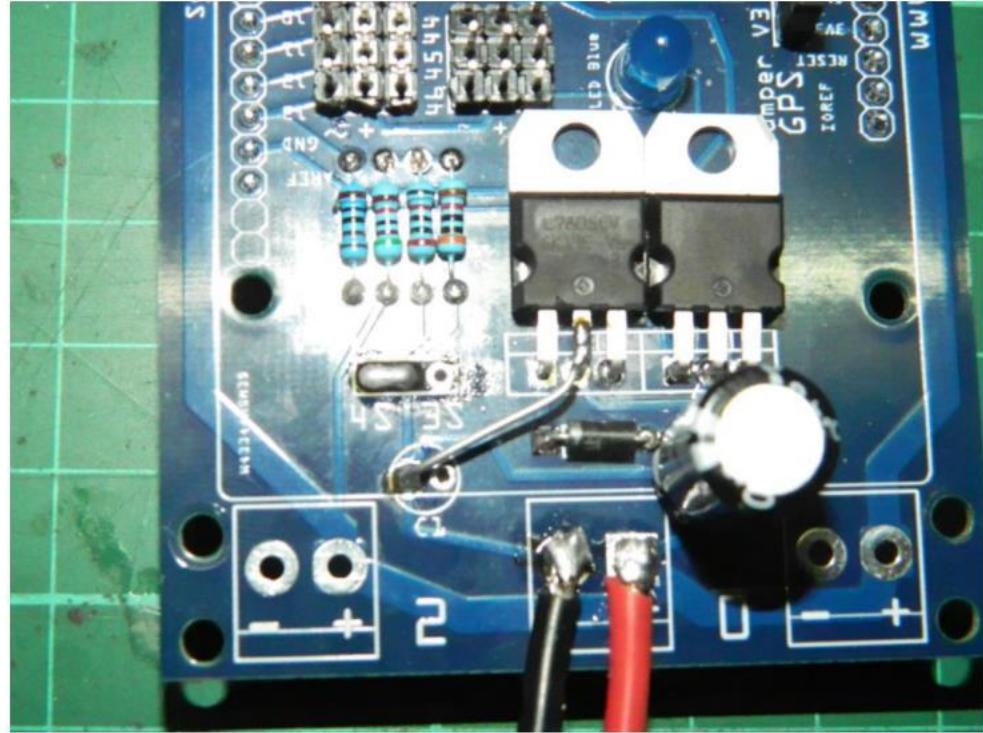
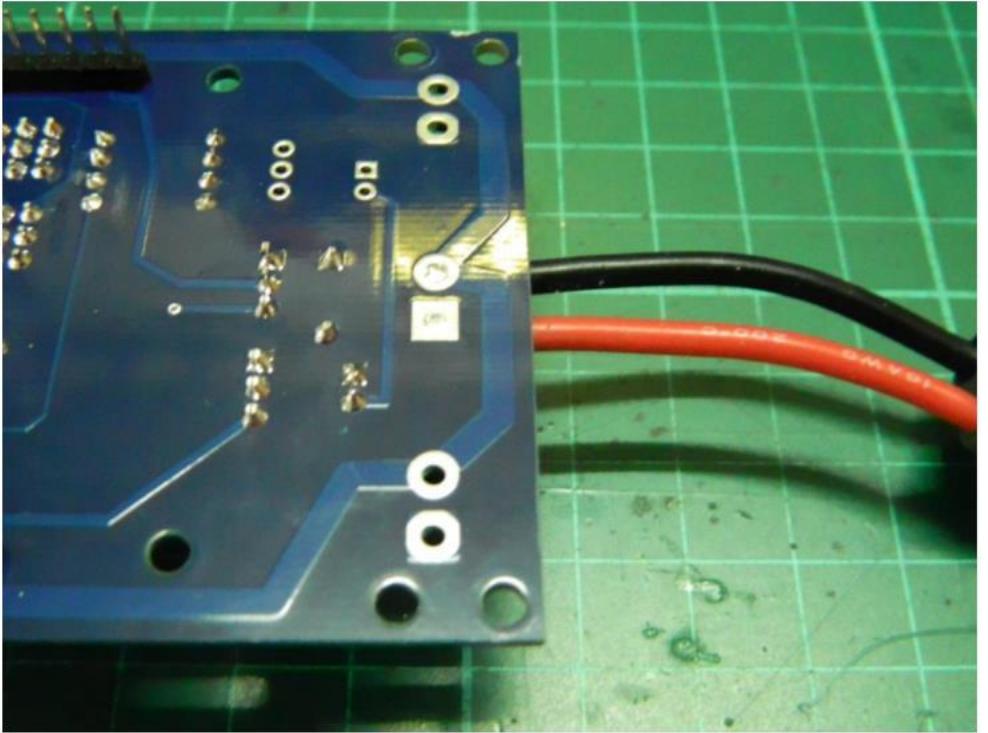


Bypass Regulator method also use for Servo , FPV and External sensor intended for Current intensive setups (when your board keeps shutting down or restarting this means in-sufficient current to run your drone system and this requires an UBEC to be installed)



Eg. Add on devices might require more current than the Regulator can handle , this case an External UBEC is required to give extra power

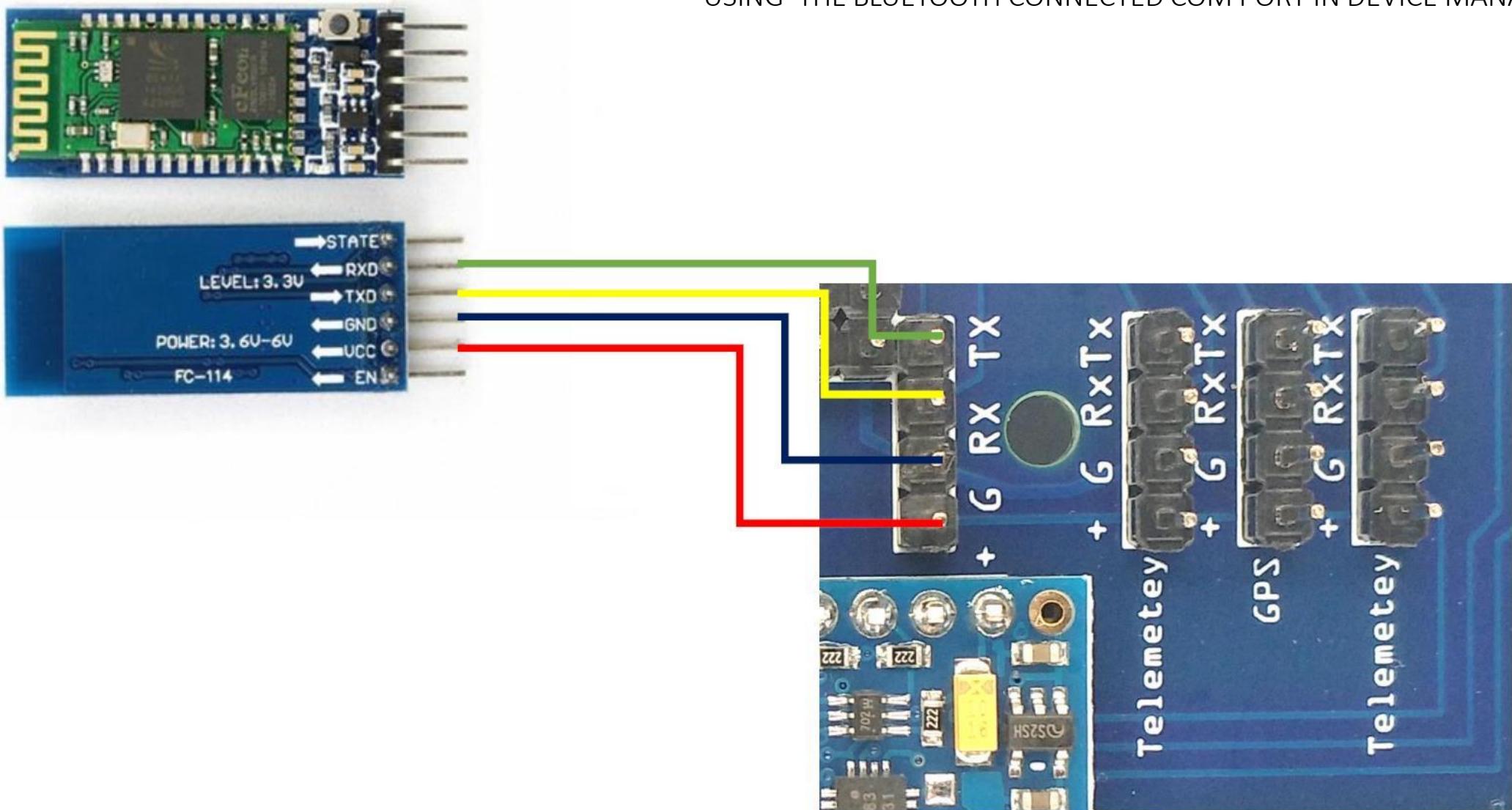




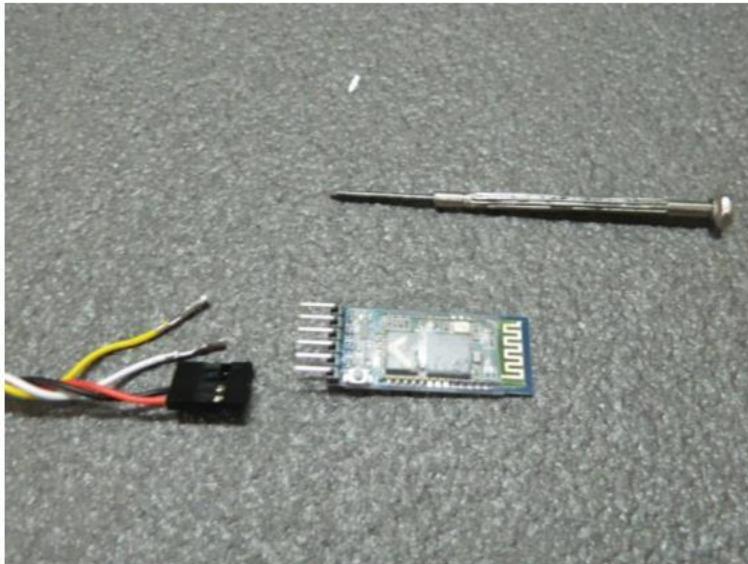
**ONLY SURFACE MOUNT THE SOLDER WIRE MUST
NOT PROTRUDE THE HOLE**

Bluetooth

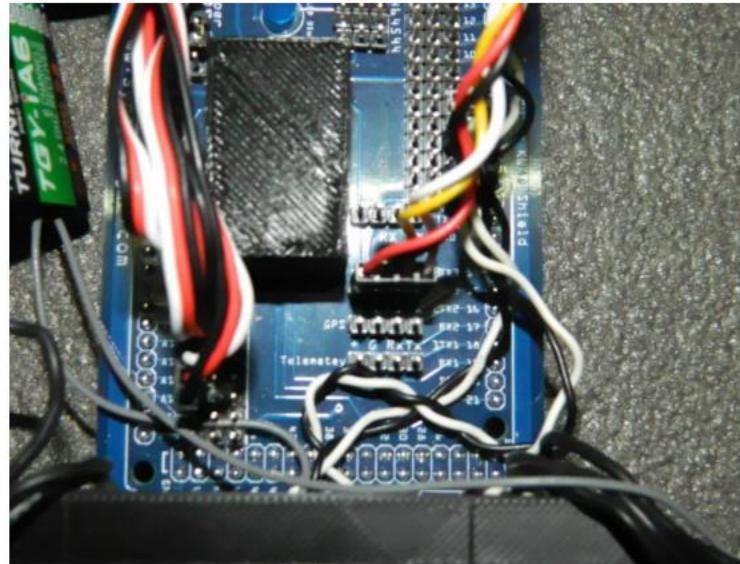
NOTE: USING 0 AT BAUD115200 APPLICABLE BOTH UNO AND MEGA BOARDS REQUIRES THE BLUETOOTH ONLY TO BE PLUG IN AFTER THE SKETCH/FIRMWARE HAS BE UPLOADED TO THE BOARD . AND PAIRING USING THE BLUETOOTH CONNECTED COM PORT IN DEVICE MANAGER



Bluetooth



BLUETOOTH PLUG INTO SERIAL 0 , 1 OR
SERIAL 3
115200 FOR BLUETOOTH HC-05



ATTENTION:

YOU MAY NEED TO REARRANGE THE HEADERS TO CONNECT THE BLUETOOTH MODULE TO THE SHIELD BOARD ACCORDINGLY

VCC >> +

GND >> G

TX >> RX

RX >> TX

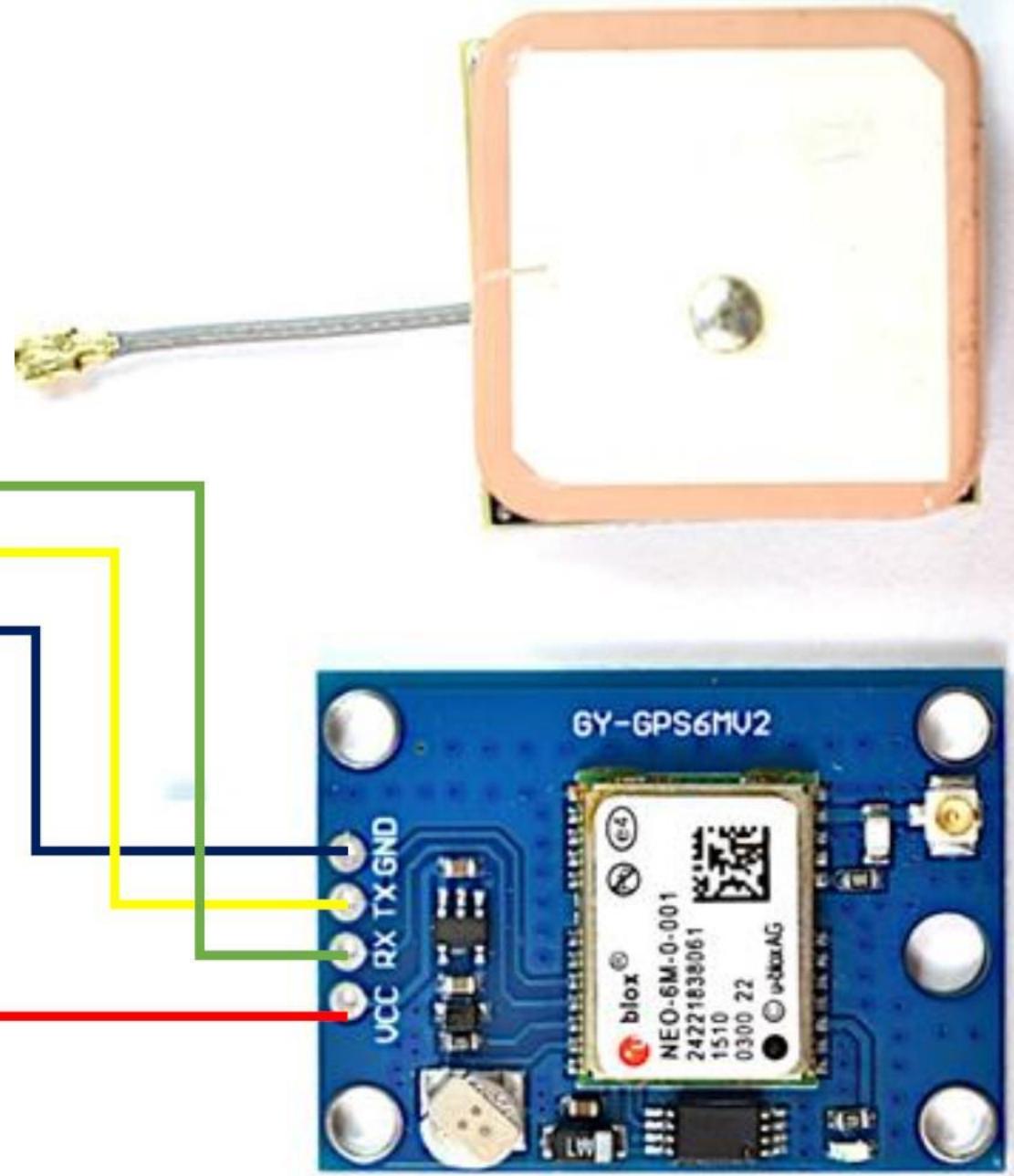
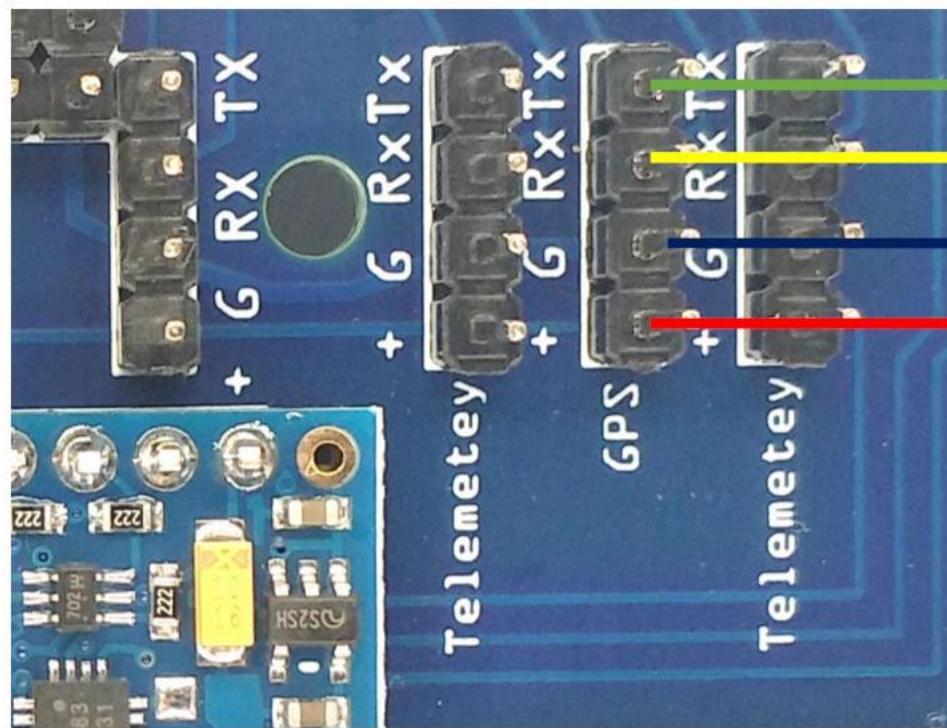


SEE TO IT THE WIRES COLOR CODE MATCHES THE MARKINGS

IMPROPER INSTALLATION MAY CAUSE DAMAGE TO THE ARDUINO BOARD AND SHIELD DUE TO REVERSE POLARITY

NOTE: WE PRESET THE BLUETOOTH FOR YOUR CONVENIENCE TO THE PROPER SETUP BUT SHOULD YOU WISH TO CHANGE THE SETTING ON YOUR DIGRESSION

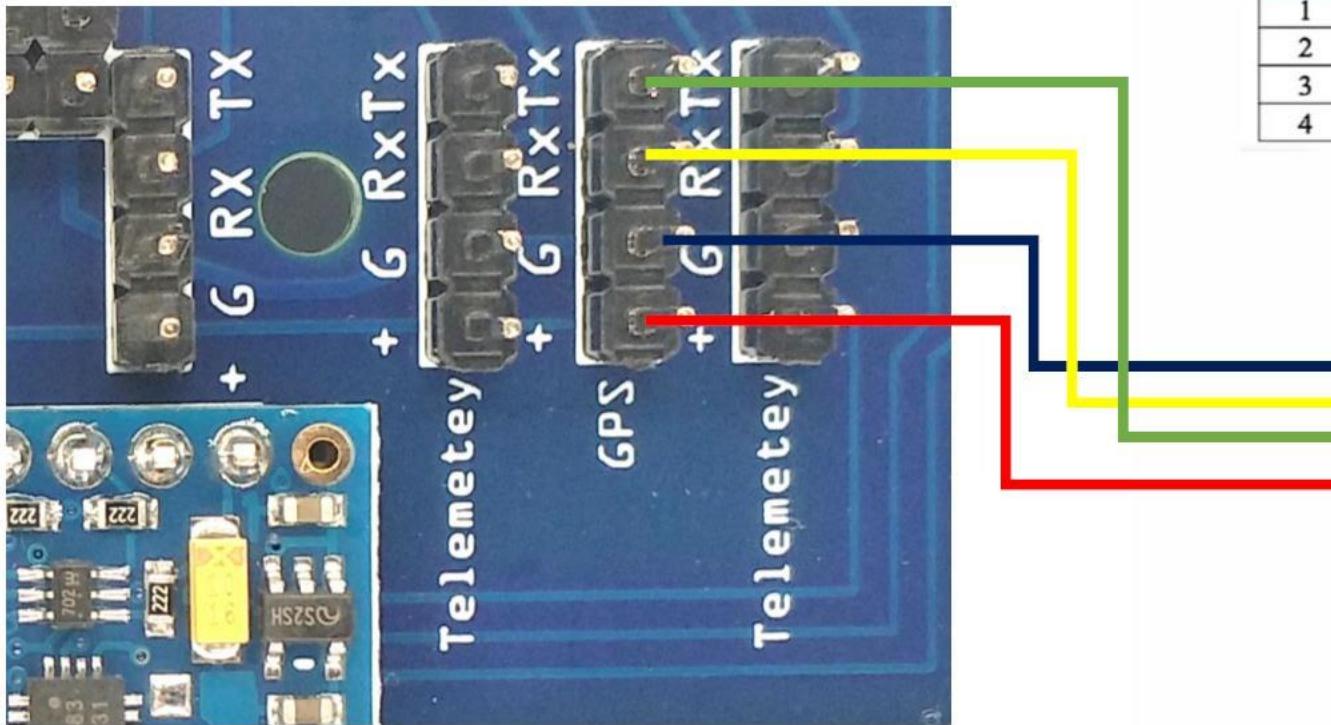
GPS NEO6 (NMEA)



GPS BEITIAN (UBLOX)

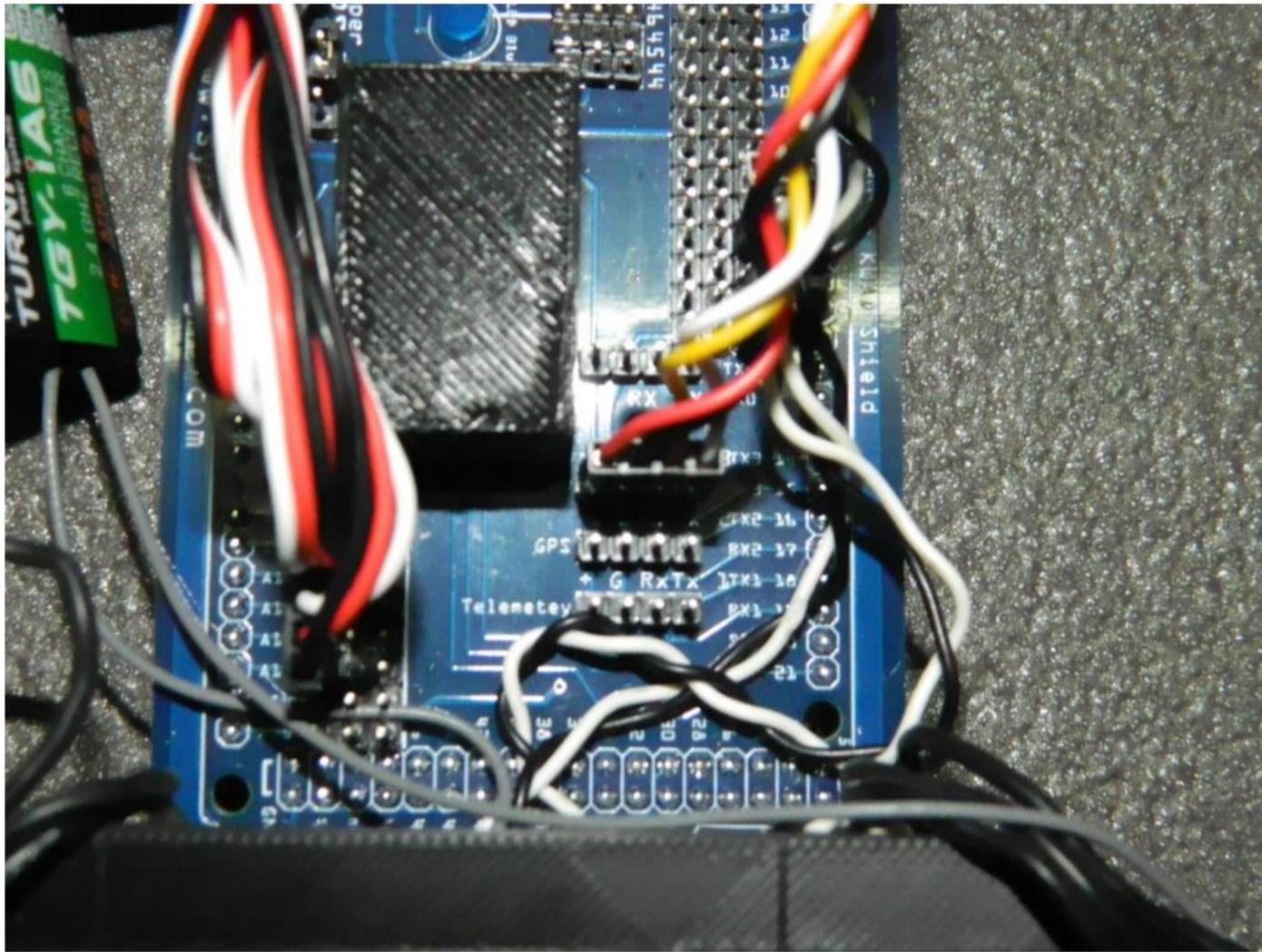


4.VCC
3.RX
2.TX
1.GND



PIN	PIN Name	I/O	Description
1	GND	G	Ground
2	TX	O	Serial Data Output.
3	RX	I	Serial Data Input.
4	VCC	I	DC 3.0V - 5.5V supply input,Typical: 5.0V





ATTENTION:

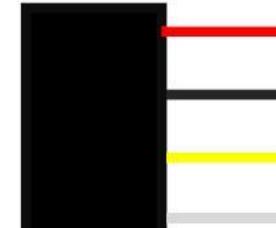
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RX >> TX



SEE TO IT THE WIRES COLOR CODE MATCHES THE MARKINGS

IMPROPER INSTALLATION MAY CAUSE DAMAGE TO THE ARDUINO BOARD AND SHIELD DUE TO REVERSE POLARITY

NOTE: WE PRESET THE BLUETOOTH AND GPS FOR YOUR CONVENIENCE

SHOULD YOU WISH TO CHANGE THE SETTING ON YOUR DIGRESSION
SEE: SYNERDUINO BASIC

BLUETOOTH ON THE TELEMETRY PIN SERIAL1
GPS IN THE GPS PIN **SERIAL2**

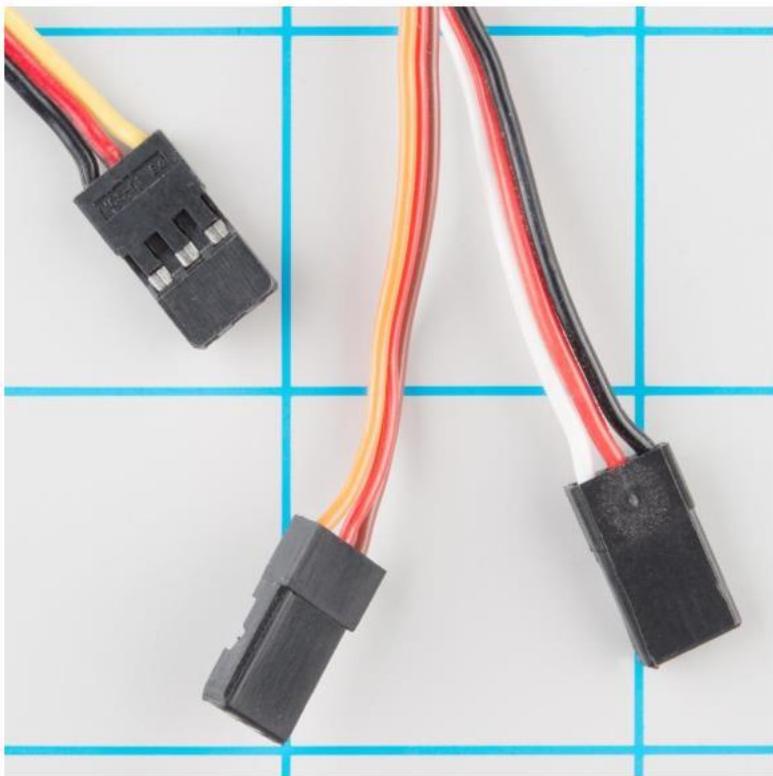
PWM INPUT Assignment

Please check the output pin from your Radio Rx manual



RX > Arduino / PWM in	Futaba Format	JR Format	Walkera Format	Mega 2560 Input
Throttle	Ch3	Ch1	Ch3	A8
Aileron	Ch1	Ch2	Ch2	A9
Elevator	Ch2	Ch3	Ch1	A10
Rudder	Ch4	Ch4	Ch4	A11
Aux1	Ch5	Ch5	Ch5	A12
Aux2	Ch6	Ch6	Ch6	A13
Aux3	Ch7	Ch7	Ch7	A14
Aux4	Ch8	Ch8	Ch8	A15

SERVO HEADER



~ + -

End view

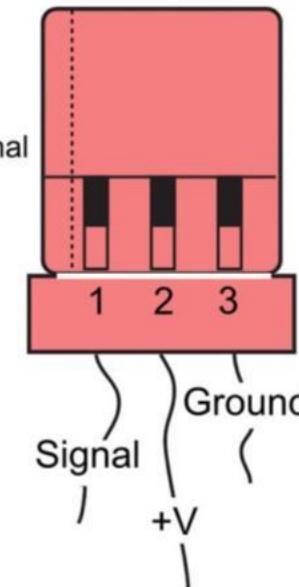


J-type (Futaba)



S-type (Hitec, JR)

Keyway =
signal terminal



They may come with different
coded wire but layout are
always same

OPTO Wires may only have
Signal and Negative Wires o



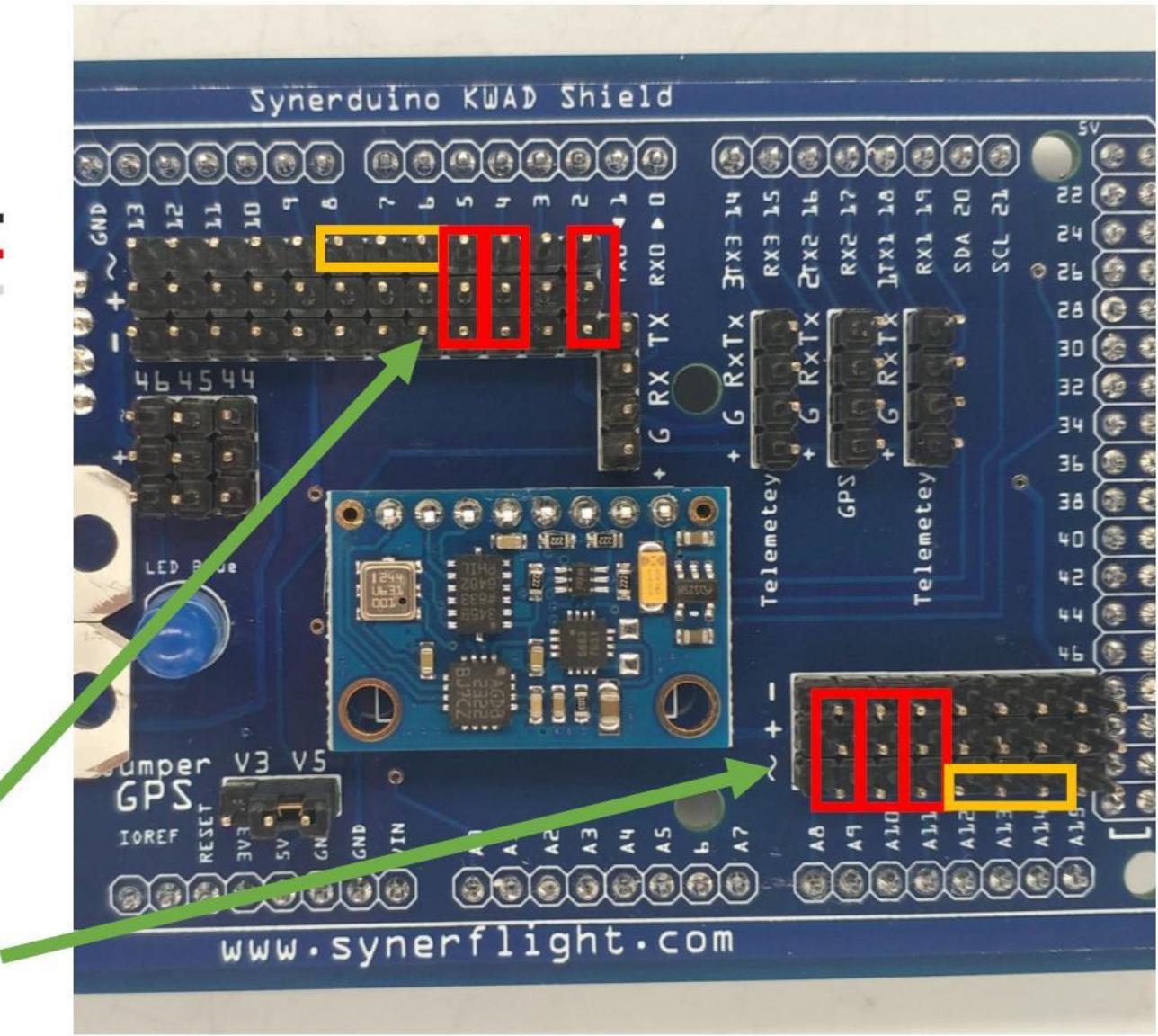


IN CASE YOU'D ASK WHY THE SERVO CONNECTORS WERE DONE THIS WAY , ITS SIMPLY YOU DON'T NEED TO PLUG ALL THE PWM POWER RAILS ON ALL CHANNELS YOU JUST NEED THE PWM SIGNAL PIN ALONE

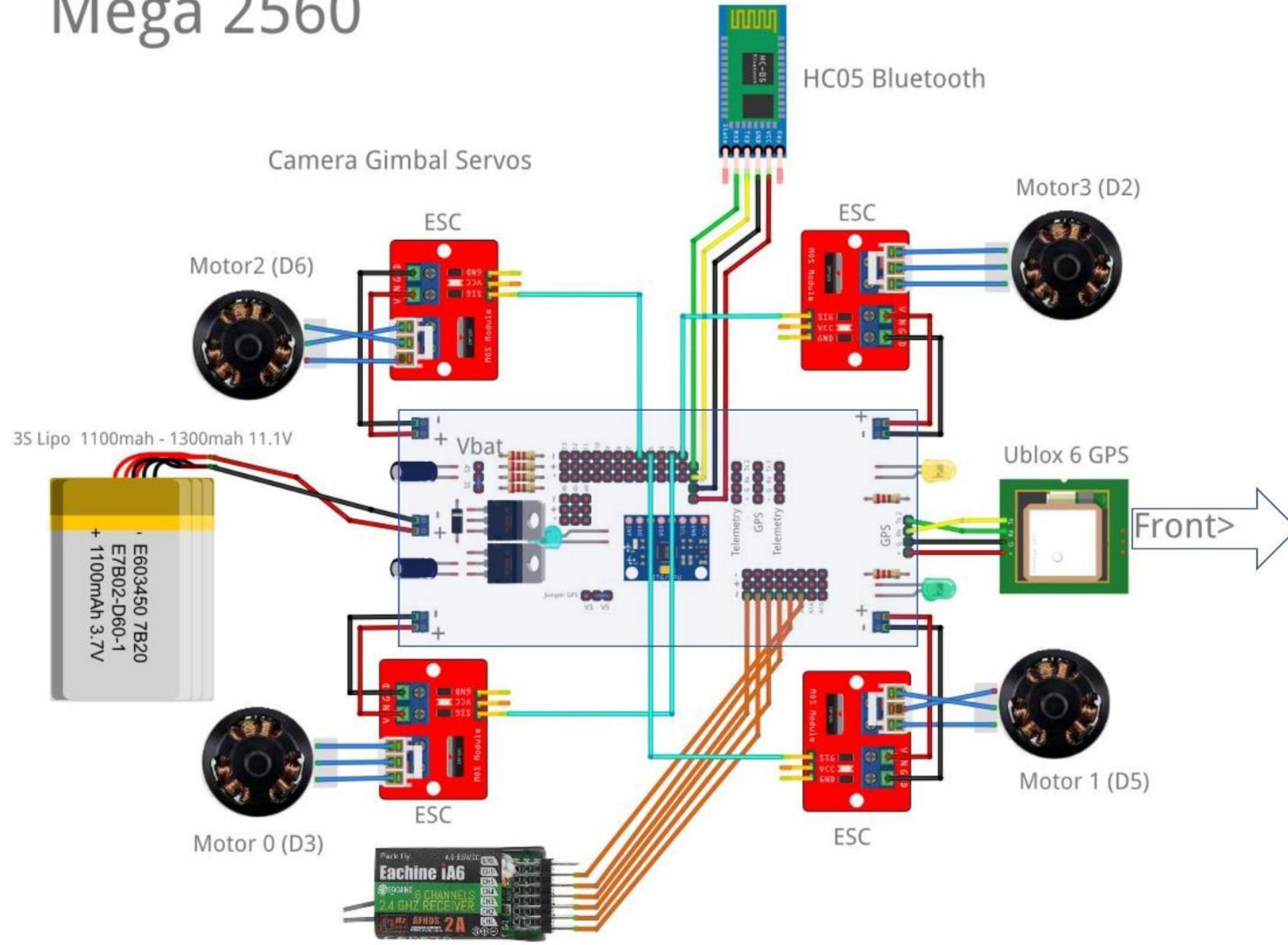
MOSTLY RUDDER AUX1 AND AUX2

UNO PWM IN

MEGA PWM IN

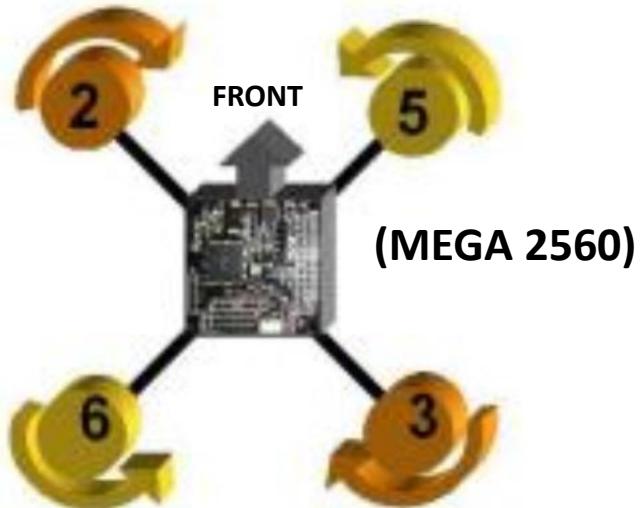


Mega 2560



Electronic Speed Controller

Motor [3]

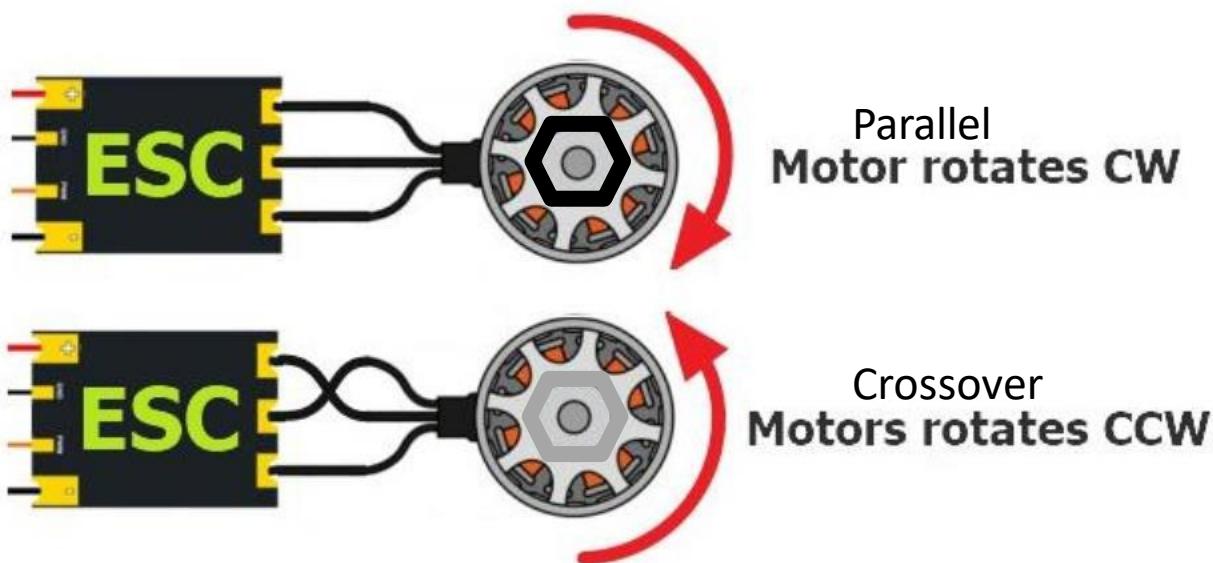


Motor [1]

Motor [2]

Motor [0]

Note : you can pre solder the motor to the board and check for rotation before installing the propeller to insure all motor rotations are correct

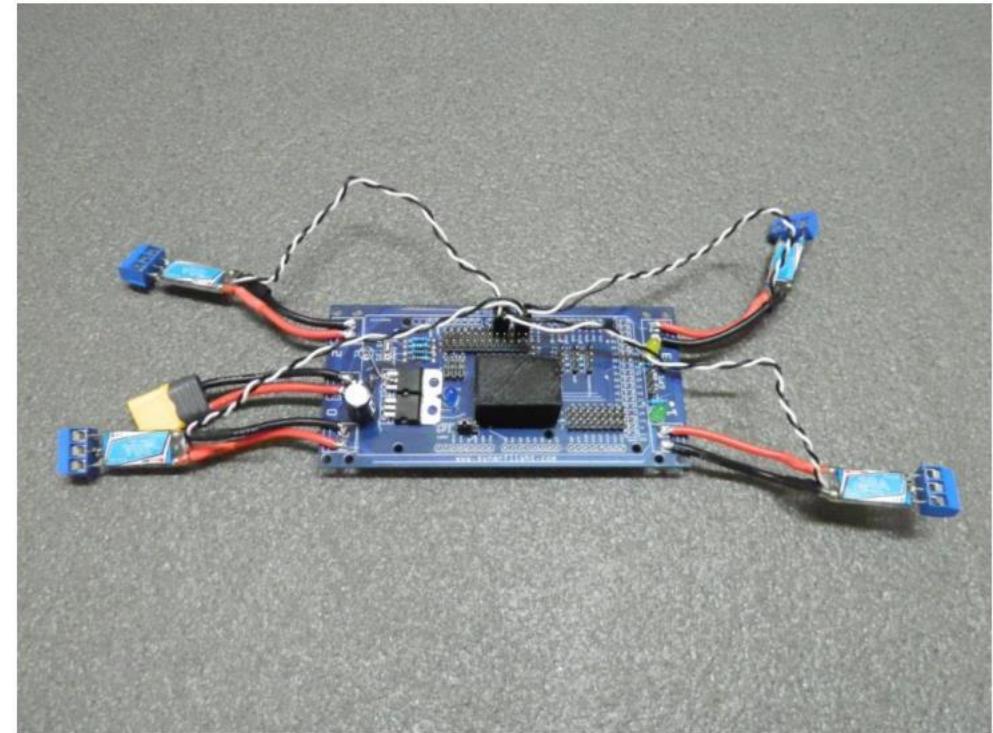
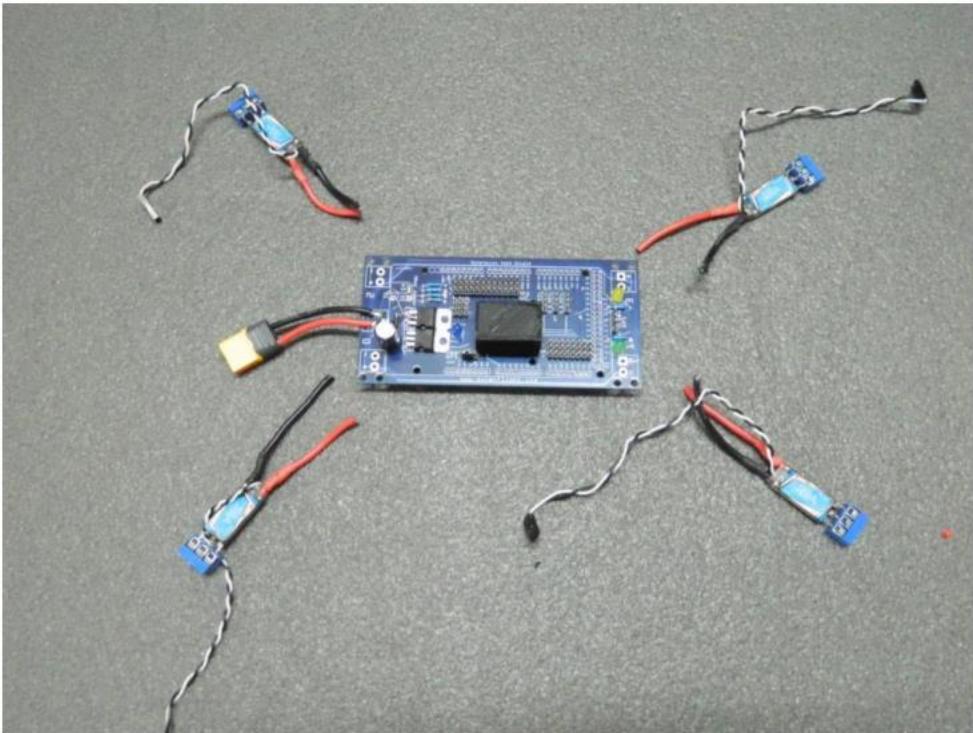


Note : on some brands of motor they may come in two different prop nuts color (Known as self tightening nuts)

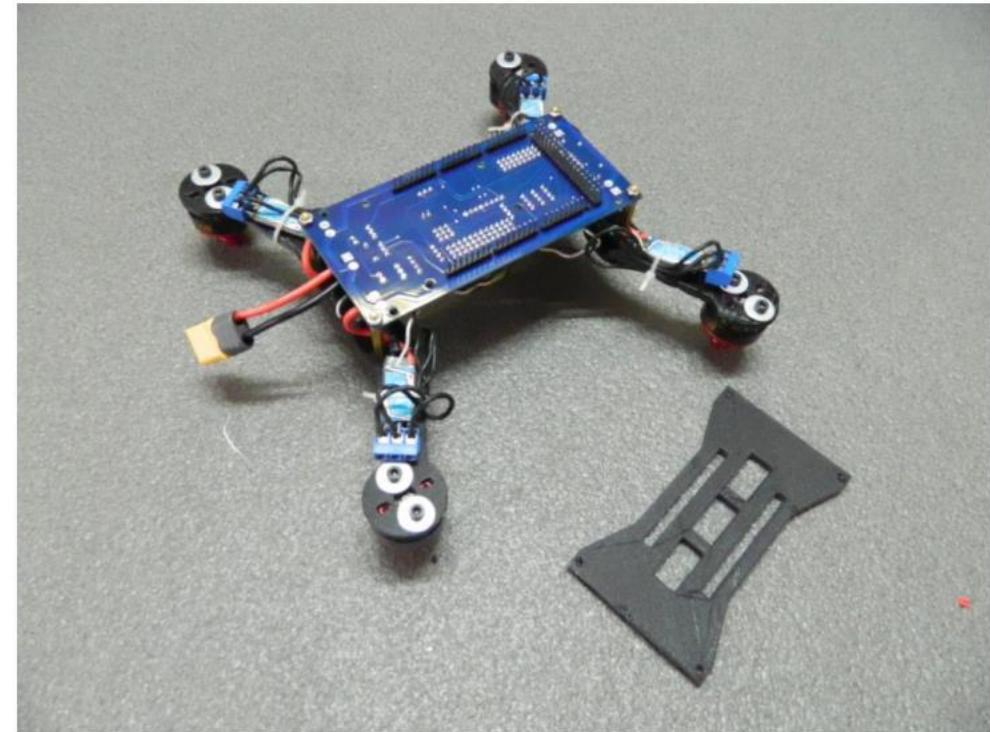
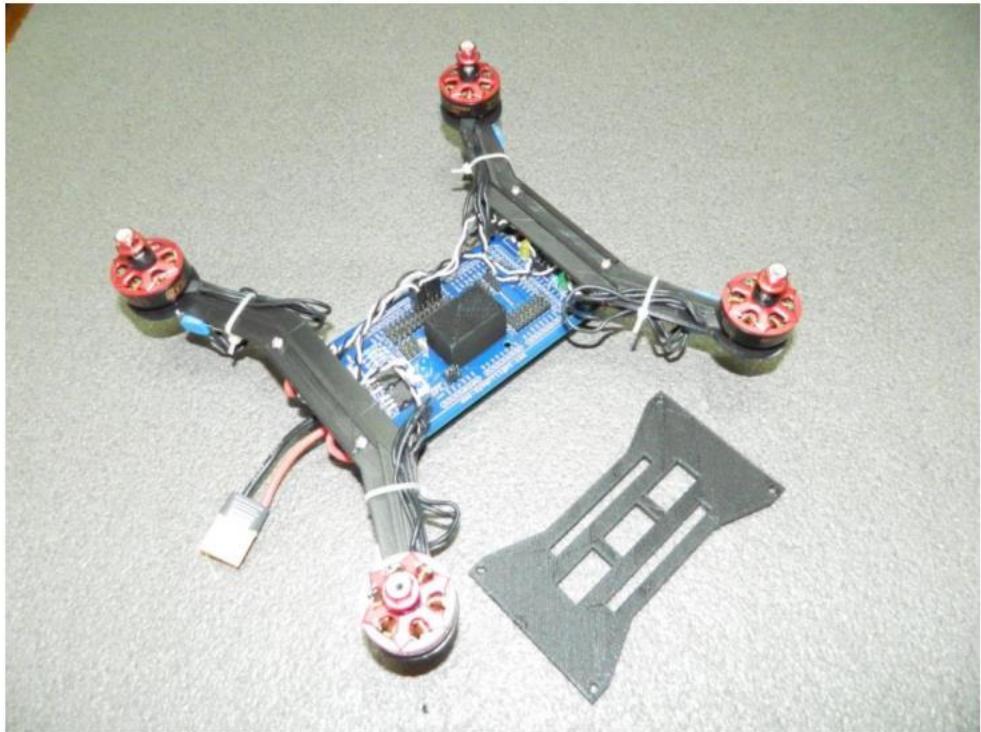
Black for Clockwise Motor

Silver for counter clockwise Motor

ESC Installation

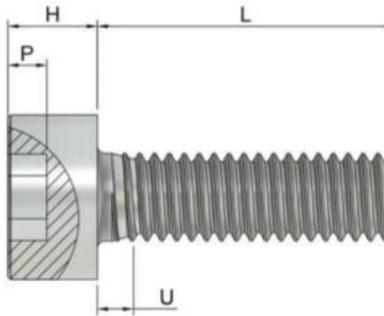
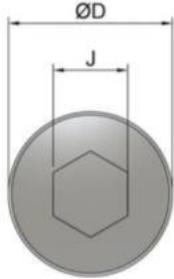


Motor Installation



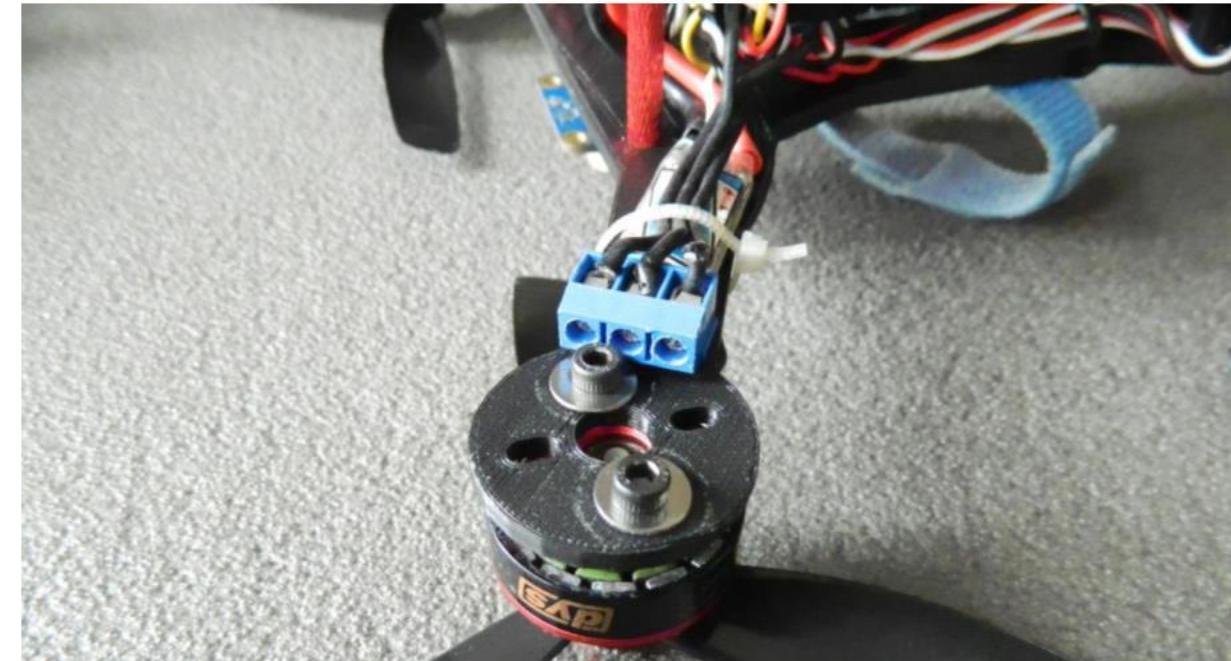
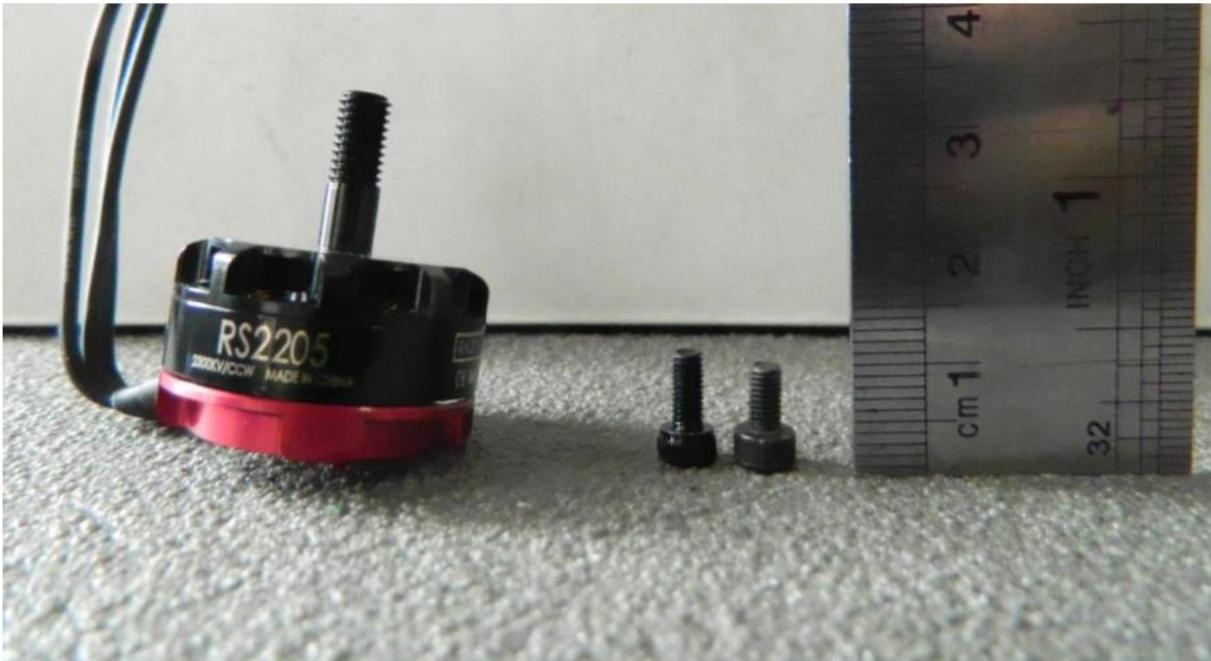
Note:

Use small amount of PVA White Glue to Thread Lock the the M3 bolts in place Preventing it from going loose and parts flying off

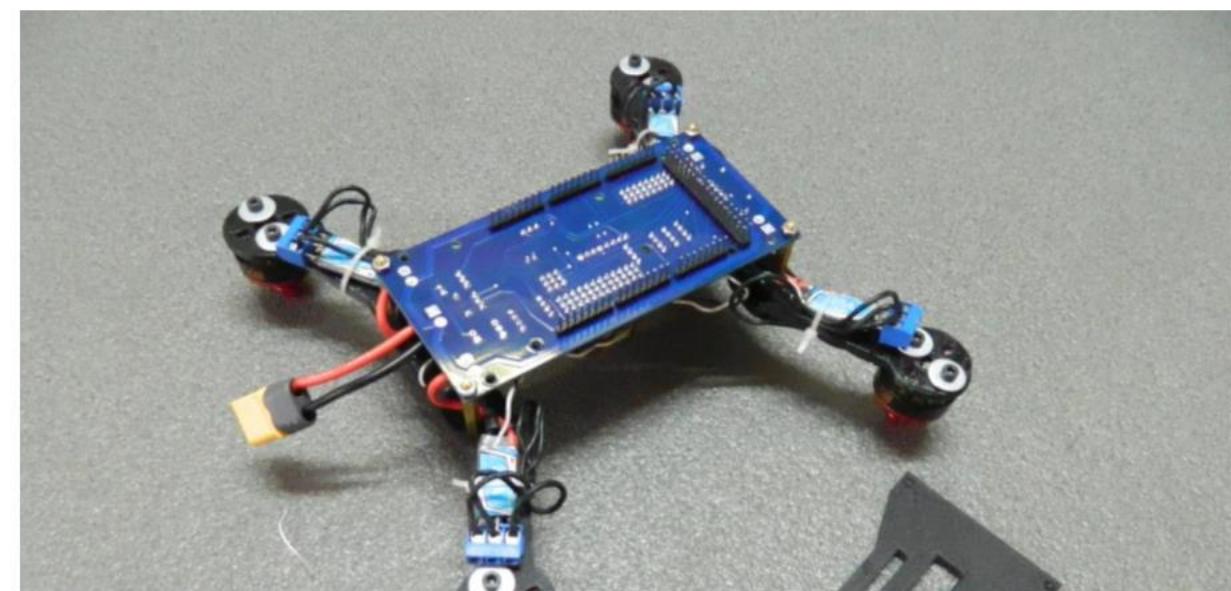
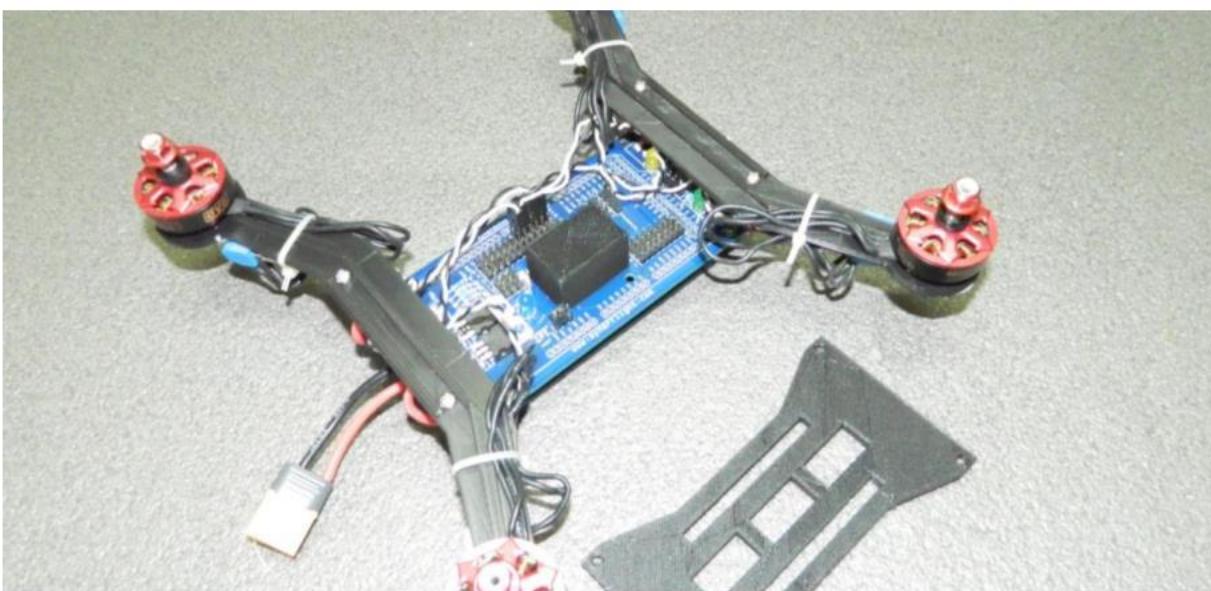


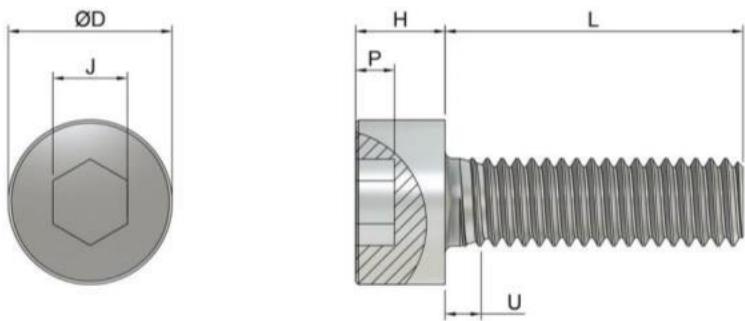
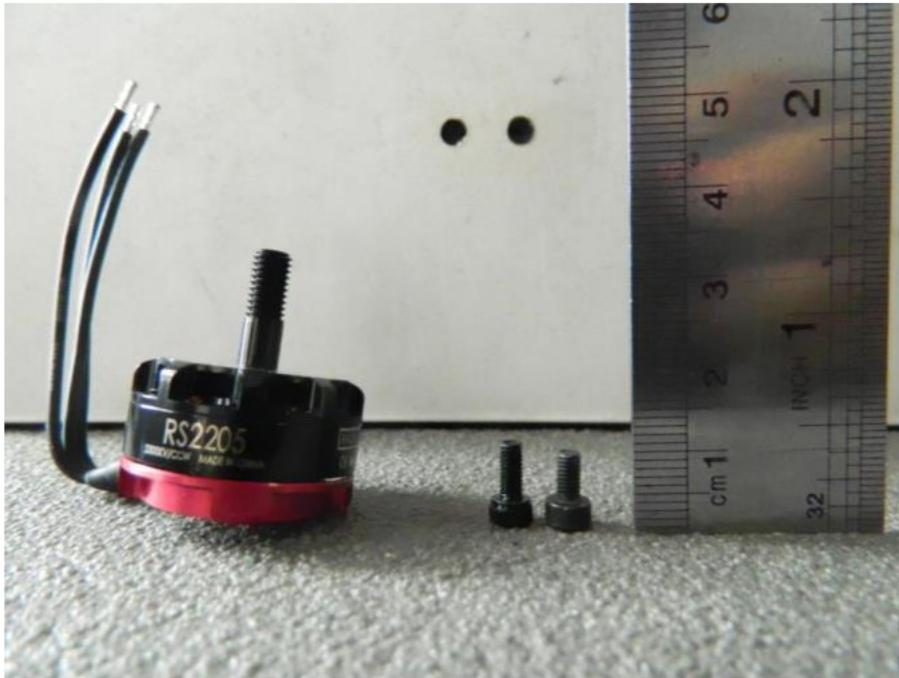
Thread Lock Purple or PVA Glue

Vibrations can cause bolts/Screws to come loose especially when bolts are on smooth plastic surface
Low strength thread lock or PVA glue are suitable in holding the bolts in place yet temporary enough that can still be removed by hand tools. Secure motors , PCB board and frame by applying a few drops enough to coat the thread of the screw and slowly tighten it in



Use the 6mm M3 Bolt provided (short one) and install with washers



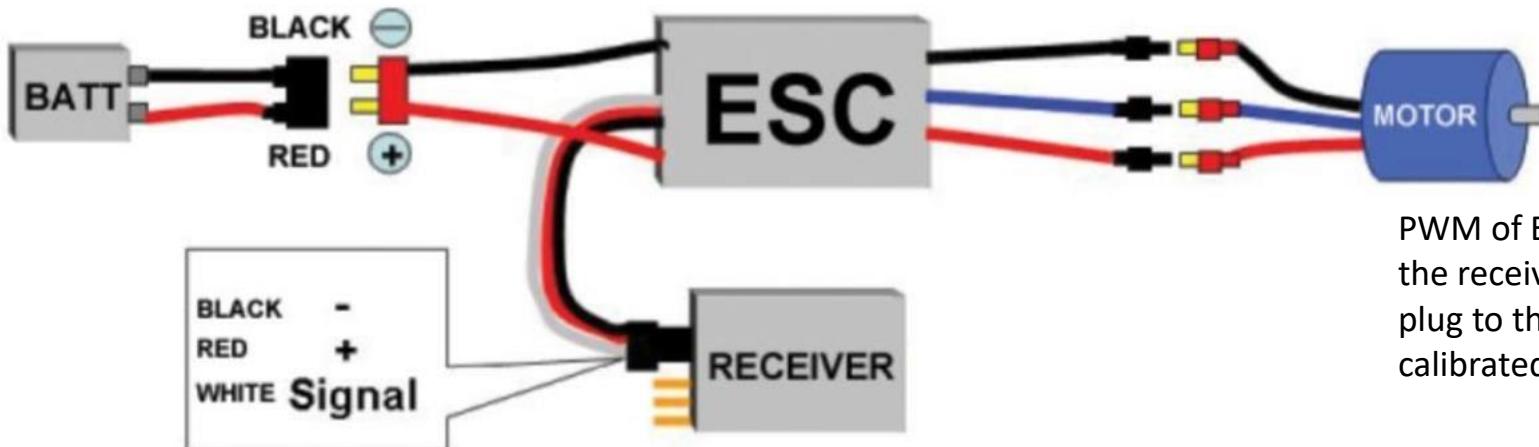


Note : this frame is design to use M3 bolts with thread length of 6mm with washer as fittings included in the set (use the shortest bolt that came with the motor set)

Ensure that the bolt thread does not touch the inner wire coils of the motor

Use small amount of PVA white Glue to Thread Lock the bolt in place Preventing it from going loose

Electronic Speed Controller CALIBRATION



ESC calibration will vary based on what brand of ESC you are using, so always refer to the documentation for the brand of ESC you are using for specific information (such as tones). “All at once” calibration works well for most ESCs, so it is good idea to attempt it first and if that fails try the “Manual ESC-by-ESC” method.

If your ESC happens to be an OPTO. The Synerduino board can provide as power supply for both RC Receiver and ESCs when soldered in . Get the PWM Pin of the ESC you want to calibrate and plug it into the Throttle Channel of your Receiver



Propellers are removed during this process

PWM of ESC is directly hook up to the receiver Throttle pin . Ensure the receiver is getting power thru the Aux PWM pin which remains plug to the synerduino board (process is repeated till all ESCs are calibrated)

Multirotors must have all ESCs calibrated similarly to ensure reliable operations

Motor must be plug in at this point w/o the propeller. As it will serve several purpose

- An Speaker to listen to calibration tone of the ESC
- Identify motor rotation should it needs to be corrected
- Test full speed range

Synerduino Multiwii ESC calibration method , for All ESC at Once

Throttle Pin is Connected to the Throttle Channel of the Receiver

All other Channels as is



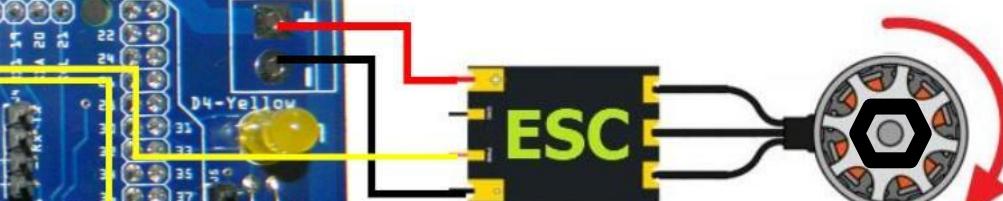
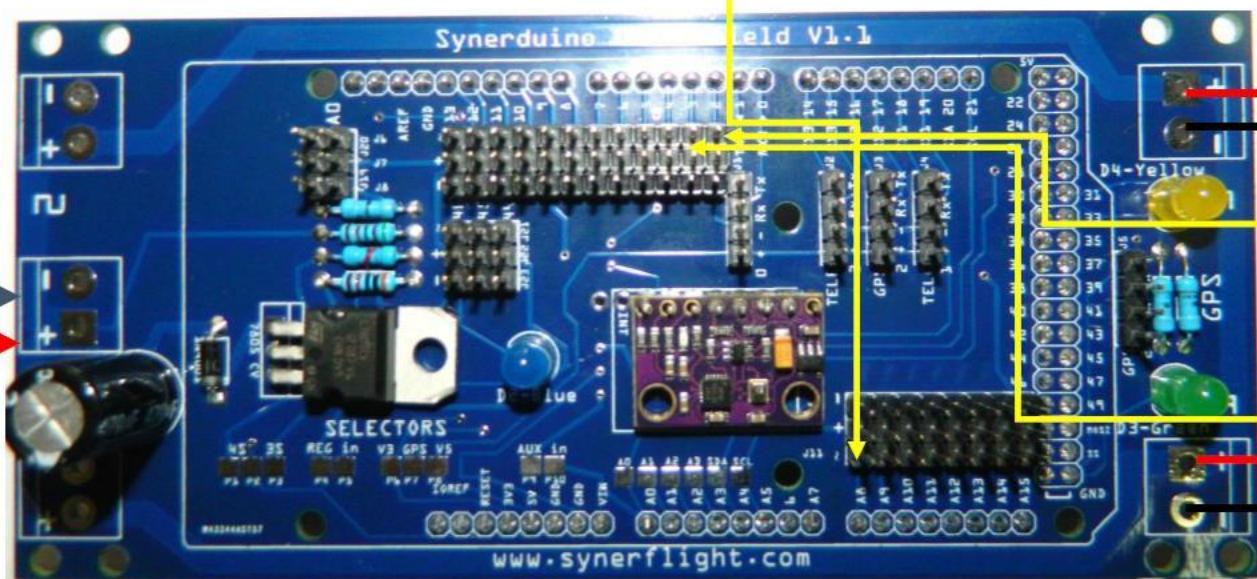
to calibrate all ESCs connected to MWii at the same time (useful to avoid unplugging/re-plugging each ESC)

Warning: this creates a special version of MultiWii Code

You cannot fly with this special version. It is only to be used for calibrating ESCs

This is applicable to those who have PPM and SBUS Receivers

Plug to battery 3S



Motor rotates CW

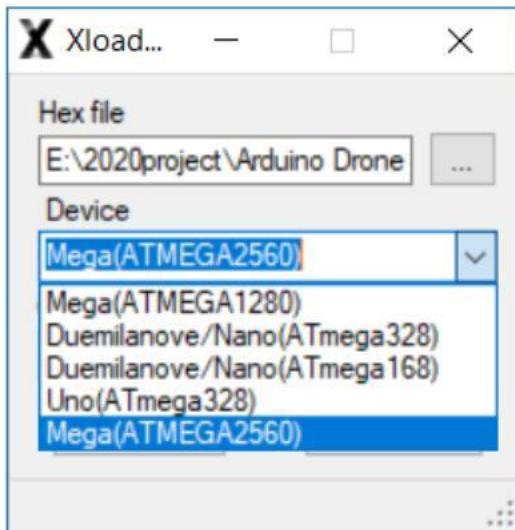
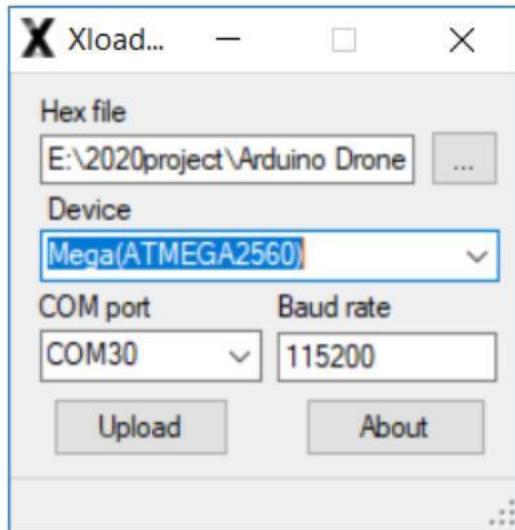
Motors rotates CCW



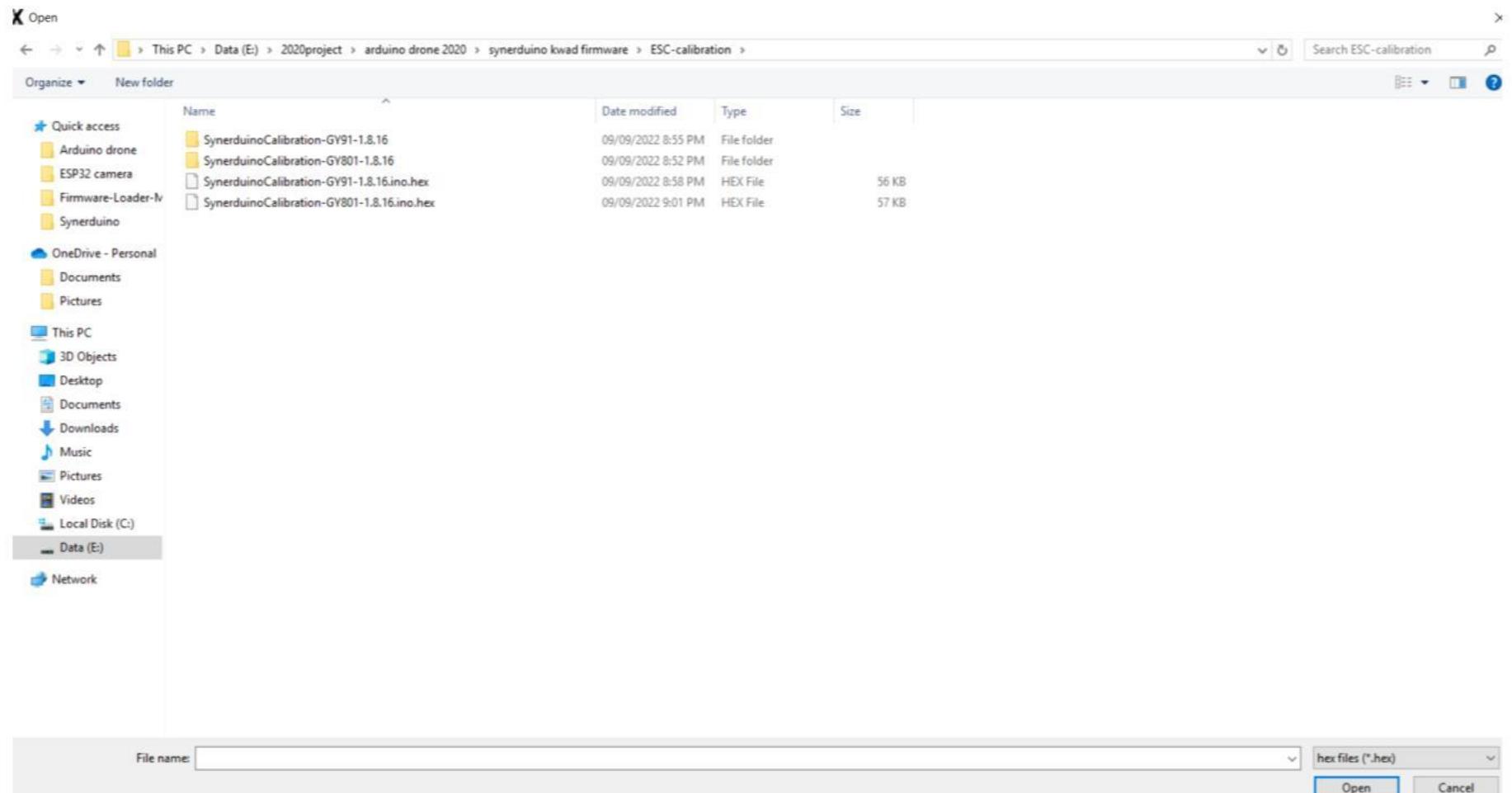
[Synerduino Calibration.ino](#)

Download

Download the ESC calibration hex & open with Xloader



Select ATMega 2560



1. Open the Synerduino Calibration GY91-1.8.16.ino.hex
2. Plug in your Arduino USB and look for the COM Port of your Arduino Mega 2560
3. Click upload

Electronic Speed Controller CALIBRATION

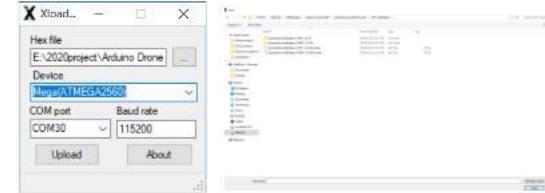
1.remove props or tie copter down the Copter



2.Plug in USB

3.Download Xloader and ESC synerduino Calibration ino.hex

4.Open the ESC [Synerduino Calibration GY91-1.8.16.ino.hex](#) using Xloader then upload the file select Arduino MEGA 2560 and its corresponding COM port.



5.Disconnect the USB

6. plug in the battery run --- cannot fly and will use ESC Tone / LEDs to indicate finished calibration (after approx 5 - 10 seconds)



Connect battery to power module.

7. Disconnect battery ,



Disconnect battery.

8. Plug in USB and Upload back the Synerduino Quad GY91.ino.hex with Xloader



9.You can test carefully with your ESCs calibrated



Connect battery to power module.

Firmware/sketch upload

Download and unzip the Xloader and Synerduino Firmware

XLoader

[Download](#)

[Unzip the Xloader and open Xloader.exe](#)

Name	Date modified	Type	Size
avrdude.conf	18/03/2012 4:49 PM	CONF File	408 KB
avrdude.exe	18/03/2012 4:49 PM	Application	1,878 KB
devices.txt	18/03/2012 4:50 PM	Text Document	1 KB
libusb0.dll	18/03/2012 4:49 PM	Application extens...	43 KB
license.txt	18/03/2012 5:03 PM	Text Document	1 KB
X XLoader.exe	18/03/2012 4:44 PM	Application	271 KB

Download and Unzip the Synerduino Firmware files

Synerduino Firmware-Multirotor

[Download](#)

[Synerduino Neo6 GPS use NMEA GPS file](#)

[Synerduino V1.1 BN220 GPS use UBLOX GPS file](#)

 GY91-NMEA GPS

 GY91-UBLOX GPS

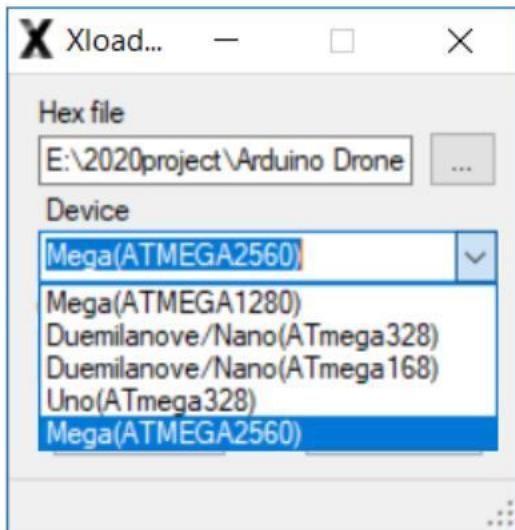
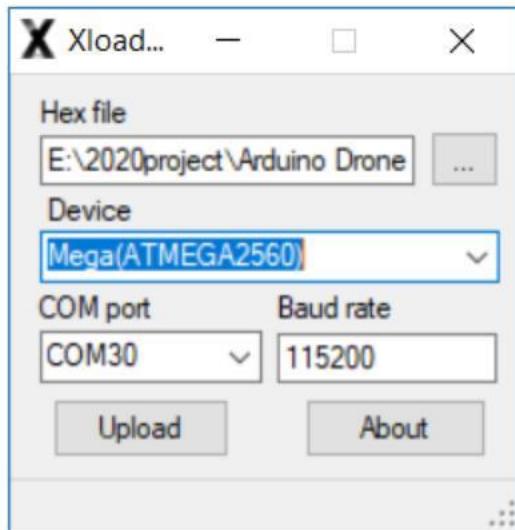
 GY801-NMEA GPS

 GY801-ULOX GPS

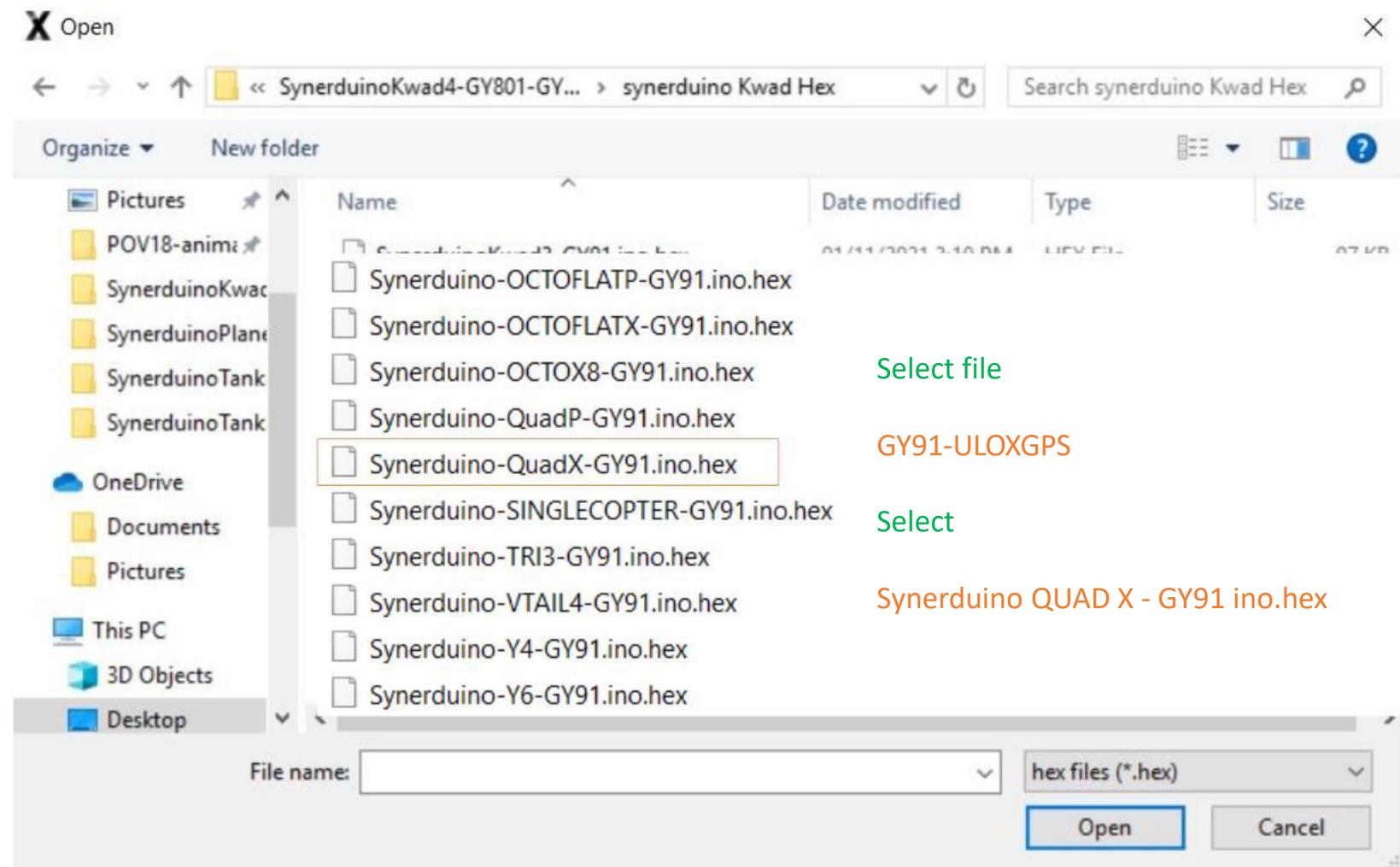
Connect your Arduino USB to the computer

- 
- Synerduino-QuadP-GY91.ino.hex
 - Synerduino-QuadX-GY91.ino.hex
 - Synerduino-SINGLECOPTER-GY91.ino.hex
 - Synerduino-TRI3-GY91.ino.hex
 - Synerduino-VTAIL4-GY91.ino.hex

Select the matching Model Arduino Device to Mega2560



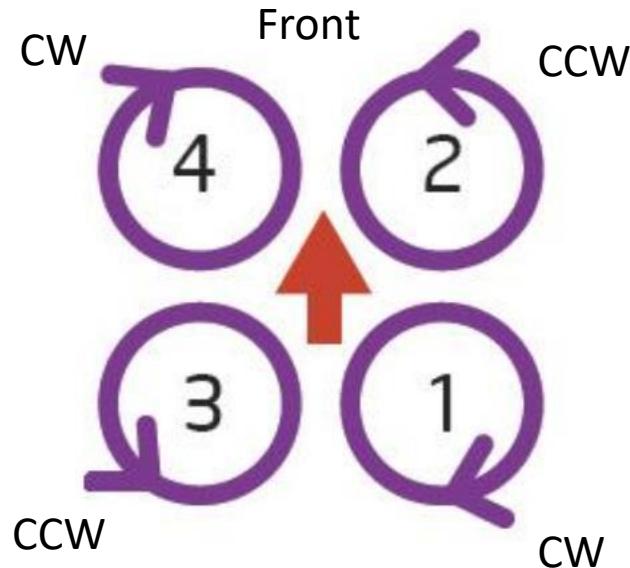
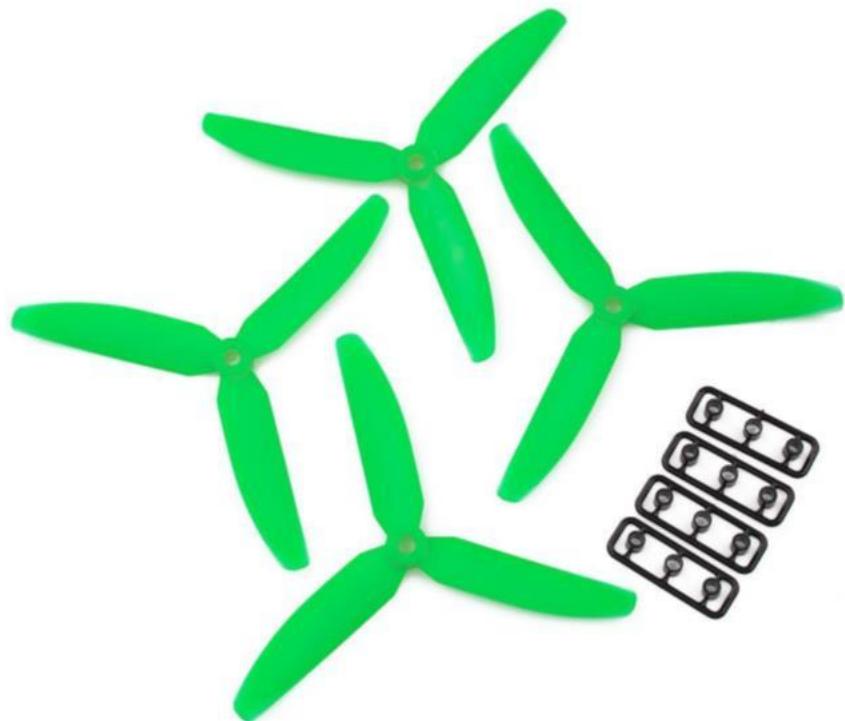
Select ATMega 2560



1. Open the Synerduino-QuadX-GY91.ino.hex
2. Plug in your Arduino USB and look for the COM Port of your Arduino Mega 2560
3. Click upload

Propellers

Sometimes even the most prominent features can be overlooked yet this is a critical element on what makes a multirotor fly



QuadCopter-X
(default)

With the Synerduino 250mm we recommend the 5x45x3 (5045 3) or 5x40x3 (5040 3) Prop type to match with the 2300kv motor the Props have to be stiff too to accommodate the extra load of the quad

Note: ensure the props are well balanced
With no blade damage if you want to ensure a good Stability in GPS and Altitude hold modes.

Vibration in the frame can cause the sensors to register noise making flights unstable



Download the FlyWiiGUI groundstation and open FlywiiGUI.exe

Name	Date modified	Type	Size
210130-0301	30/04/2021 3:01 PM	File	3 KB
210814-0408	14/09/2021 4:08 PM	File	3 KB
212812-0428	12/06/2021 4:28 PM	File	3 KB
214012-0340	12/06/2021 3:40 PM	File	3 KB
AForge.Controls.dll	25/01/2015 1:15 PM	Application extens...	44 KB
AForge.dll	25/01/2015 1:15 PM	Application extens...	17 KB
AForge.Imaging.dll	25/01/2015 1:15 PM	Application extens...	248 KB
AForge.Math.dll	25/01/2015 1:15 PM	Application extens...	67 KB
AForge.Video.DirectShow.dll	25/01/2015 1:15 PM	Application extens...	52 KB
AForge.Video.dll	25/01/2015 1:15 PM	Application extens...	19 KB
AForge.Video.FFMPEG.dll	25/01/2015 1:15 PM	Application extens...	60 KB
avcodec-53.dll	25/01/2015 1:15 PM	Application extens...	13,181 KB
avdevice-53.dll	25/01/2015 1:15 PM	Application extens...	342 KB
avfilter-2.dll	25/01/2015 1:15 PM	Application extens...	870 KB
avformat-53.dll	25/01/2015 1:15 PM	Application extens...	2,405 KB
avutil-51.dll	25/01/2015 1:15 PM	Application extens...	135 KB
FlyWiiGUI.exe	30/10/2021 11:41 ...	Application	6,945 KB
FlyWiiGUI.exe.config	28/02/2017 5:31 PM	CONFIG File	1 KB
FlyWiiGUI.exe.manifest	30/10/2021 11:41 ...	MANIFEST File	30 KB

The FlyWii GUI is a free updated version of the MultiWii WinGUI. It serves as the ground control station for the MultiWii 2.4 controller software.

FlyWii GUI is currently only supported for Windows 7/8/10



[Download](#)

Latest Release

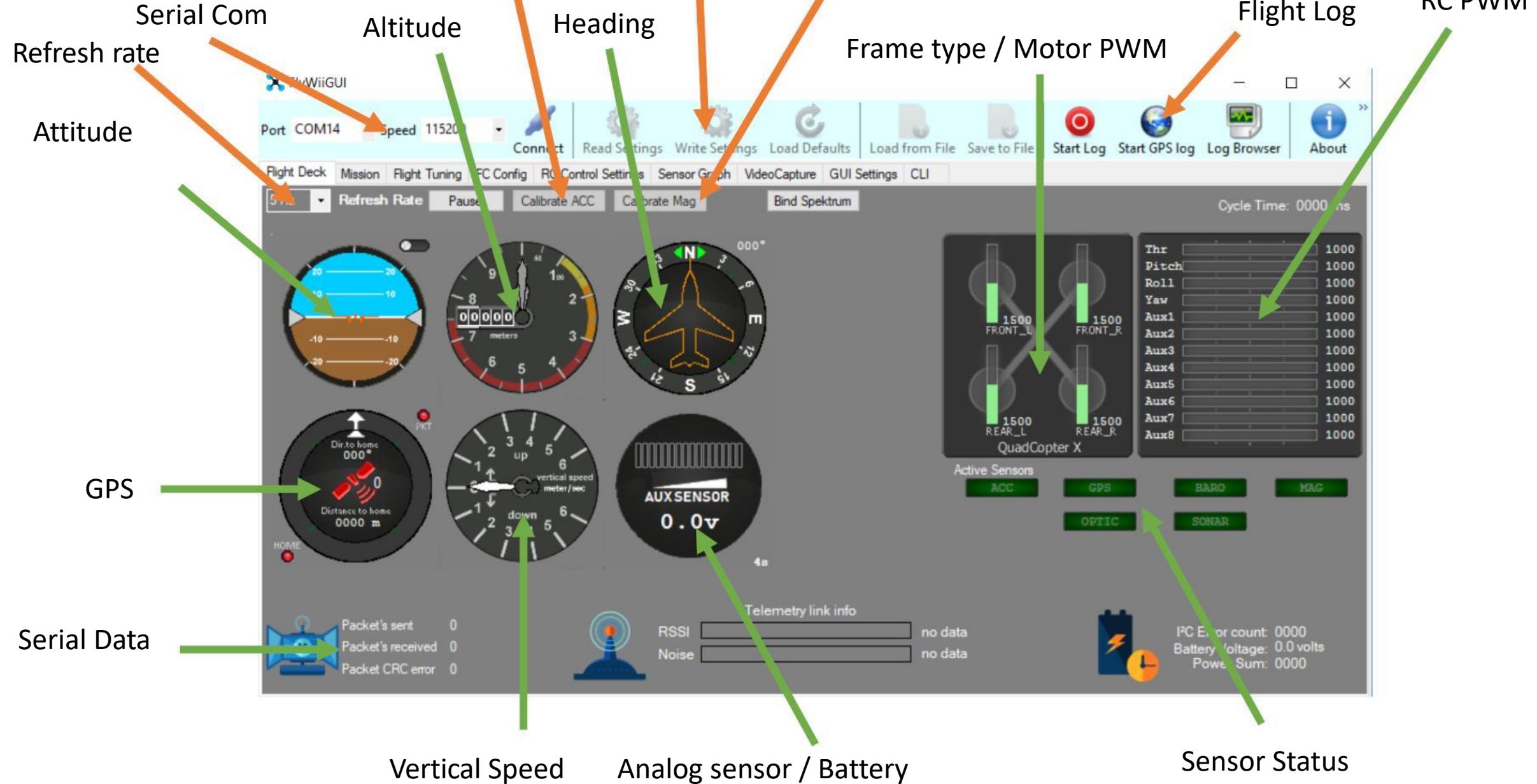
FlyWiiGUI Ground Station Software .EXE*

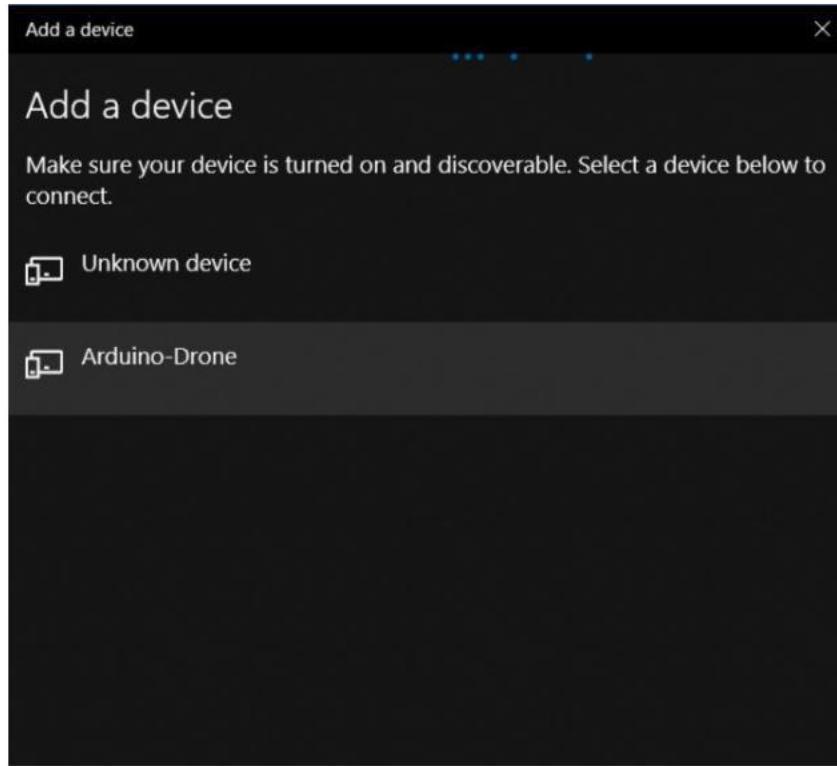
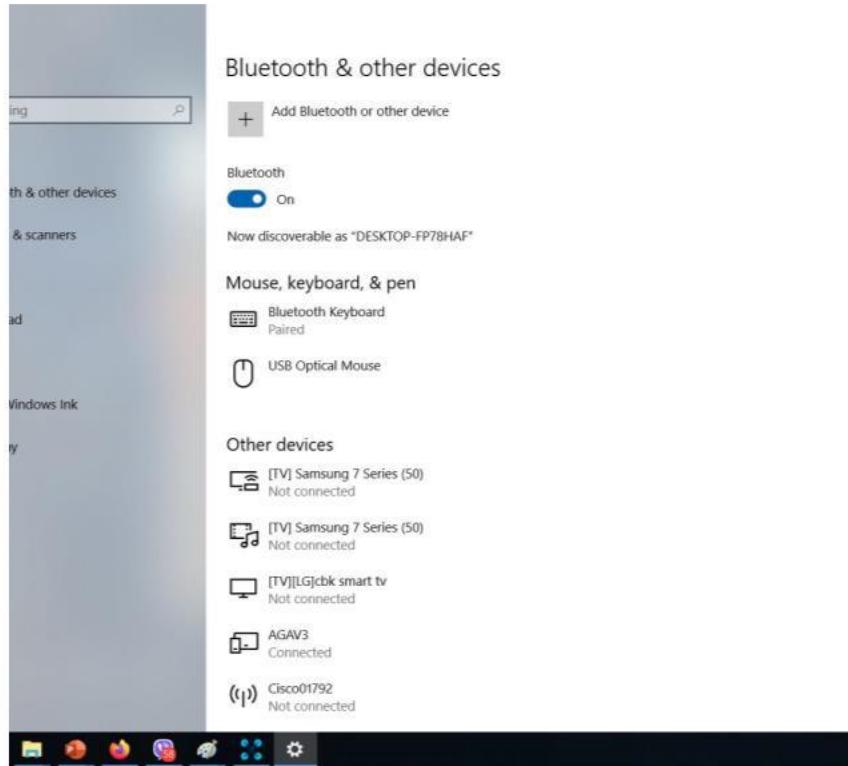
FlyWiiGUI20

[Download](#)

Calibration Acc – Drone must be on level surface

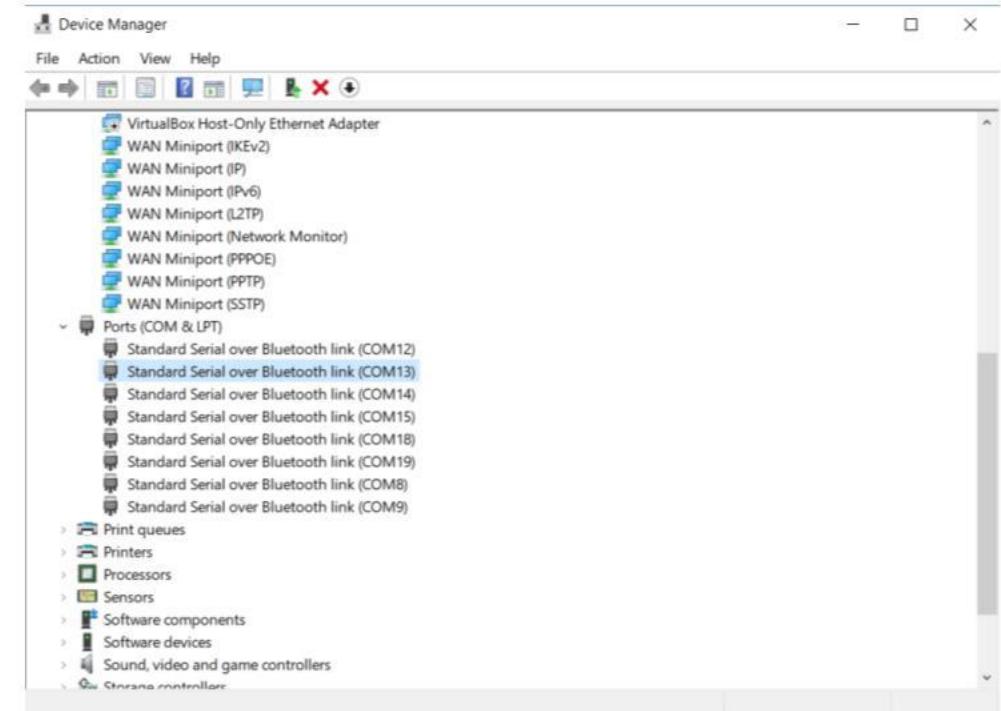
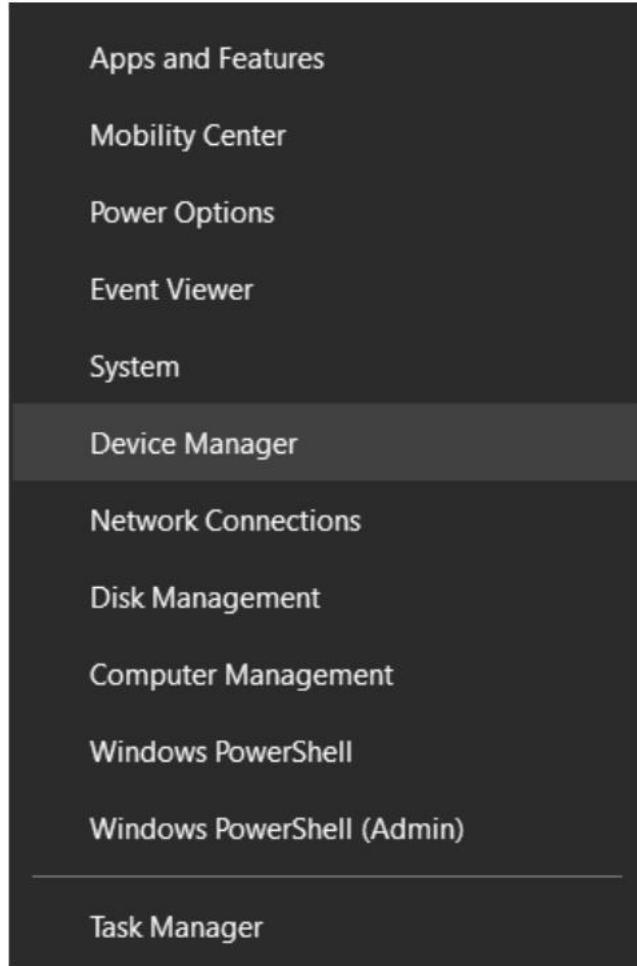
Write settings after changes made in any of the parameters





Adding Bluetooth on Windows Device Manager look for Arduino-Drone BT device

Take note on which Serial Com port its added to in Device Manager

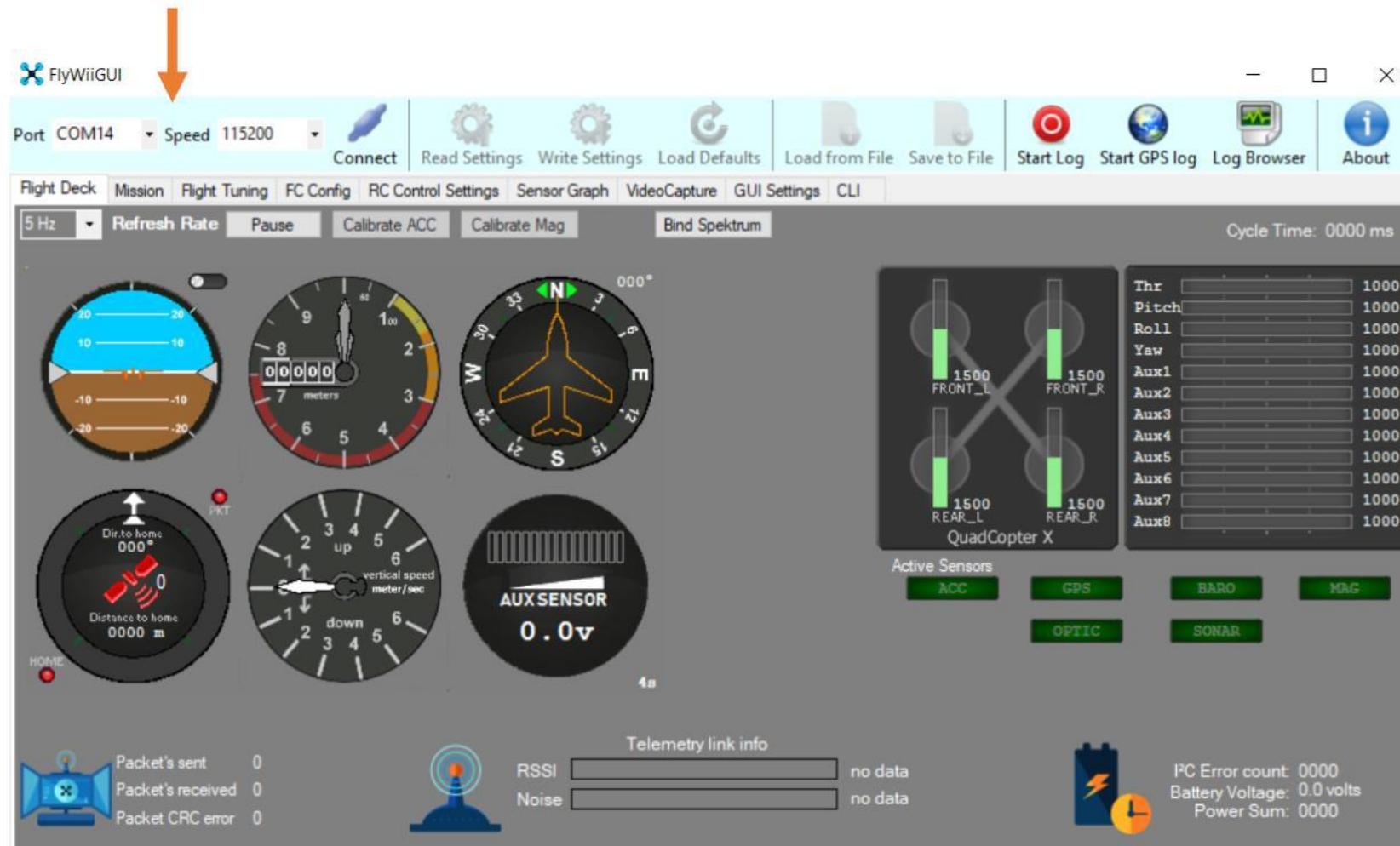


in Device Manager Located in COM & LPT

Select the com port your Bluetooth is connected to .

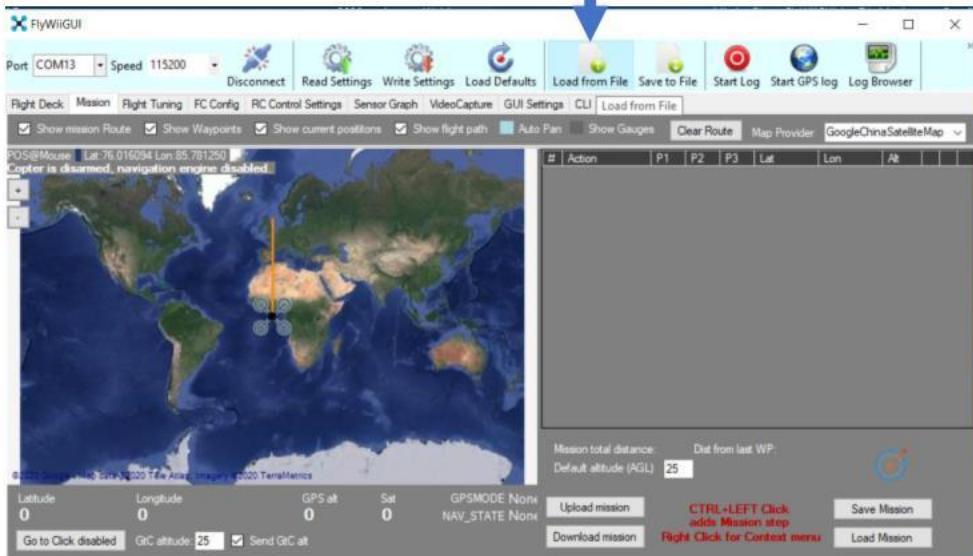
At this point Disconnect your Physical USB and your drone should be running on batteries using only the Bluetooth to communicate

Connect to the Drone with the associated COM port and Baud as found in your device manager

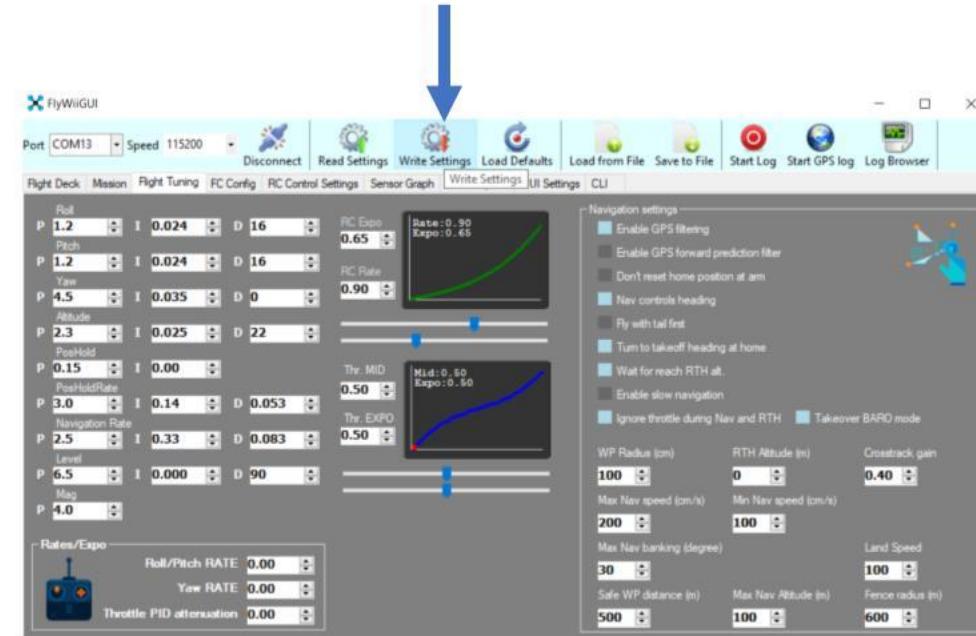


Download PID Parameters Preset Unzip and Load the PID file and Write settings after changes made in any of the parameters

Load the PID file



Write PID Parameter to drone



PID Parameters Preset*

PID 250mm v1.1 Slow Rate*

Download

250mm v1.1 Kwad - slow rate PID.mws

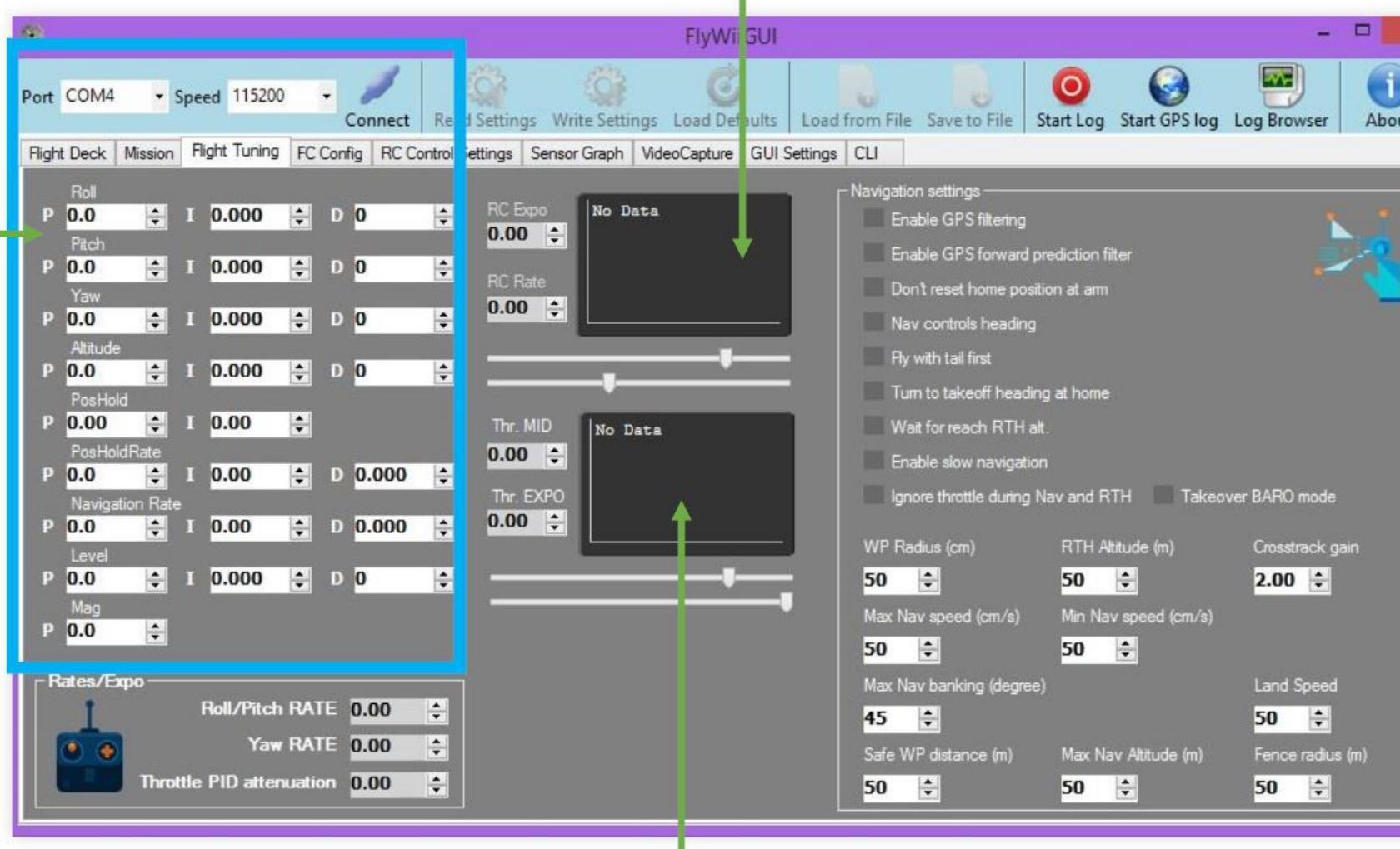


FLIGHT TUNING

FLIGHT TUNING
FOR STABILITY
AND CONTROL
(PID)

PROPORTION
INTEGRAL
DERIVATIVE

RC RADIO EXPO RATE CONTROL , THIS CONTROL
HOW RESPONSIVE YOUR DRONE RESPOND TO
YOUR STICK INPUT



THROTTLE CURVE EXPO THIS ALSO CONTROLS THE THROTTLE RESPONSIVENESS
AND THE DEAD ZONE FOR ALTITUDE HOLD

FLIGHT TUNING

FlyWiiGUI

The screenshot shows the FlyWiiGUI software interface with the 'Flight Tuning' tab selected. On the left, there's a list of flight controller parameters with their current values:

Mode	P	I	D
Roll	1.2	0.024	16
Pitch	1.2	0.024	16
Yaw	4.5	0.035	0
Altitude	2.8	0.010	15
PosHold	0.15	0.00	
PosHoldRate	3.0	0.14	0.053
Navigation Rate	3.0	0.33	0.083
Level	6.5	0.000	90
Mag	4.0		

Below these are two curve editors:

- RC Expo:** A graph showing a green curve with the text "Rate: 0.90" and "Expo: 0.65". It has a slider for "Rate" and a slider for "Expo".
- Throttle:** A graph showing a blue curve with the text "Mid: 0.50" and "Expo: 0.50". It has a slider for "Mid" and a slider for "Expo".

At the bottom, there's a section for "Rates/Expo" with sliders for "Roll/Pitch RATE", "Yaw RATE", and "Throttle PID attenuation".

RC RADIO EXPO RATE CONTROL , THIS CONTROL HOW RESPONSIVE YOUR DRONE RESPOND TO YOUR STICK INPUT

HIGHER NUMBER MEANS MORE RESPONSIVENESS THE DRONE TO STICK INPUTS

FOR BEGINNERS WE RECOMMEND RC RATE AT .50-.60 THIS OFFER A MORE SLUGGISH RESPONDS OF THE DRONE AND NOT ADVICE ABLE FOR STRONG WINDS CONDITION

THROTTLE CURVE EXPO THIS ALSO CONTROLS THE THROTTLE RESPONSIVENESS AND THE DEAD ZONE FOR ALTITUDE HOLD

ADJUST THIS FOR YOUR THROTTLE RESPOND RATE AND WHERE YOUR CENTER STICK DEADBAND FOR ALTITUDE HOLD IS

On Flight Deck Tab calibrate your drone

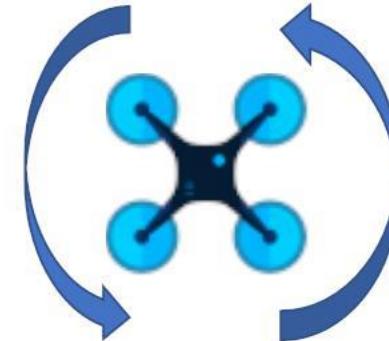
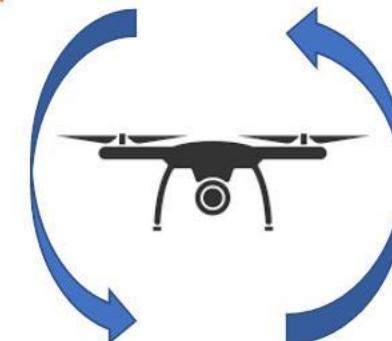


Refresh Rate . Telemetry update speed

Acc Calibration . Set the drone down on a level surface . Away from any metal objects for 30 secs.

Mag Calibration . Move the drone 360 degrees in all axis within 1 min. while the blue Led flashes

These Calibration must be perform after Parameter updates after Flashing the firmware



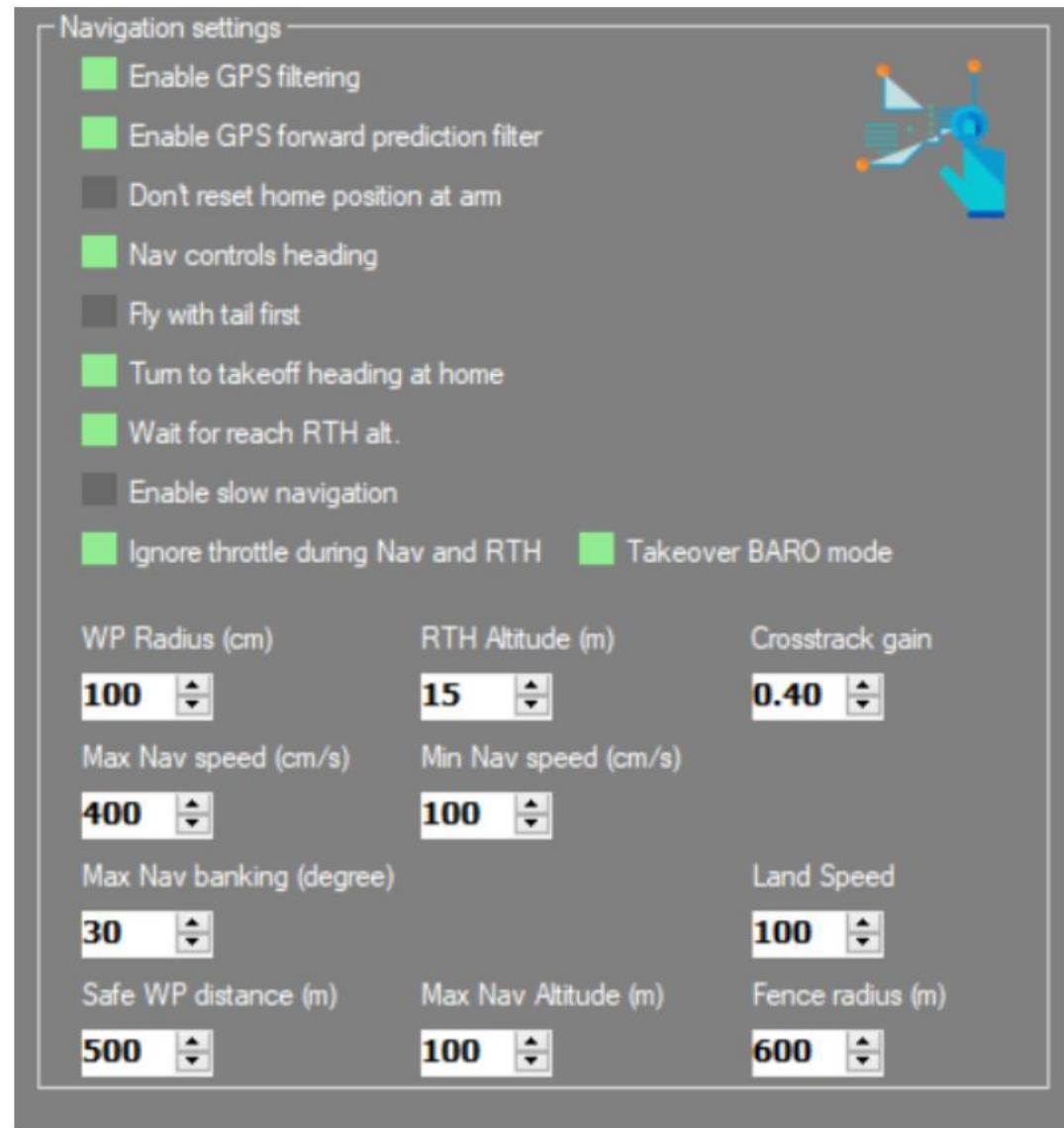


Graphs and Data Logging



Check the Graphs to ensure each sensors are correctly oriented properly

Other Navigation Functions



WP Radius – the radius of the area the Pos PID will trigger if it has reached the waypoint

Max Nav Speed – Maximum speed the drone travels between waypoints (too fast and you likely over shoot your target) **for first mission flight test Nav speed of 100cm/s with ("Enable Slow Navigation "Active)**

Min Nav Speed – the speed the drone travels when within the WP Radius

RTH Altitude – Altitude the drone will climb to when it's below the altitude in relation to its home point when the RTH is triggered set this to 0 to RTH at current altitude

Max Nav Banking – the max allowable pitch and roll the drone will be set to while traveling between waypoints (tune this along with Max Nav Speed to take account with Environment conditions)

Max Nav Altitude – Max altitude the drone is capped to fly at

Land Speed – speed of descending for Landing cm/s

Safe WP Distance – max distance between waypoint before it's nullified

Fence Radius – Geo Fence to keep the drone within the perimeter in relation to home position

CrossTrack gain - this tunes the GPS and Nav sensitivity

GPS Filtering – used to enhance GPS accuracy

GPS Forward Prediction Filter – predicting the drone's location and to compensate for lag. (optional) – not necessary for most applications

Navigation settings –

- Enable GPS filtering
- Enable GPS forward prediction filter
- Don't reset home position at arm
- Nav controls heading
- Fly with tail first
- Turn to takeoff heading at home
- Wait for reach RTH alt.
- Enable slow navigation
- Ignore throttle during Nav and RTH Takeover BARO mode

WP Radius (cm)	RTH Altitude (m)	Crosstrack gain
100	15	0.40
Max Nav speed (cm/s)	Min Nav speed (cm/s)	
400	100	
Max Nav banking (degree)	Land Speed	
30	100	
Safe WP distance (m)	Max Nav Altitude (m)	Fence radius (m)
500	100	600



Don't Reset Home position at Arm – this retains the home position where you first plug power on your drone

Nav Controls Heading – this points the drone to its next waypoint

Fly tail first – makes the drone fly reverse (don't use unless it's a camera pull out shot)

Turn take off heading at Home – when drone arrives at home position it orientates to its heading right after arming

Wait to reach RTH - this works with RTH altitude command which the drone would climb to the said altitude before initiating the flight to home position

Enable slow navigation – this works with keeping the drone to its **Min Nav speed**

Ignore throttle and Take over Baro – as the name suggest disable throttle stick command from the controller when the drone is on mission mode

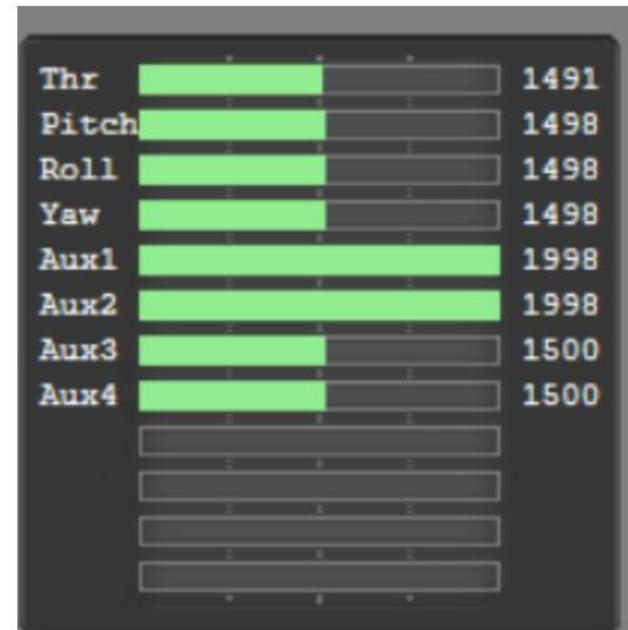
RC Mapping and Remote



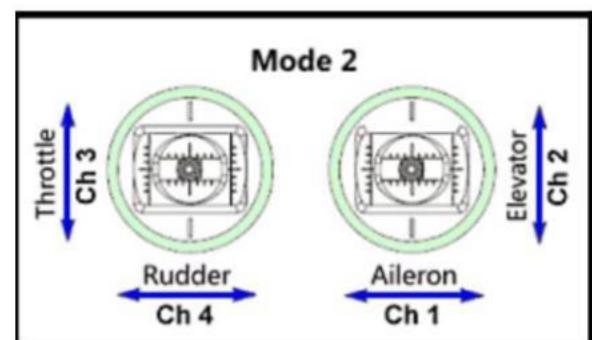
To Ensure correct orientation of your control and PWM Pin installation

FlywiiGUI Arrangment as follows

Throttle
Aileron
Elevator
Rudder
Aux1
Aux2
Aux3
Aux4



PWM 1000 1500 2000



RC Reverse

In Reality Not all Radio Brand have similar standard should the output doesn't match the required input needed by Synerduino you may need to reverse the RC function

Press OK for 1 sec

Enter Systems

Choose RX Setup

Choose Reverse

Choose Channel to set by pressing OK button

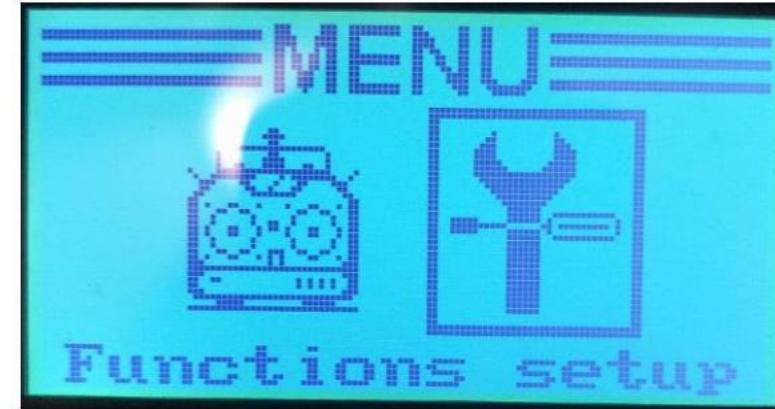
Between Nor and Rev

Good news for the i6 Series Radio that this function is aligned to the Synerduino codes – everything is set as Nor

Hold Cancel Button for 3sec to set when exiting to Save the profile

However should you notice the PWM isn't correct or the if the display output doesn't match what the Flywii is doing then you may need to reverse it

See manual for other radios as Channel output may differ



RC Display

This is Use to see if the RC output matches with the required input of the Synerduino . As seen in FlywiiGUI main dashboard Flight Deck Tab

Press OK for 1 sec

Enter Systems

Choose RX Setup

Choose Display

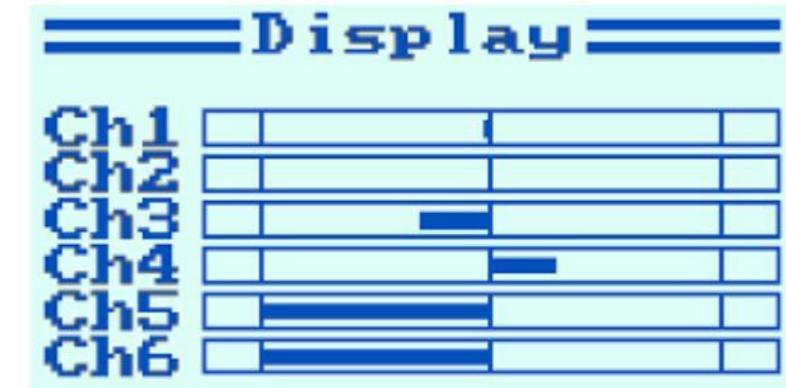
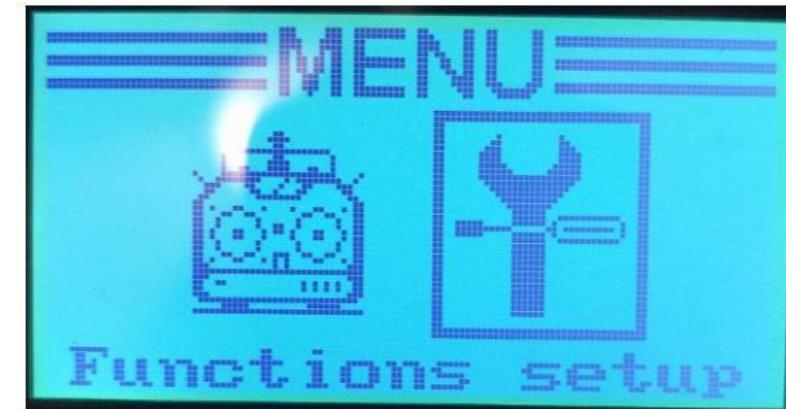
Test the channels by moving the sticks and Switches

Good news for the i6 Series Radio that this function is align to the Synerduino codes

Hold Cancel Button for 3sec to set when exiting to save the profile

How ever should you notice the PWM isn't correct or the if the display output doesn't match what the Flywii is doing then you may need to reverse it

See manual for other radios as Channel output may differer



Aux Switches



Flight modes allows for additional access functions to your drone's capabilities

And can be setup using the Aux switch

ARM
Baro
Altitude
GPS Hold
Mag
GPS Home
Mission
Trigger
Land



FS or TYG i6 remote example for Assigning Aux switch

Press OK for 1 sec

Enter Function setup

Choose Aux Channels

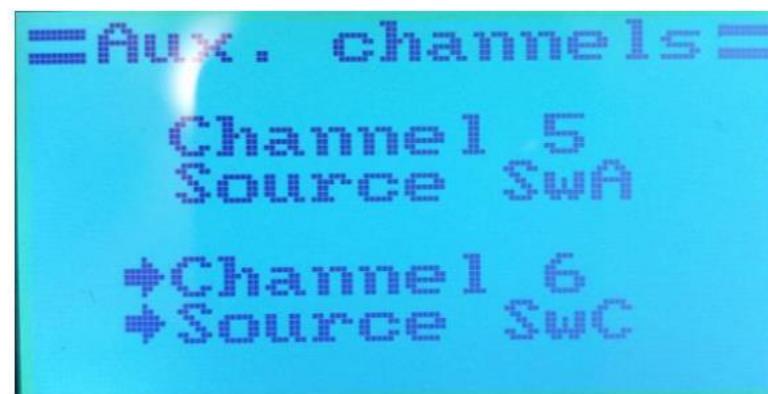
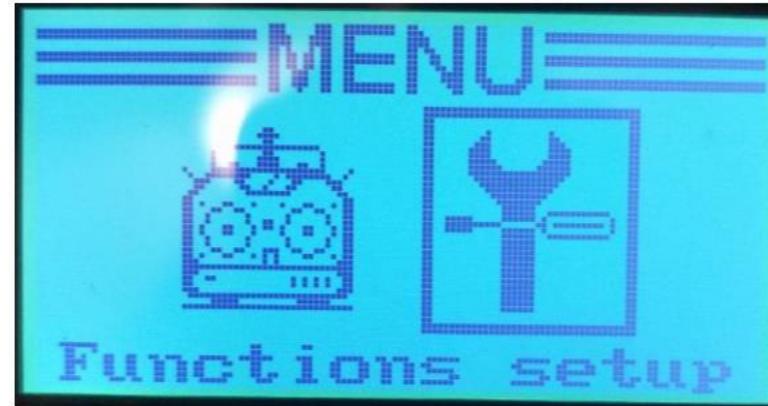
Hit ok button

Choose Channel to switch assignment on the remote

Up/down button to select assignment

Hold Cancel Button for 3sec to set when exiting the Aux Channel menu

You may enter in again to see if its set properly



Fail Safe



Your Drone should enter this modes when it gets disconnected from the remote for whatever reason

it's a safety function as important as getting it connected in the first place.

Two Option can be configured



- GPS Home (RTH)– this sets the drone into return to home mode right to the Launch location only works when GPS is available
- Land - the simplest way is to quit all other flight modes and throttle down . Commonly use in none GPS Drones

This require setup both on Remote and FlyWiiGUI

FS or TYG i6 remote example for Fail safe

Press OK for 1 sec

Enter Systems

Choose RX Setup

Choose Failsafe

Choose Channel to set failsafe to

Move the stick or Aux switch to its fail safe position

Eg. GPS Home Mode (Ch5 or Ch6 where ever you set that mode in) or throttle down Stick on Ch3

Hit ok button

Hold Cancel Button for 3sec to set when exiting the failsafe menu

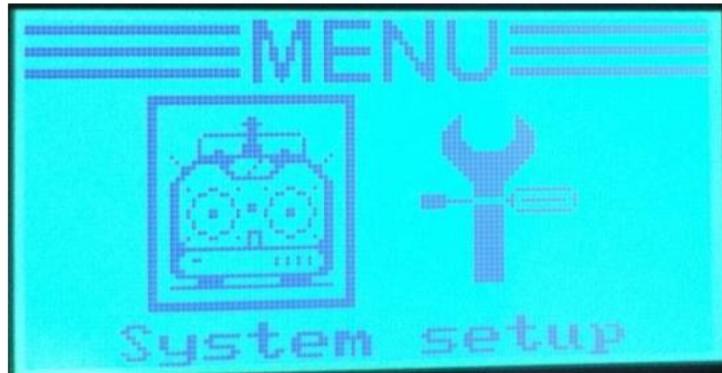
You may enter in again to see if its set properly

Attention:

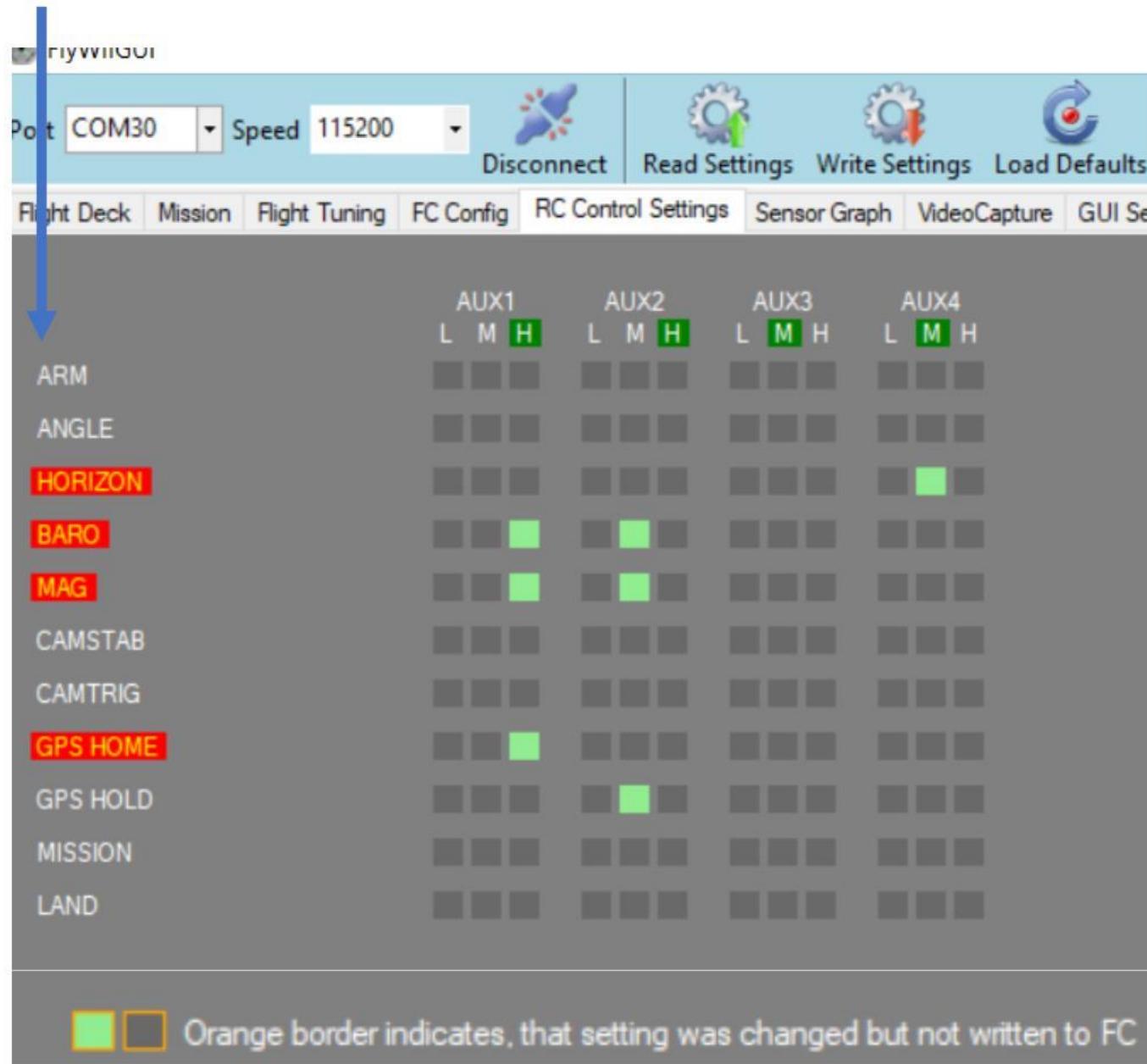
The Receiver will enter this mode when radio link is lost from the Transmitter

Switch transmitter off to test this function

Make sure props are remove before doing so



Flight mode Highlighted when Mode is on



Click on the
Box to
Highlight on
position



Mode on



Mode off

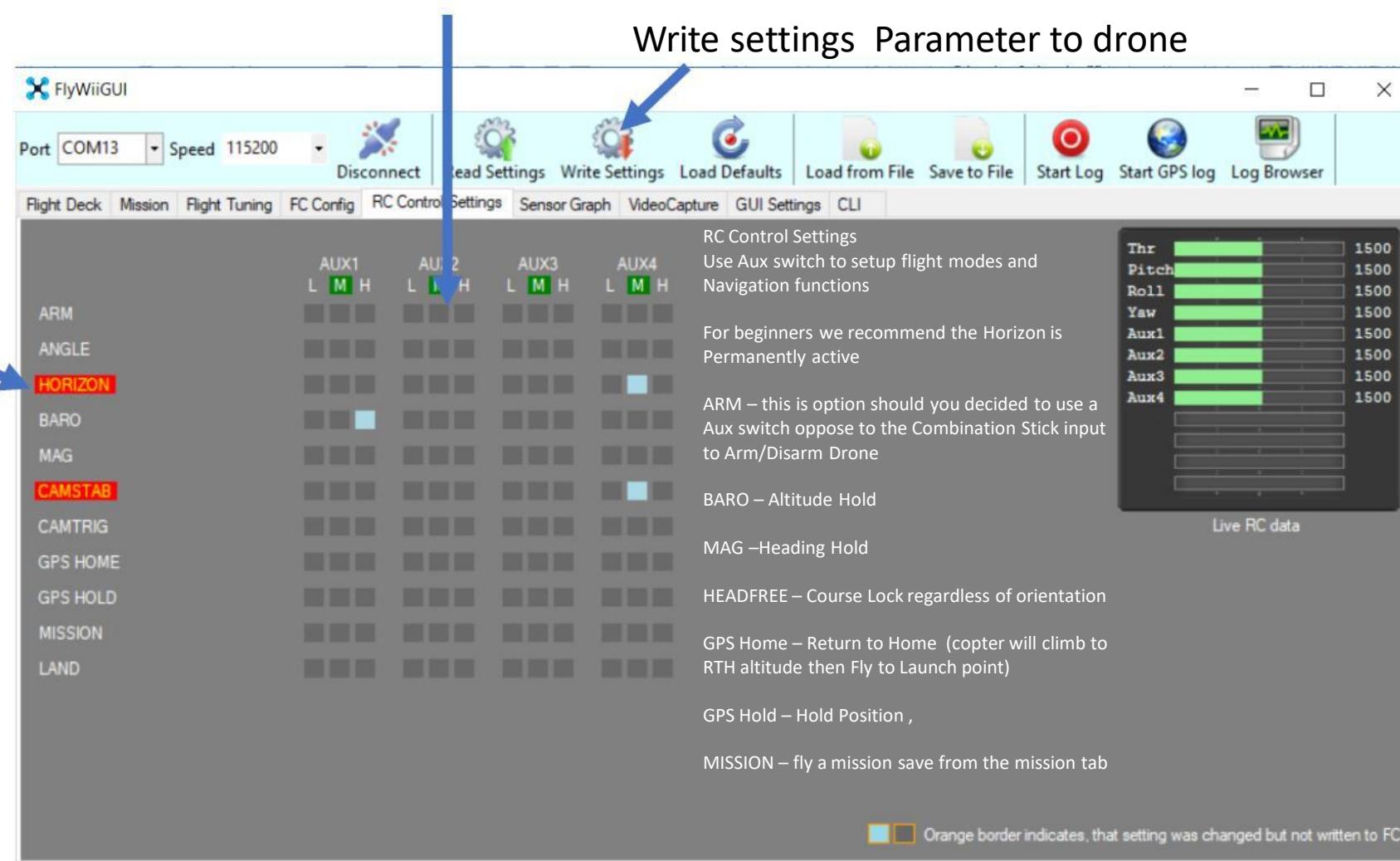
For Beginners

- **Horizon** mode is permanently active
- Other flight modes Place on switch & must be off when Arming or not in use

Set Flight Modes and Failsafe Modes using the Aux switch on your remote then hit the write setting icon

Write settings Parameter to drone

Flight mode
Highlighted
when Mode is
on



For Beginners set Horizon Mode to permanently active



Missions

Note: Only functional for **Mega 2560 Boards with GPS**

Waypoint – the drone with travel between those points

Time PosHold – Drone will wait X number of **00 Seconds** then move to the next waypoint

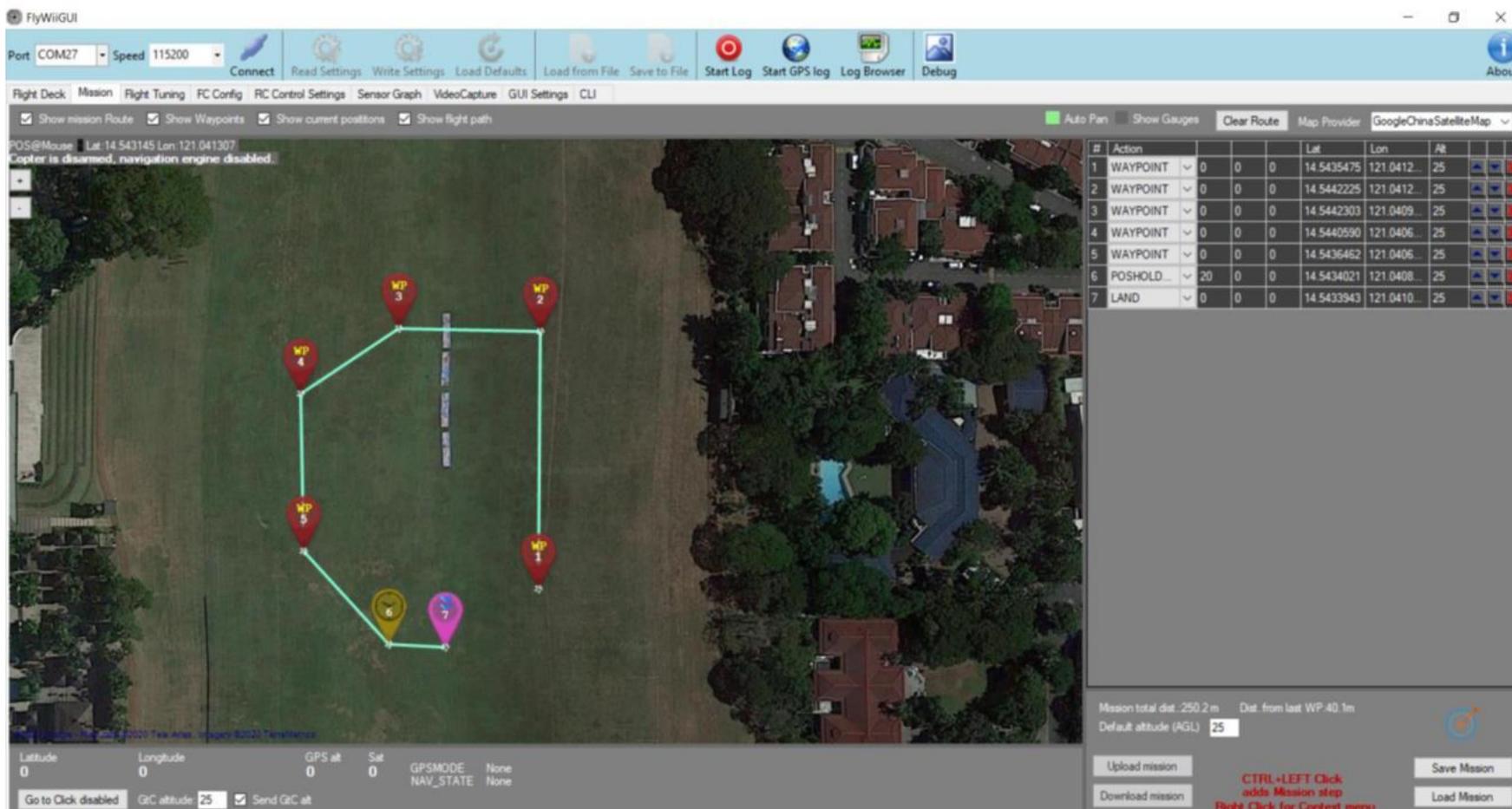
Unlimited PosHold – once the drone reach this point it will hover and wait till you switch out of Mission mode

Land – the drone will land once it has reach this point (**Must be place at the end of the mission**)

RTH – the Drone will fly back to home position (**Must be place at the end of the mission**)

- : **0** – Maintain last Waypoint Altitude at RTH
- : **1** - Land at RTH

Default Alt – Altitude in meters (for first Mission test waypoint with altitude 2m-3m Above Ground Level) And set missions with 2m-3m altitude with Nav speed of 100cm/s .



RC Control Setting Tab – activate Baro , Mag , Mission

To start mission takeoff aircraft in stabilize mode up to 1-2meter altitude then switch the aux switch to mission mode .

Any time you can switch out of it on hold or stabilize mode



Missions

Note: Only functional **for Mega 2560 Boards with GPS**

Jump – the drone will travel to the selected waypoint and continue the mission from there

WP# - the Waypoint to jump to

REP - how many times to repeat this operation

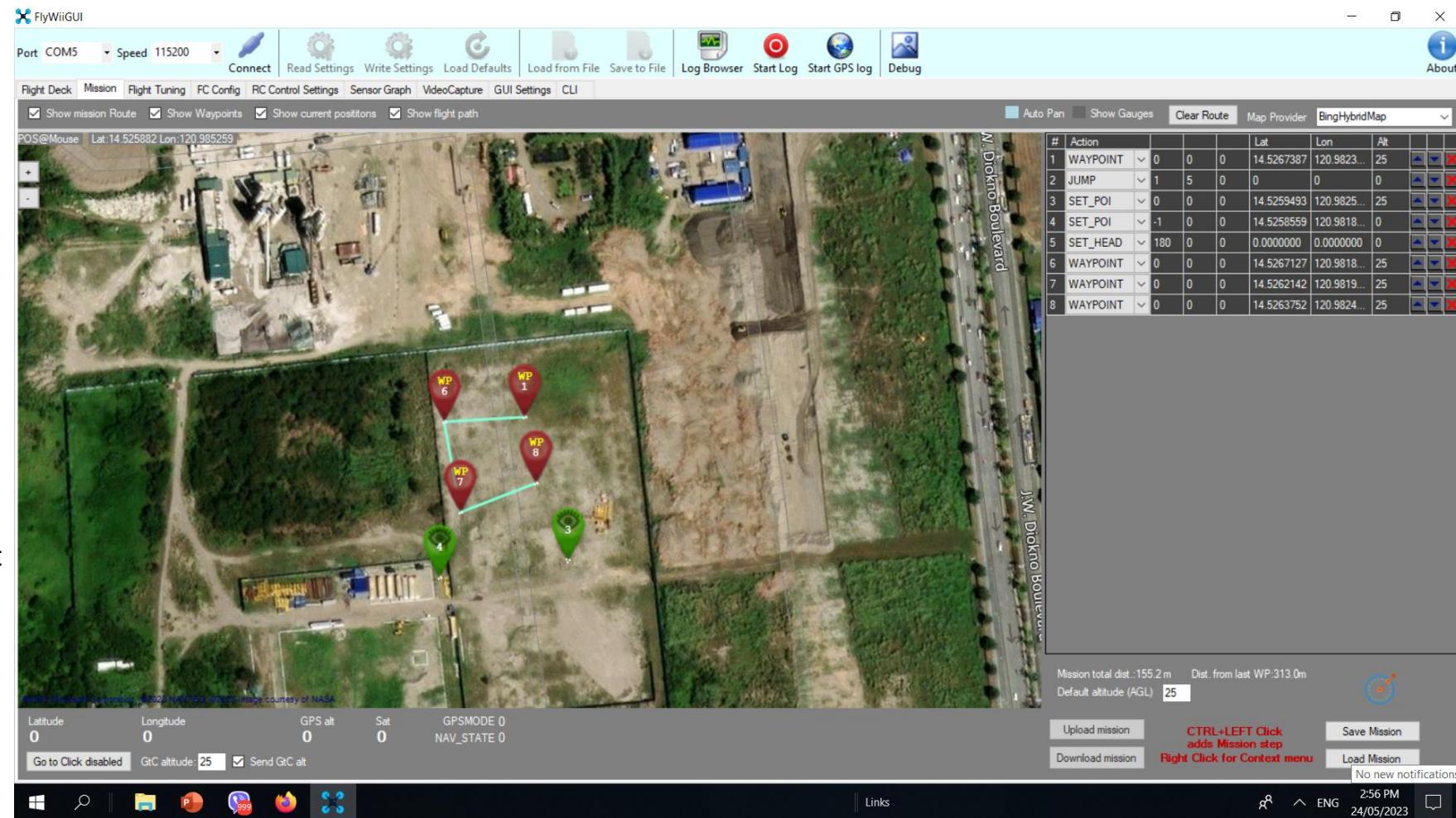
SET_POI – Drone heading would face the Point of interest while flying between waypoint

0 or 1 – Turn POI on

-1 - Turn POI off and resume Nav Heading

SET_HEAD – Drone heading would base the orientation as inputted **1-360**

-1 - Turn Set_head off and resume Nav Heading



RC Control Setting Tab – activate Baro , Mag , Mission

To start mission takeoff aircraft in stabilize mode up to 1-2meter altitude then switch the aux switch to mission mode .

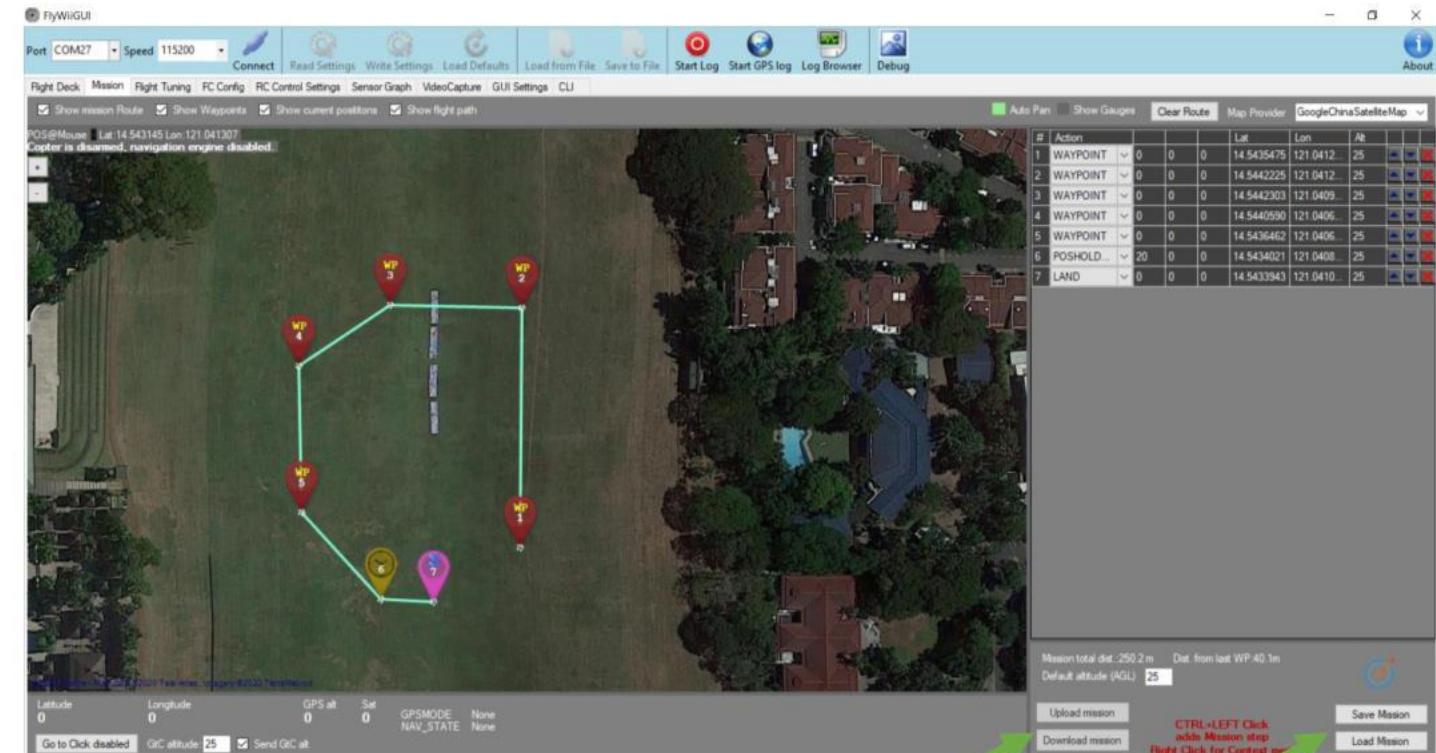
Any time you can switch out of it on hold or stabilize mode



Missions

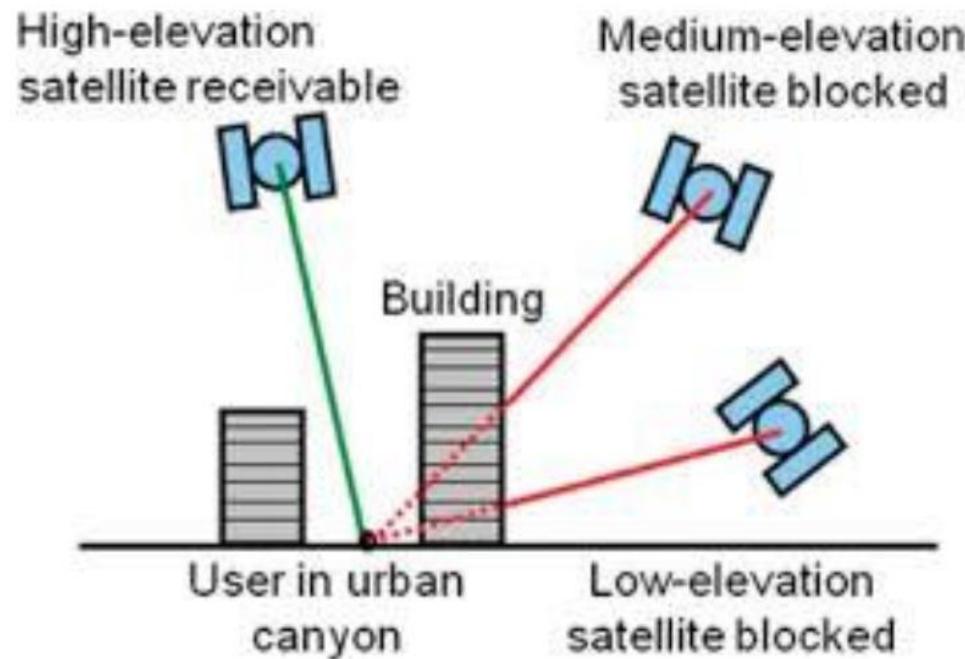
Prerequisite and process for a good mission , Points to test before performing a mission

1. Drone is flying stable in horizon and Alt hold mode , holding altitude consistently less than 1m variation over 1 minute period . Tune PID and altitude PID when necessary. ([Horizon ,Mag ,Baro](#))
2. Drone is flying stable and holding position in PosHold mode and Alt Mode not deviating with in a 1 x1 Meter Imaginary box , tune PosHold Rate PID when necessary ([Horizon , Mag ,Baro ,GPS Hold](#))
3. RTH – set RTH Altitude to 0 , Max Nav speed to 100cm/s , set aux switch to RTH ,Baro , Mag and write settings ,Fly the drone 5 Meters away from the Launch site and activate the RTH Aux switch ,see if the drone returns back to home position and holds position when arrive . Tune Navigation Rate PID when necessary. ([Horizon , Mag ,Baro ,GPS Home](#))
4. Your first Mission . Set Max Nav speed at 100cm/M in flight tuning and set altitude no higher than 3 meters and make a simple Box with a Land here marker . Test in a large area to perform mission stability checks . Revert to POS Rate and Nav Rate PID tuning when necessary ([Horizon , Mag ,Baro ,Mission](#))
5. Ensure that all other Flight modes in [Exception of Horizon](#) Can Be switch off on demand while performing these tests.



Mission upload to /download from Drone

Mission Save to /Open from File

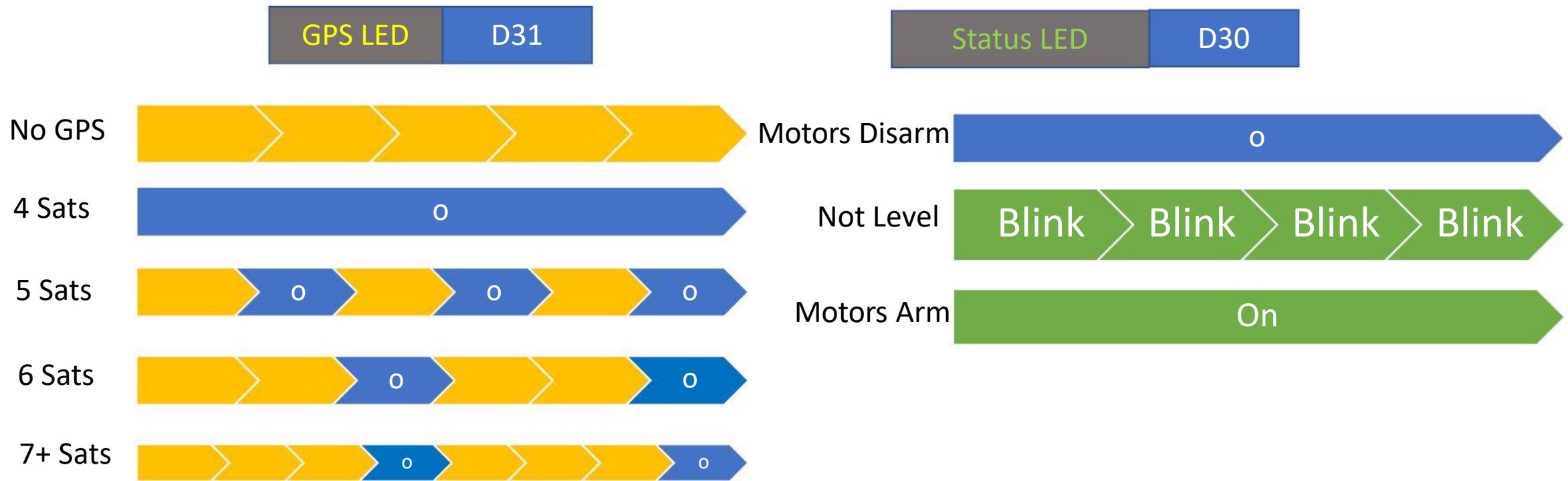


Note : GPS require a clear open area to get a proper fix and accuracy minimum 7 satellites but 10+ are Ideal

Flying next to a building can distort satellite signal deteriorating accuracy

Which in this case its better to not use GPS modes and fly Manual

LED Indicator



indicate a valid GPS fix by flashing the LED

- led work as sat number indicator
- No GPS FIX -> LED blinks constant speed
- Fix and sat no. below 5 -> LED off
- Fix and sat no. ≥ 5 -> LED blinks, one blink for 5 sat, two blinks for 6 sat, three for 7 +

BATTERY CHARGER



Standard Lipo Balance Charger
Nimh/Nicad/Lipo/Pb Mode 1s to 6s 5A

The Advantage of this is the ability to monitor your charge as well as resurrecting batteries that were over drain by 1V from drain



Cheap Balance Charger but no way users can monitor their battery condition

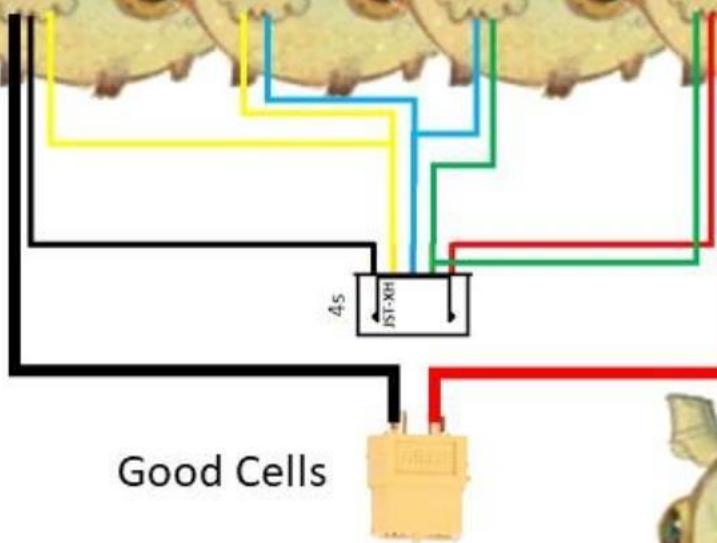
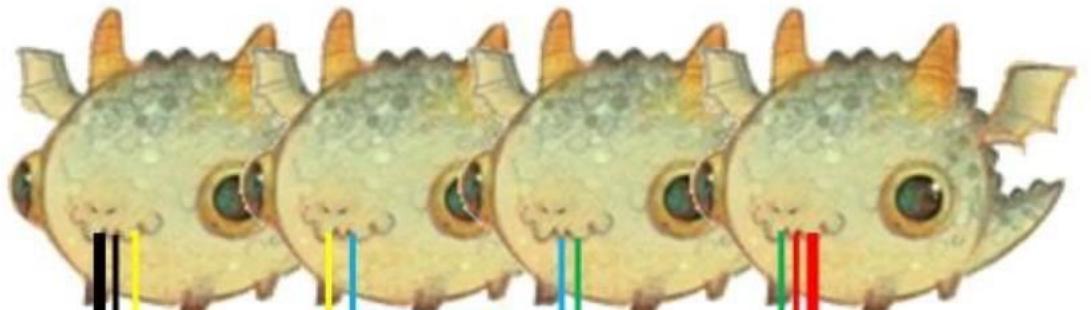
May post risk as you cannot monitor or emergency charge your battery

4.20

4.19

4.19

4.18



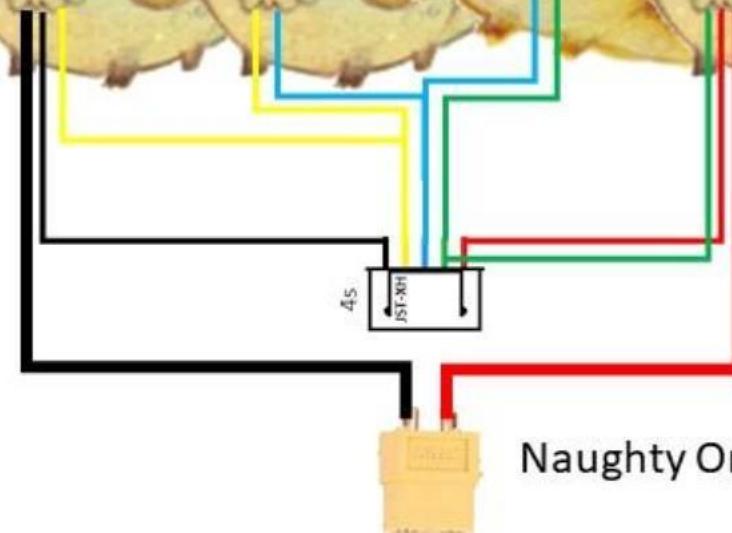
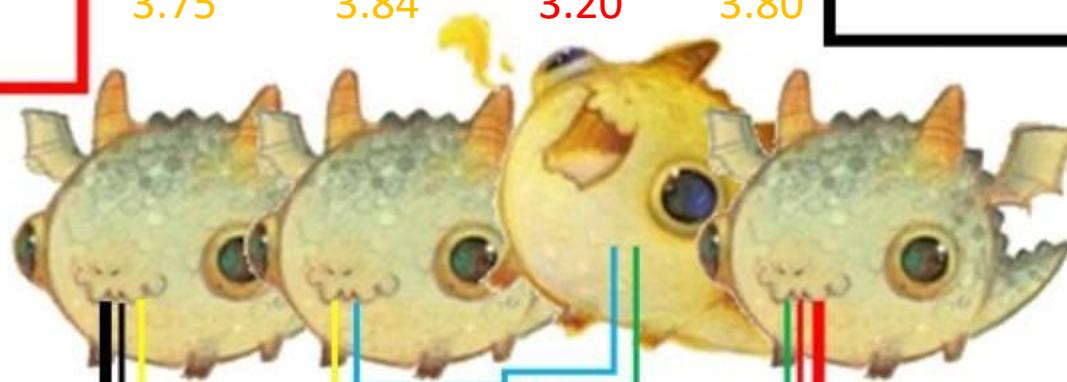
Good Cells

3.75

3.84

3.20

3.80



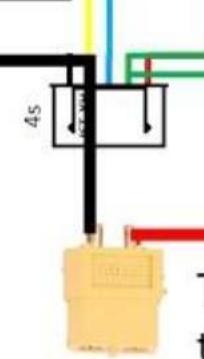
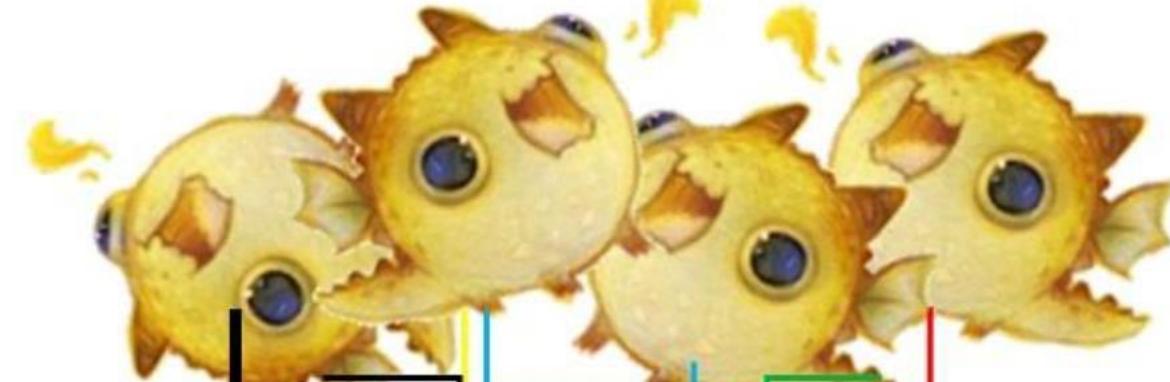
Naughty One

3.10

3.14

2.60

2.80



Throw those
things away!!!

I always tell newbies to pretend they were
Orb Dragons

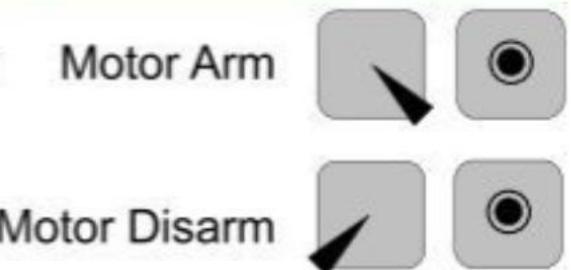
Treat them right and they will last a long time

Abuse them and your asking for trouble



And your much Done on your setup

For Mode 2 Hold 2 seconds



Cannot Arm Motors

when on GPS Home , GPS Hold , Mission Flight modes & when USB is plugged in . (pls use Bluetooth telemetry)

Tests motors with Props off

Baro and Mag preferably switch off when Arming

Pls calibrate ACC and Mag in the Dashboard



Before your First Flight one Final procedure known as pre flight and Tuning tests

