Ardupilot / Qground Guide

Synerduino STM

VERSIONS: F405

For more Information:
www.synerflight.com

INTRODUCTION

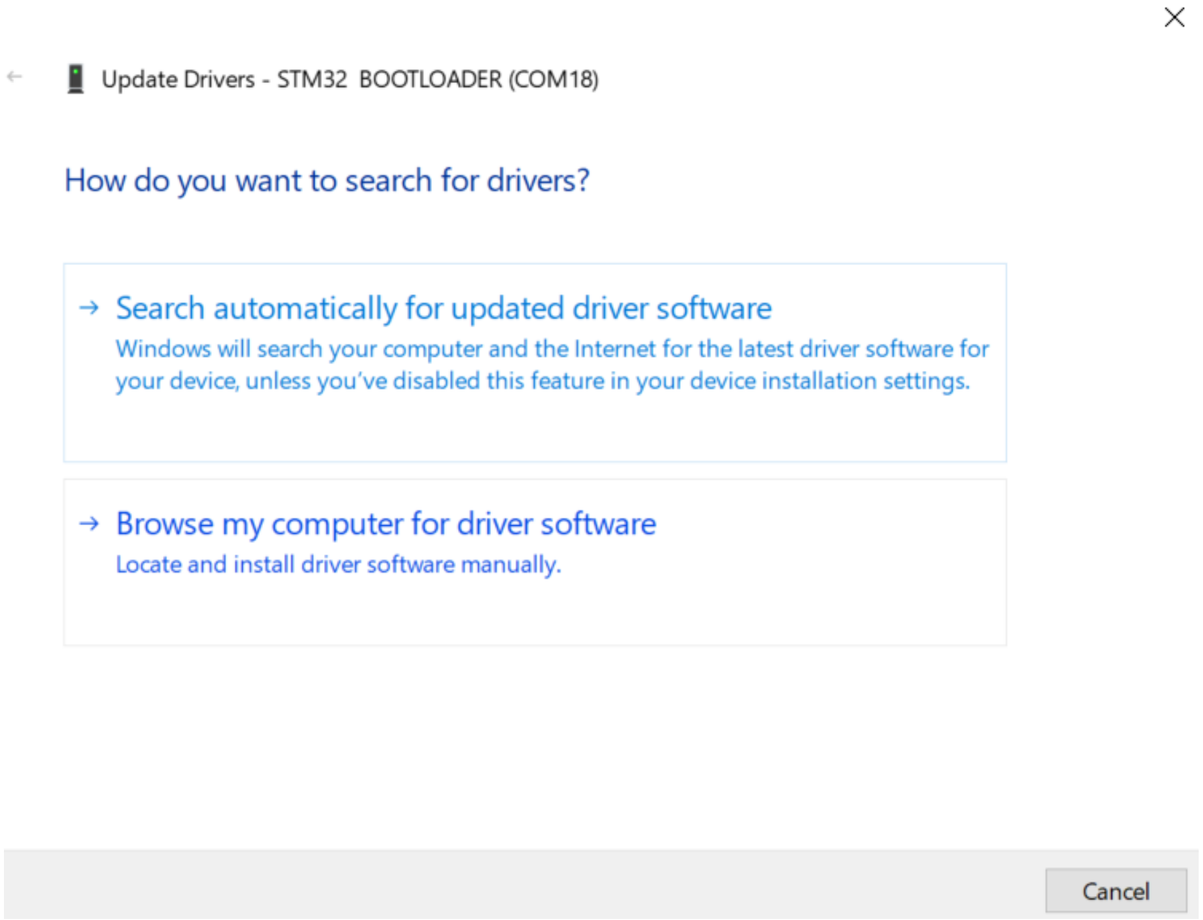
Installation

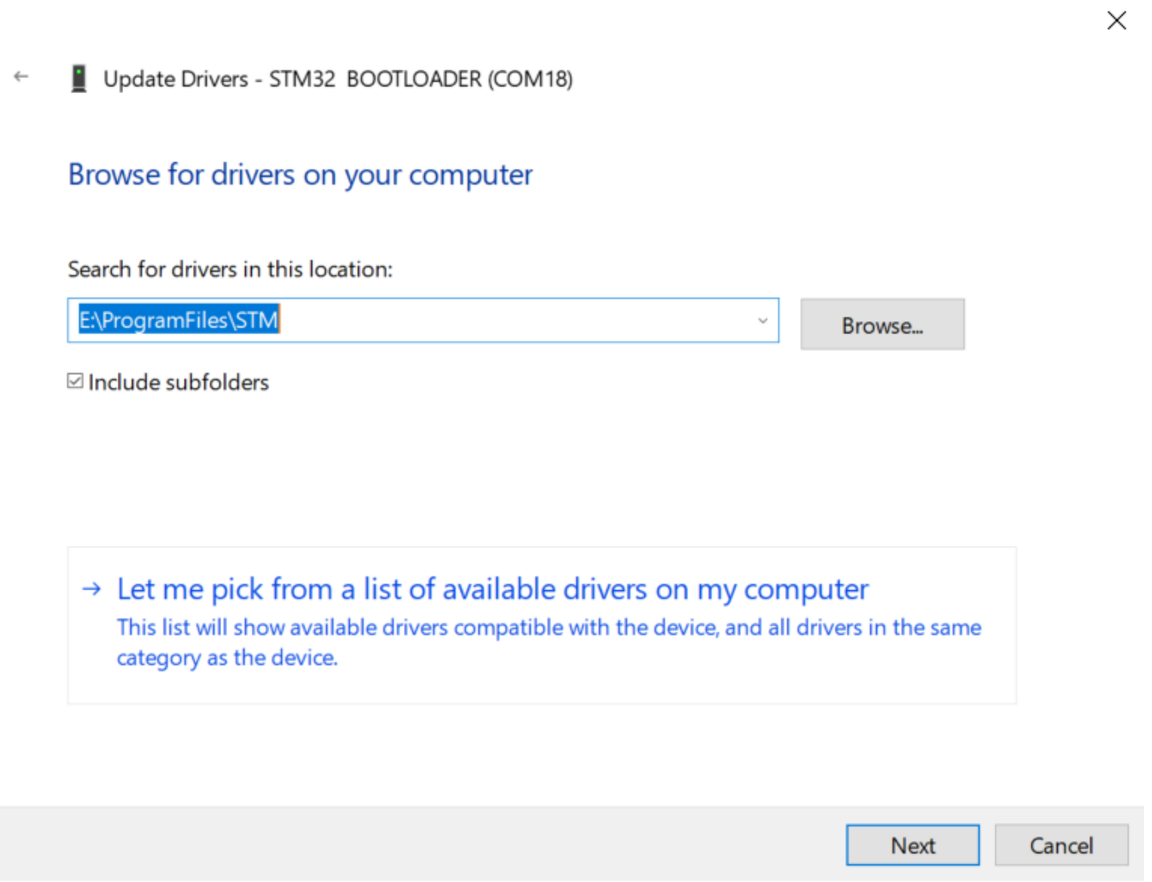
- Firmware
- Setup
- Configuration

This guide shows the software installation process

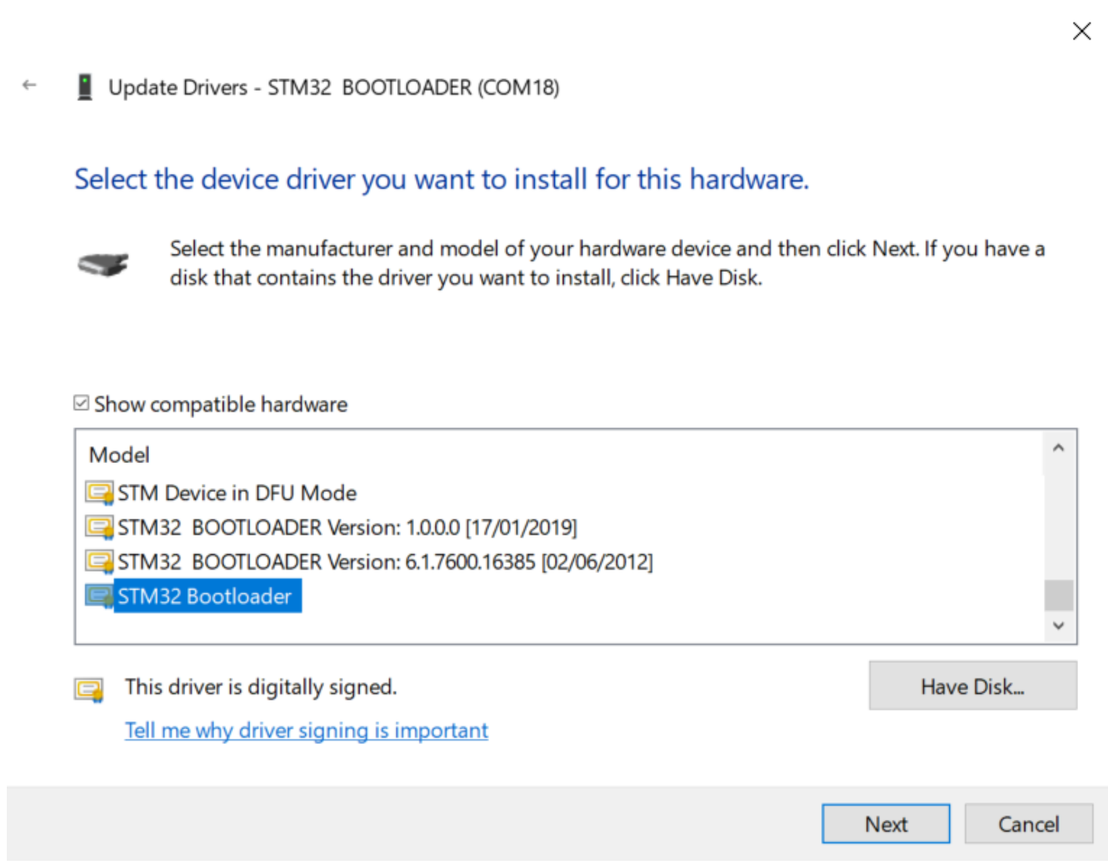
FIRMWARE INSTALLATION

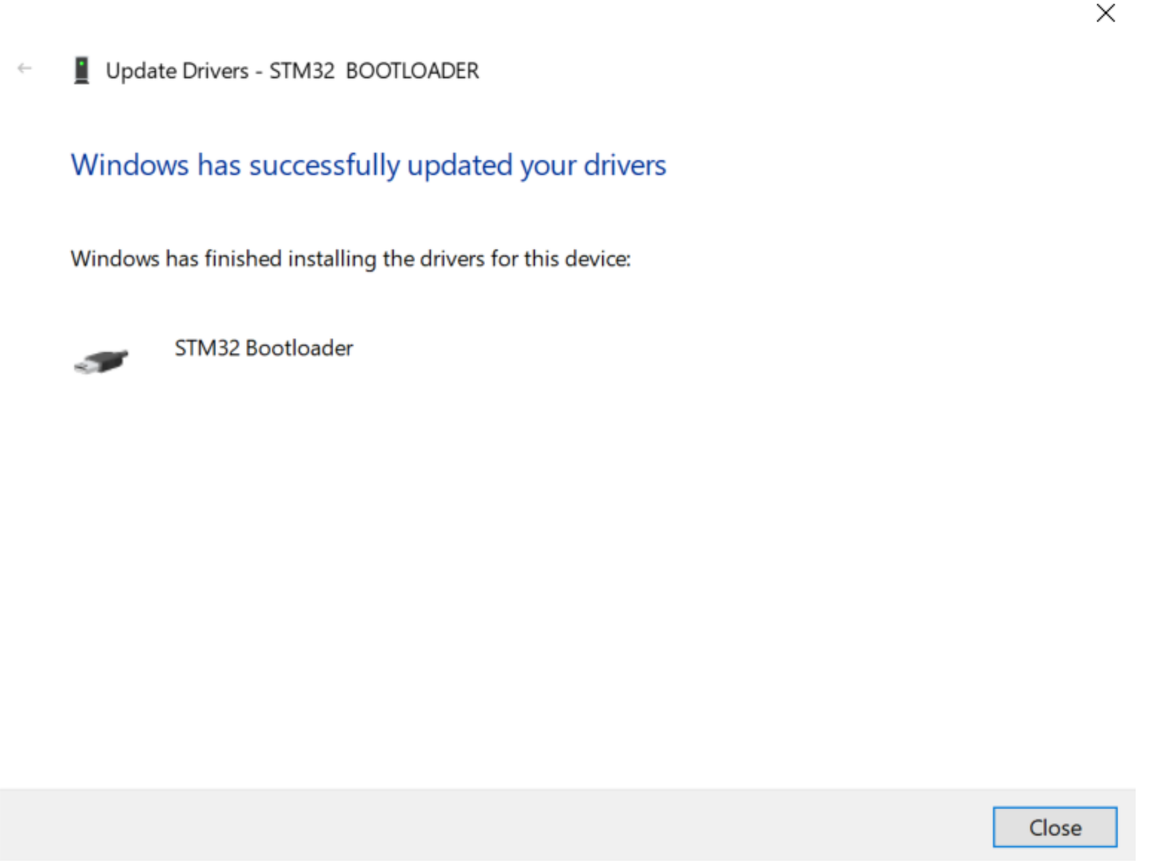
- Browse my Computer for Driver
- Let Me Pick from List





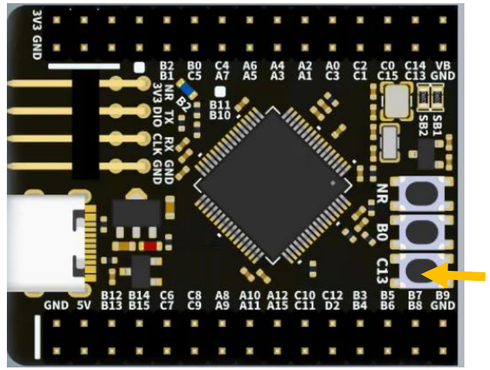
FIRMWARE INSTALLATION

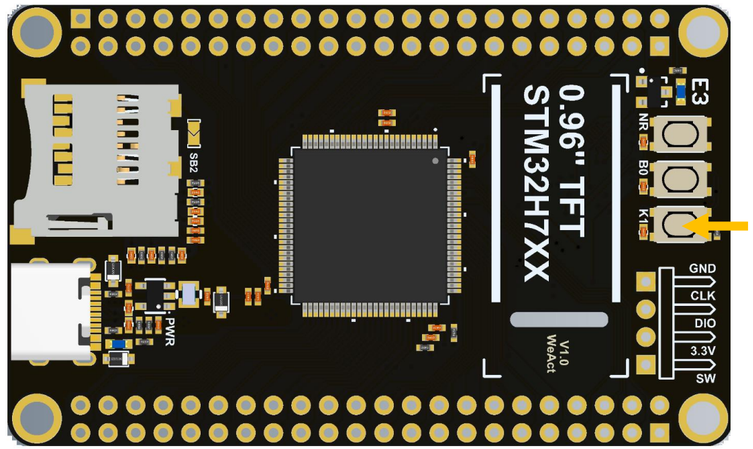


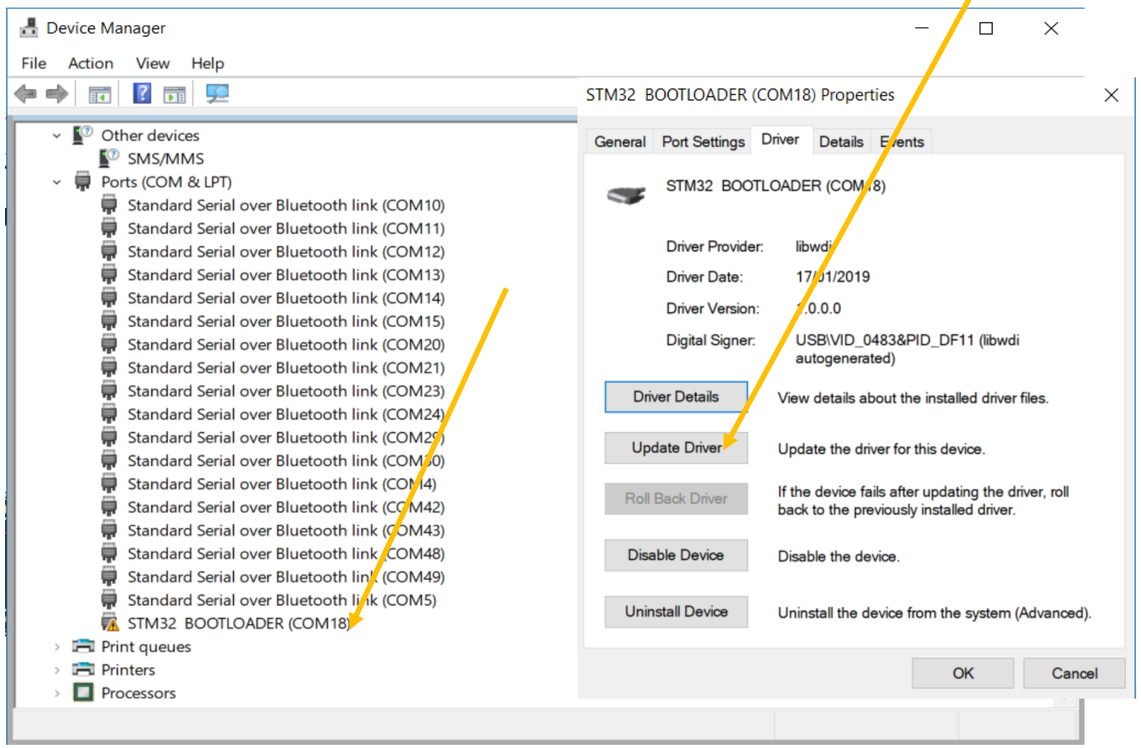


FIRMWARE INSTALLATION

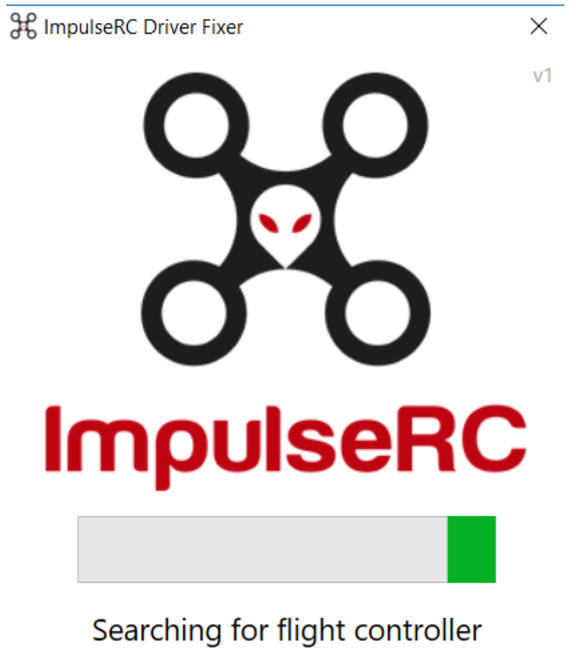
- Plug in USB you see Blue Led fading in and out
- Hold the Key Button for 3seconds till the blue light flashes and goes out
- In device manager the STM32 Bootloader (Com should show up)
- Note : this is for Brand new boards that were not flash with firmware , skip this for Synerduino package kits as they are preflashed for your convenience







FIRMWARE INSTALLATION

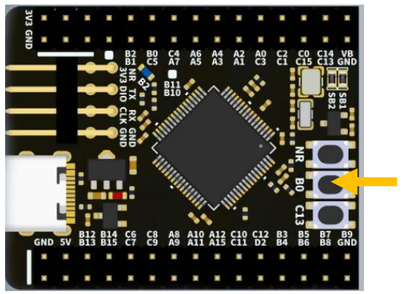


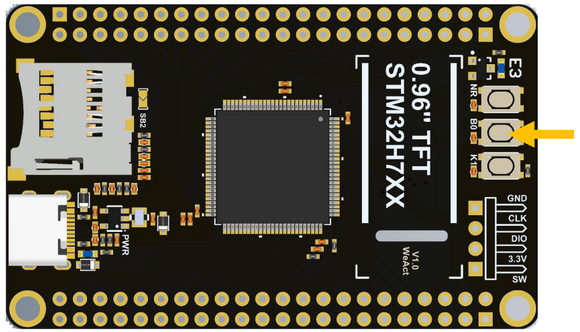
ImpulseRC Driver Fixer

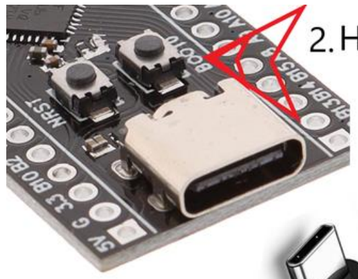
https://impulserc.blob.core.windows.net/utilities/ImpulseRC_Driver_Fixer.exe

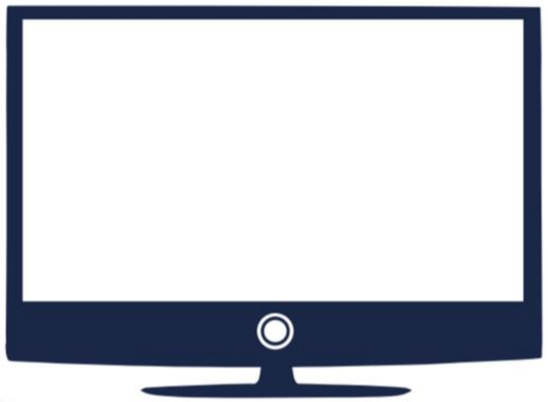
- Start ImpluseRC Driver Fixer
- Connect the FC USB to the PC While On DFU mode . (DO NOT power on FC via external 5V or Vbat)
- The ImpulseRC Driver Fixer should then see and load the proper driver

FIRMWARE INSTALLATION





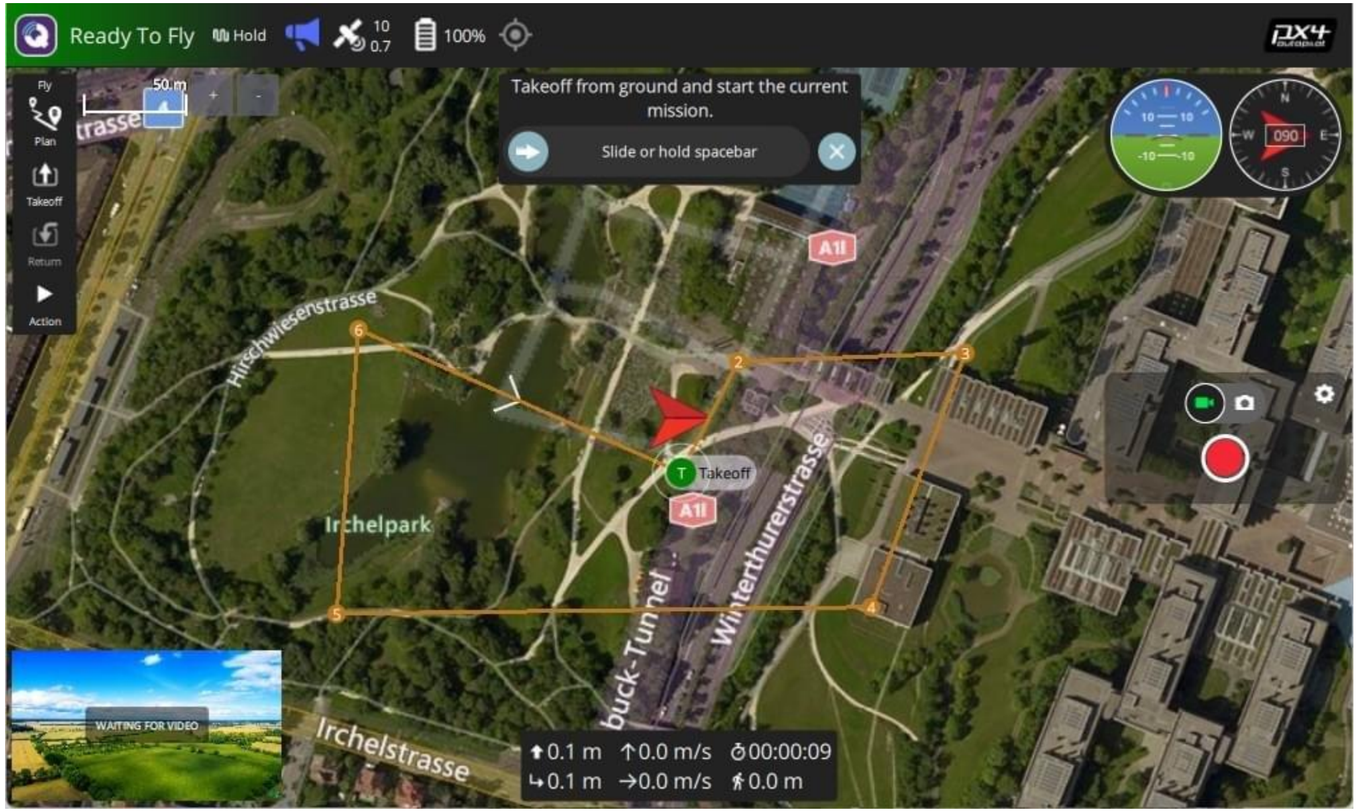




After Flashed Processor setup

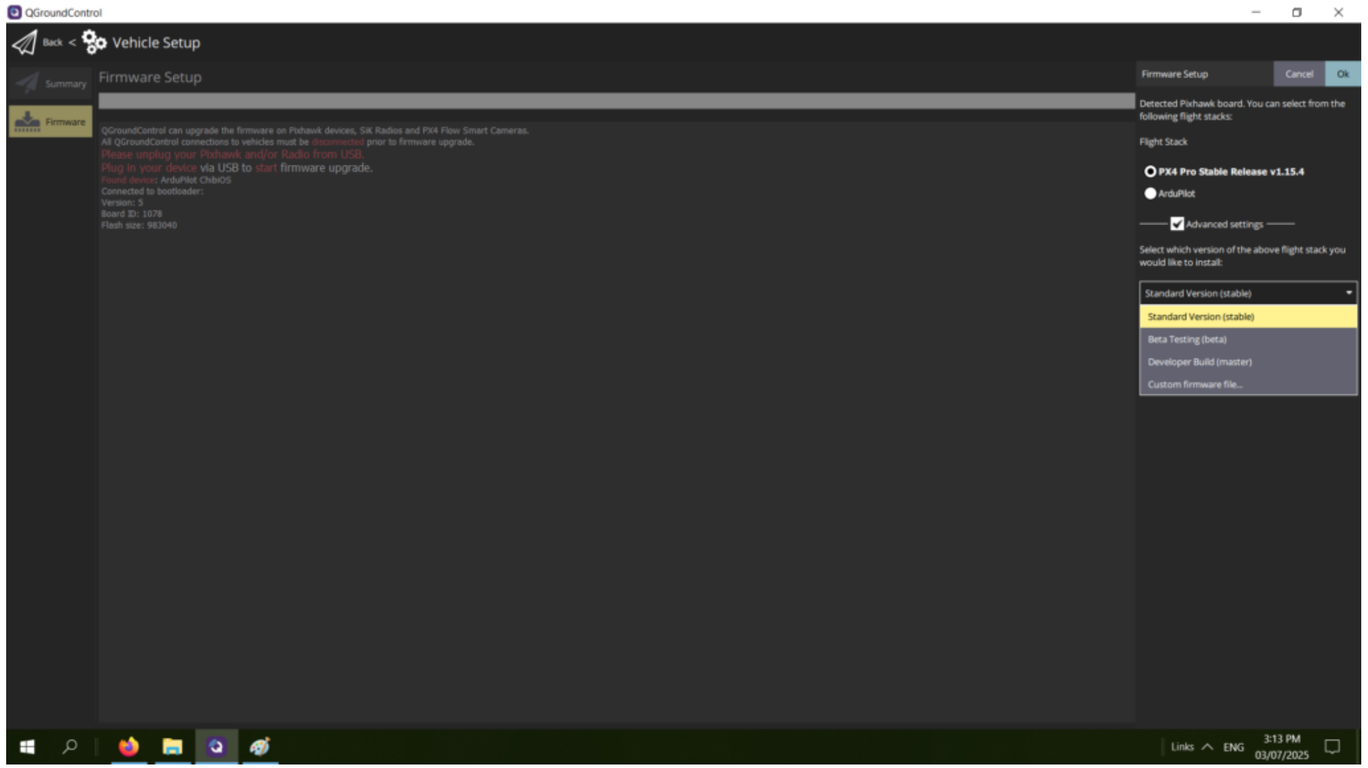
This can also be done by holding down the boot button while pressing the NRST button to reset the board . This is just like unplugging and plugging the USB

FIRMWARE INSTALLATION



Q ground Control one of several Ground station options compatible with Ardupilot it has a clean refine design across its OS platforms making it easy to use and setup of your drone.

FIRMWARE INSTALLATION



While the board is on **DFU** mode

Start Qground

Open the Firmware tab

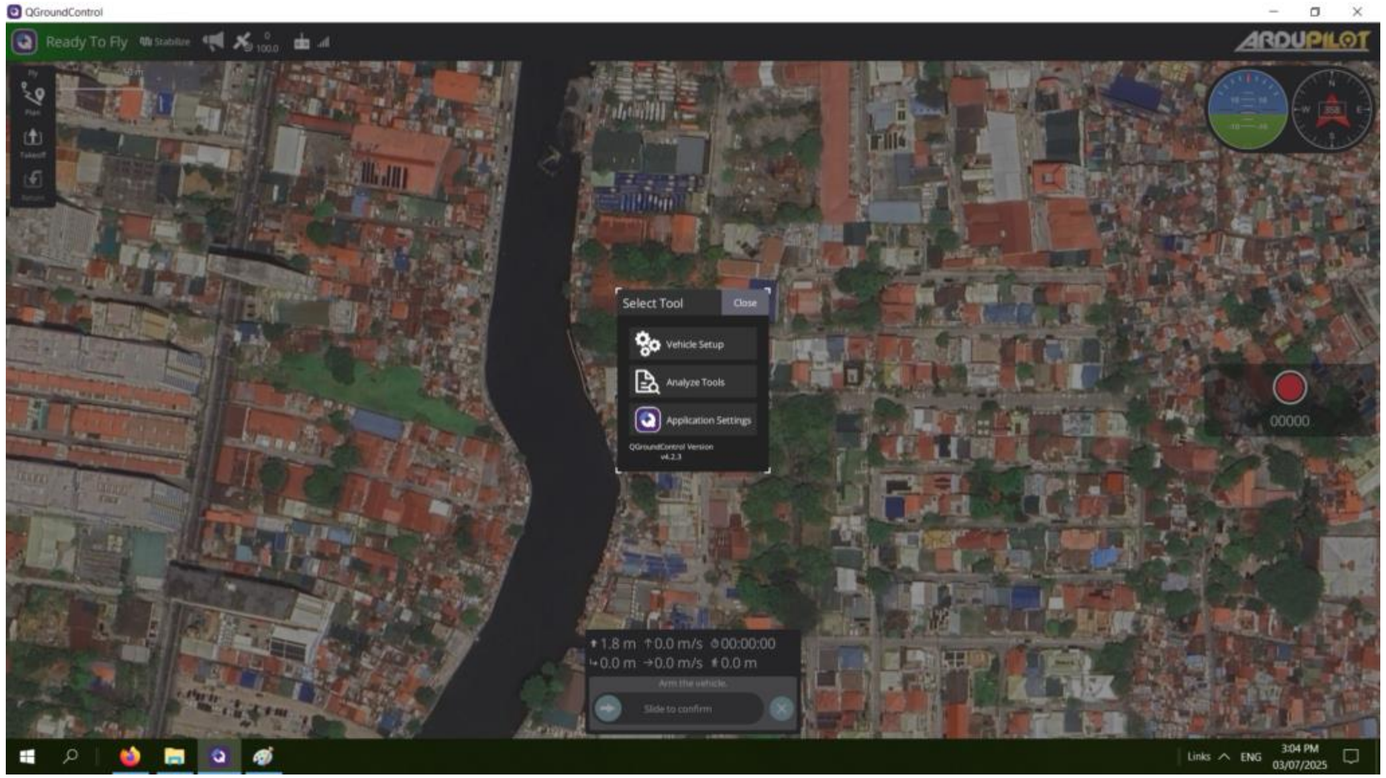
select **Ardupilot** and ***Custom firmware***. Select the **.bin** or **.apj** file of **Synerduino F405**

Respectively Select the vehicle type you wish to use

- Arducopter
- Arduplane
- Ardurover
- Ardusub
- Blimp
- Antenna tracker

Note: Synerduino Ardupilot firmware can also be flash using INAV configurator .HEX see: INAV Documentation firmware flash.

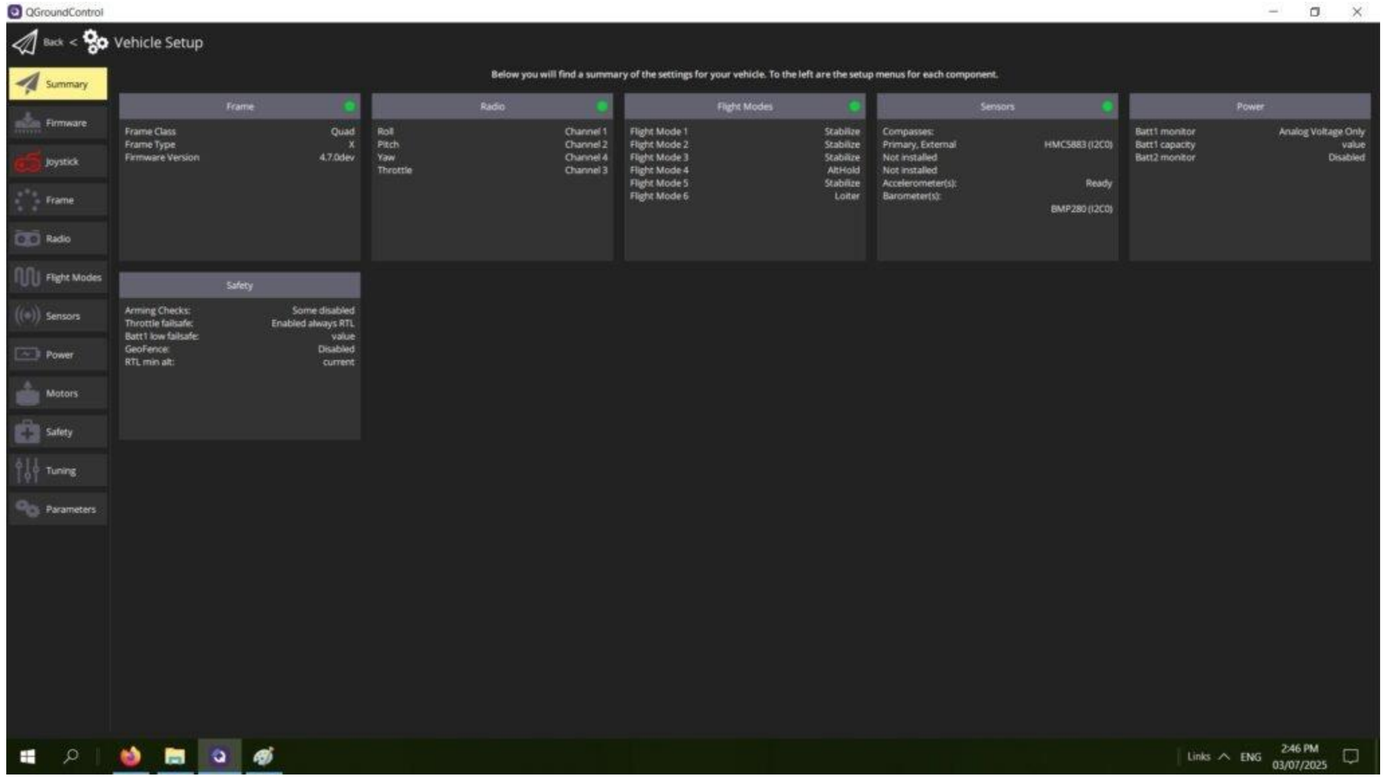
QGROUND



Once Firmware Is loaded Qground would automatically search for the USB where Synerduino is plugged in

For those using the telemetry later on this can be setup on the Comms later on

VEHICLE STATUS

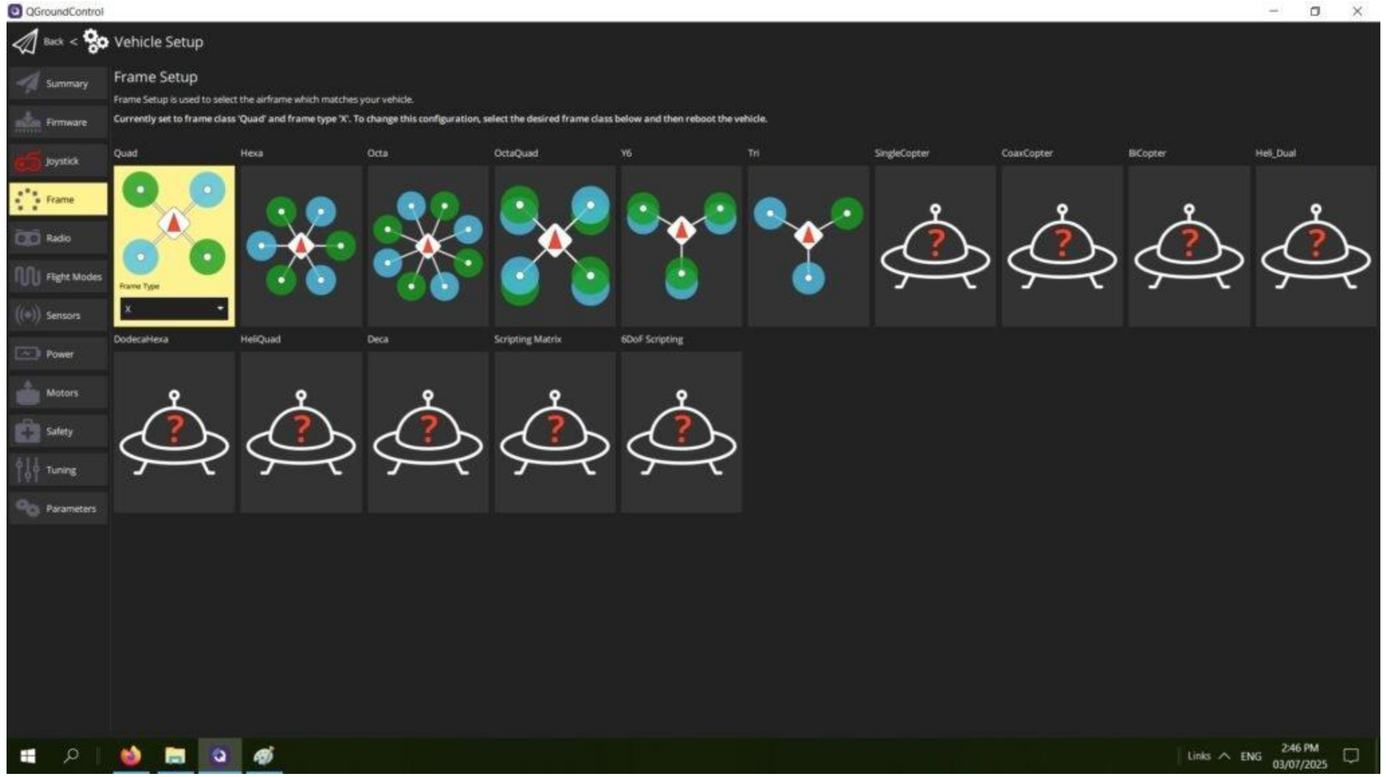


Summary Tab

This is the basic status reported by the Flight controller

This relays information about the health conditions and modes that the drone is set to

VEHICLE FRAME



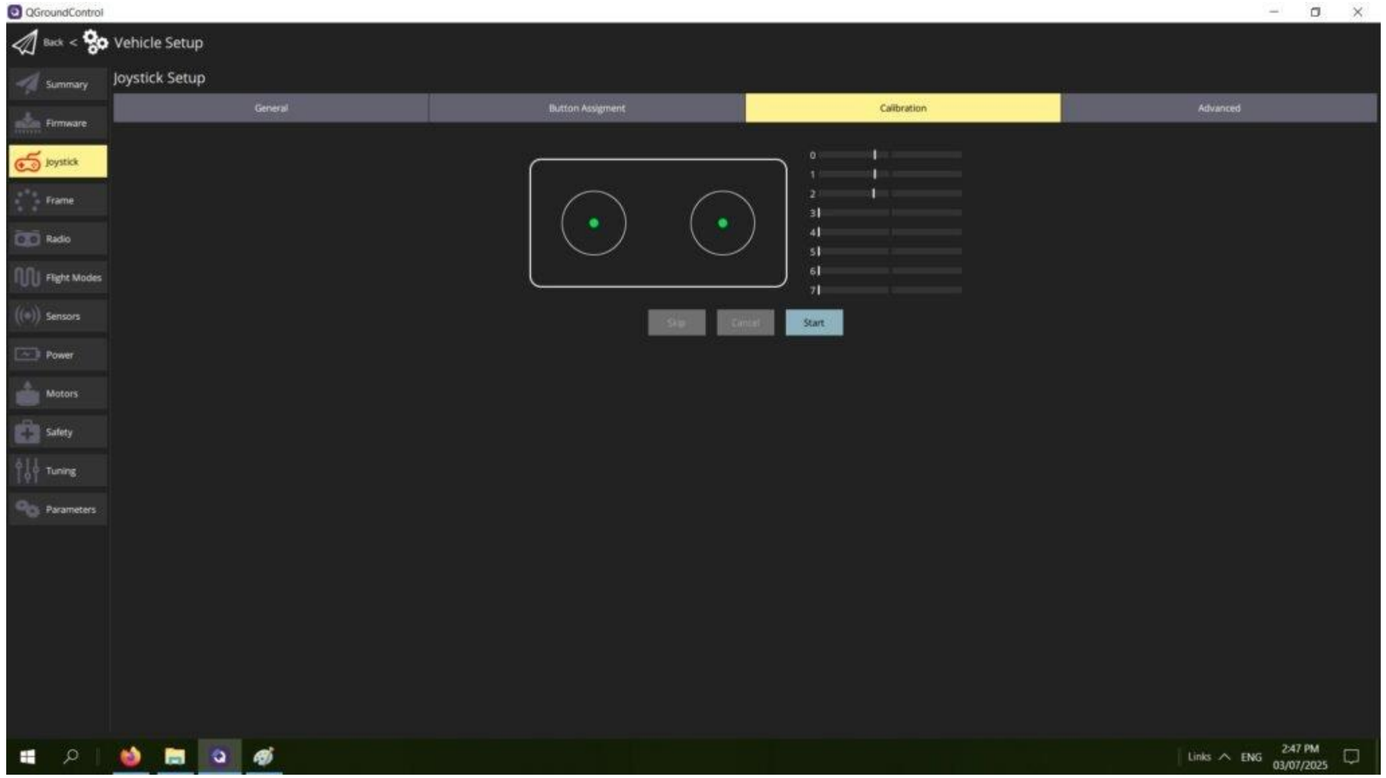
Frame

Synerduino uses Quad X. Be aware of the motor Orientation Pin assignment

See: documentation *ArduCopter Documentation*

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/airframe_ardupilot.html

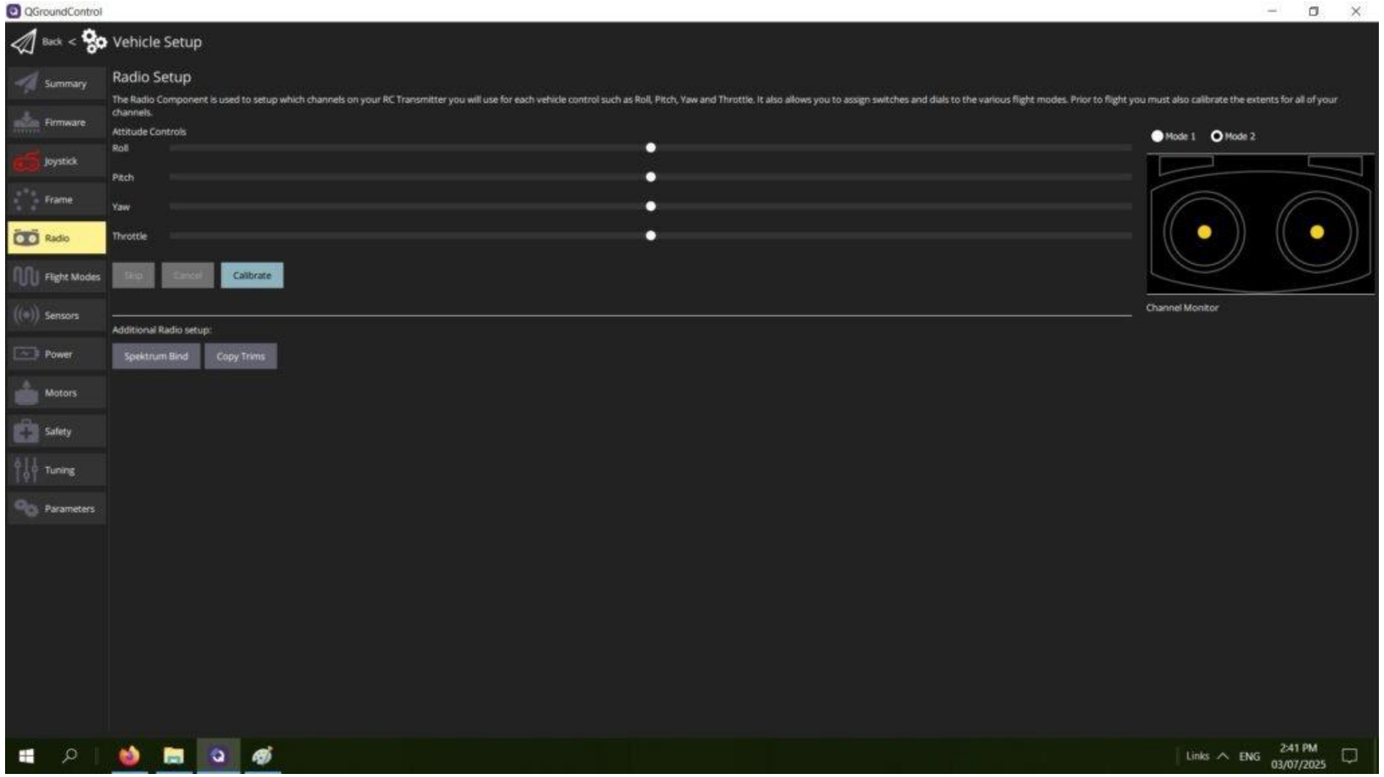
JOYSTICK



Joystick

This allows USB joystick to operate injunction with the GCS and what ever your means to communicate to the drone

RADIO TRANSMITTER



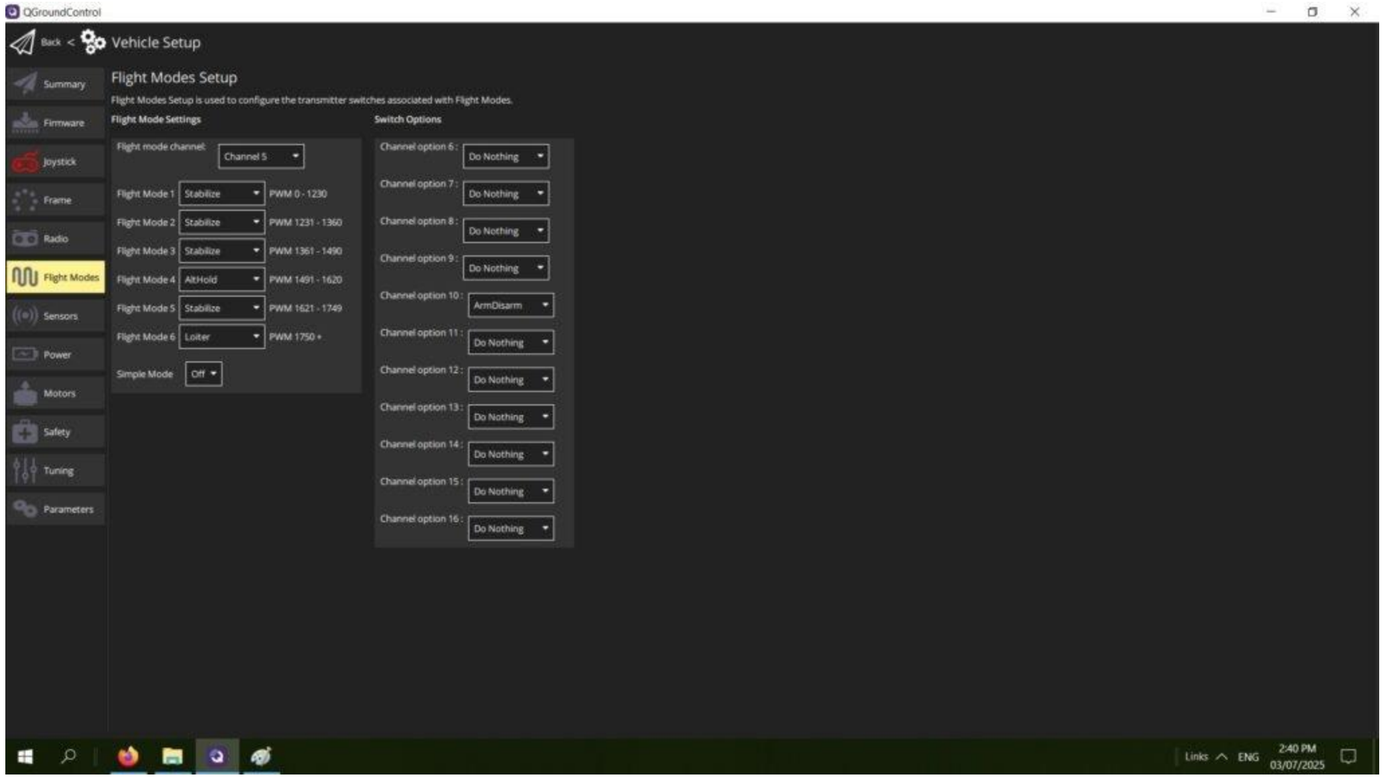
Radio

RC mapping and calibration of your main and Aux channels

Click on the calibrate button and follow as instructed

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/radio.html

FLIGHT MODES



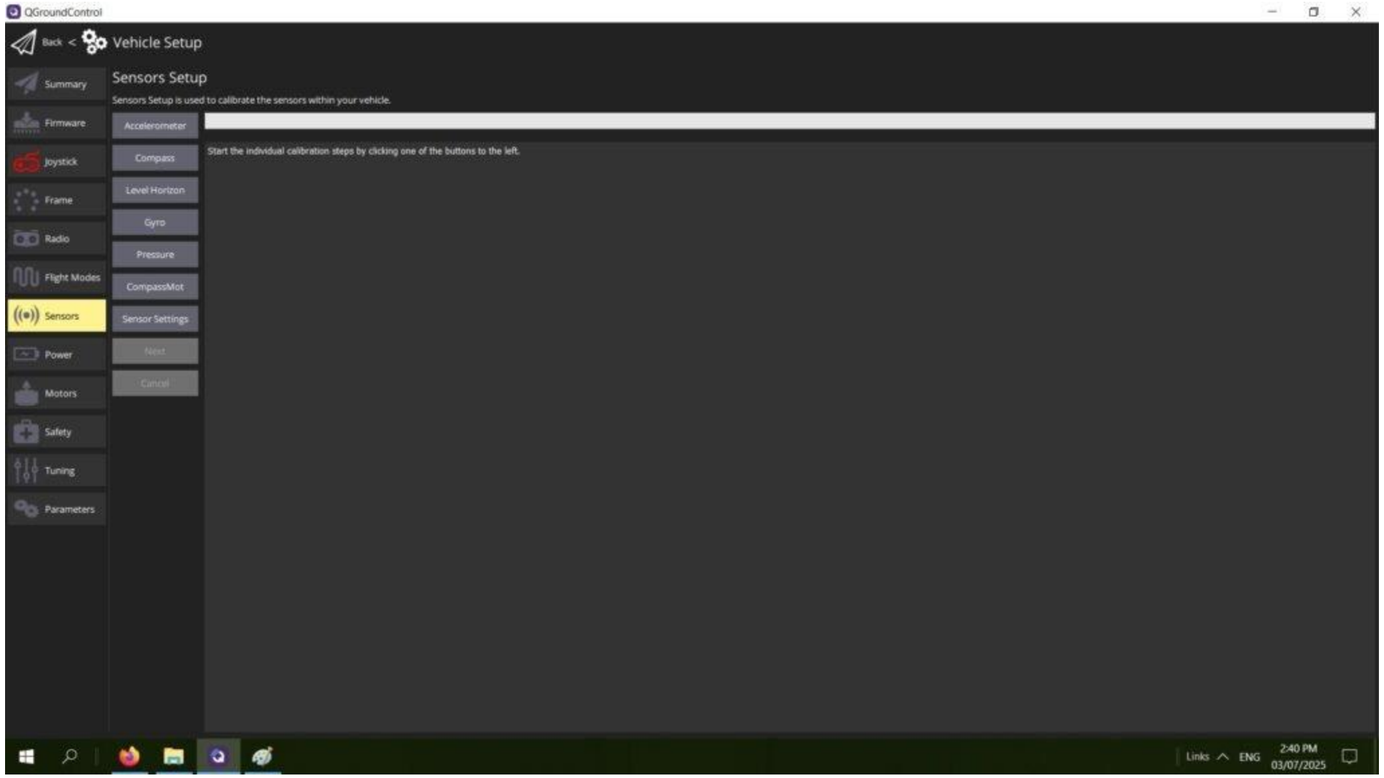
Flight Modes
Here you setup your modes assign to your Aux channels Switches

Note Ardupilot always have Ch5 as a multi selection

Eg.

Ch5 – Althold/Loiter/Mission
Ch6 – Arm/Disarm
Ch7 - Payload

SENSORS

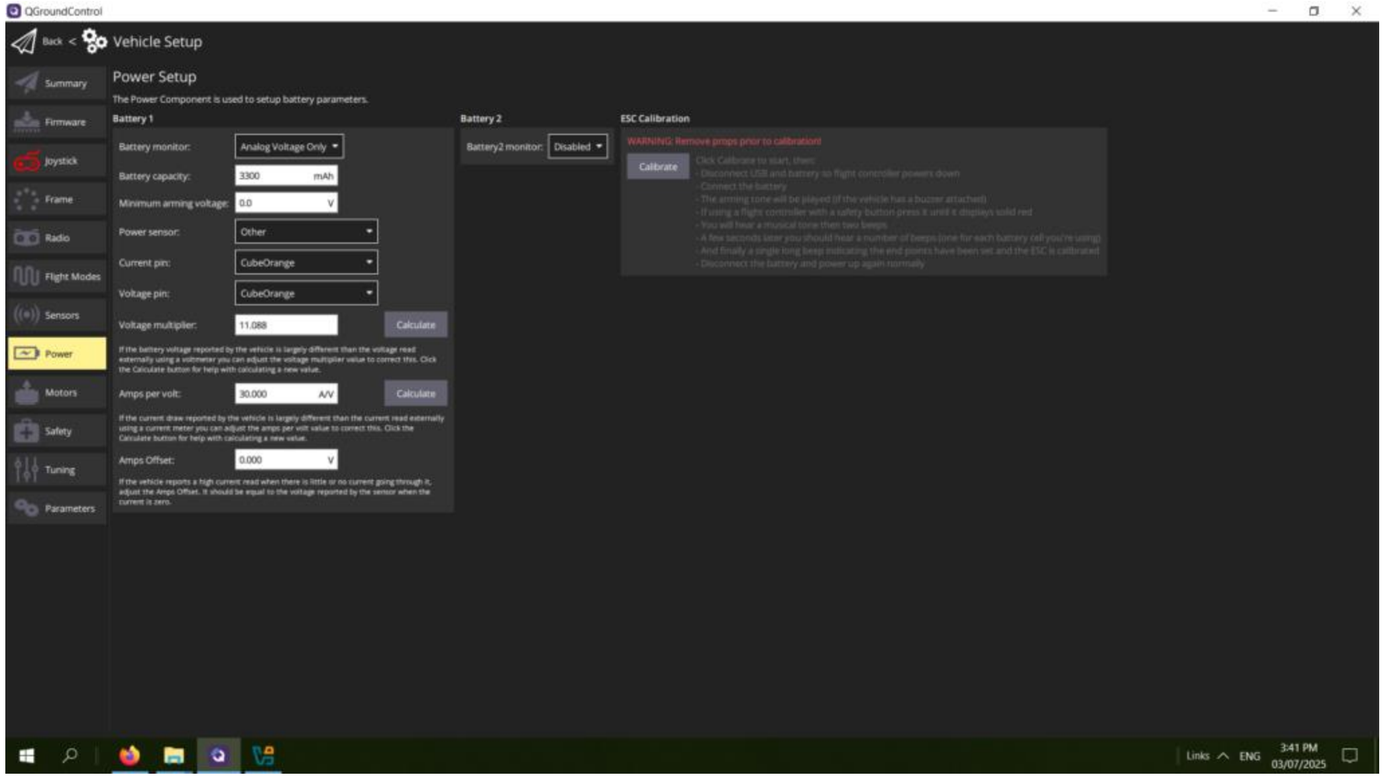


Sensors
IMU setup and Calibrations , you need to follow the instruction on how to orientate your drones to calibrate it and require Reboot .

This calibrates the
Magnetometer
Gyro Accelerometer
Horizon

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/sensors_ardupilot.html

POWER



Power
setup your power management parameters

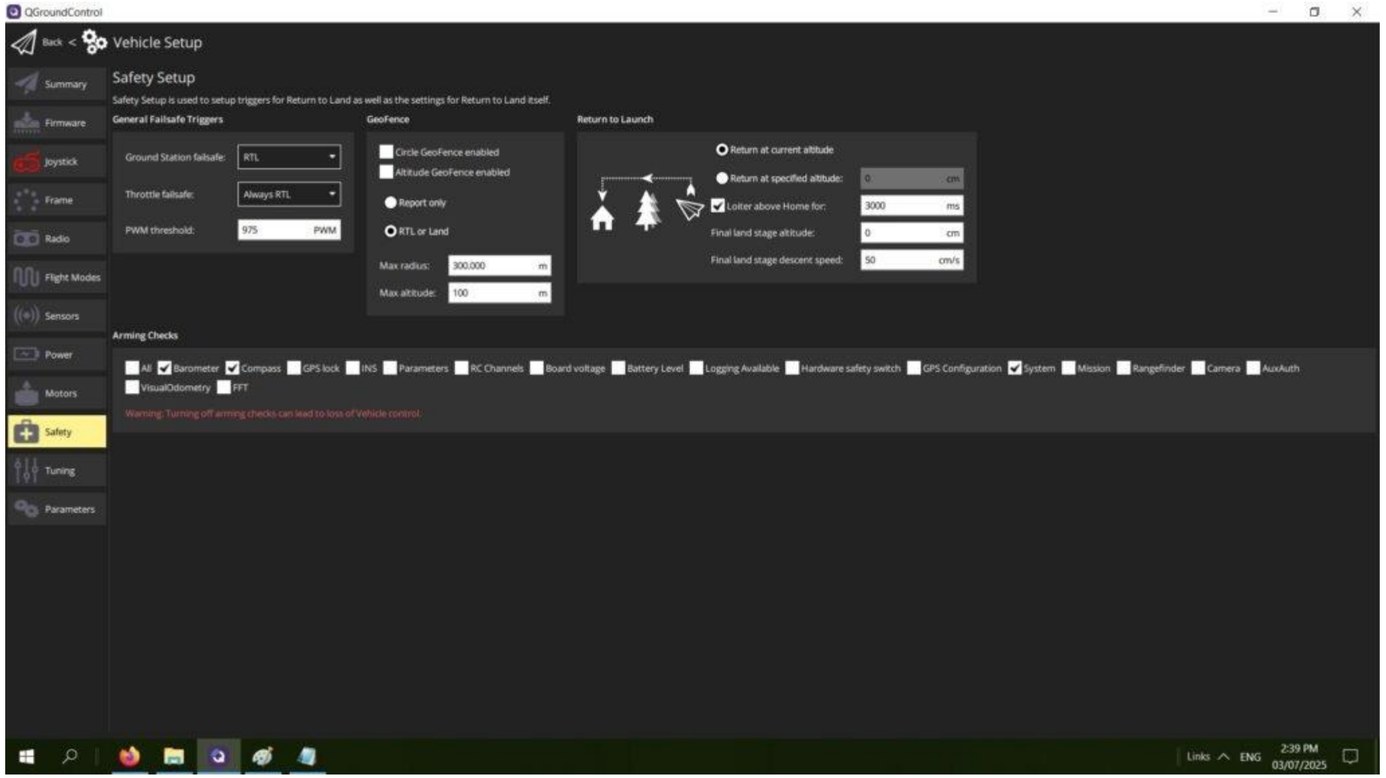
Voltage test your batteries before pluging them in the drone

Use the test information as baseline to calibrate your voltage

Adjust multiplier when needed

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/power.html

SAFETY



Safety
This setup the failsafe mode what the drone would do if it gets disconnected from RC or Telemetry

This specify the various trigger and action the would do

General Trigger

- Ground station – loss telemetry
- Throttle – thrust loss error
- PWM – PWM as set by your receiver which is zero throttle when disconnected

Geofence
- When your drone exceed the perimeter

Return to Launch

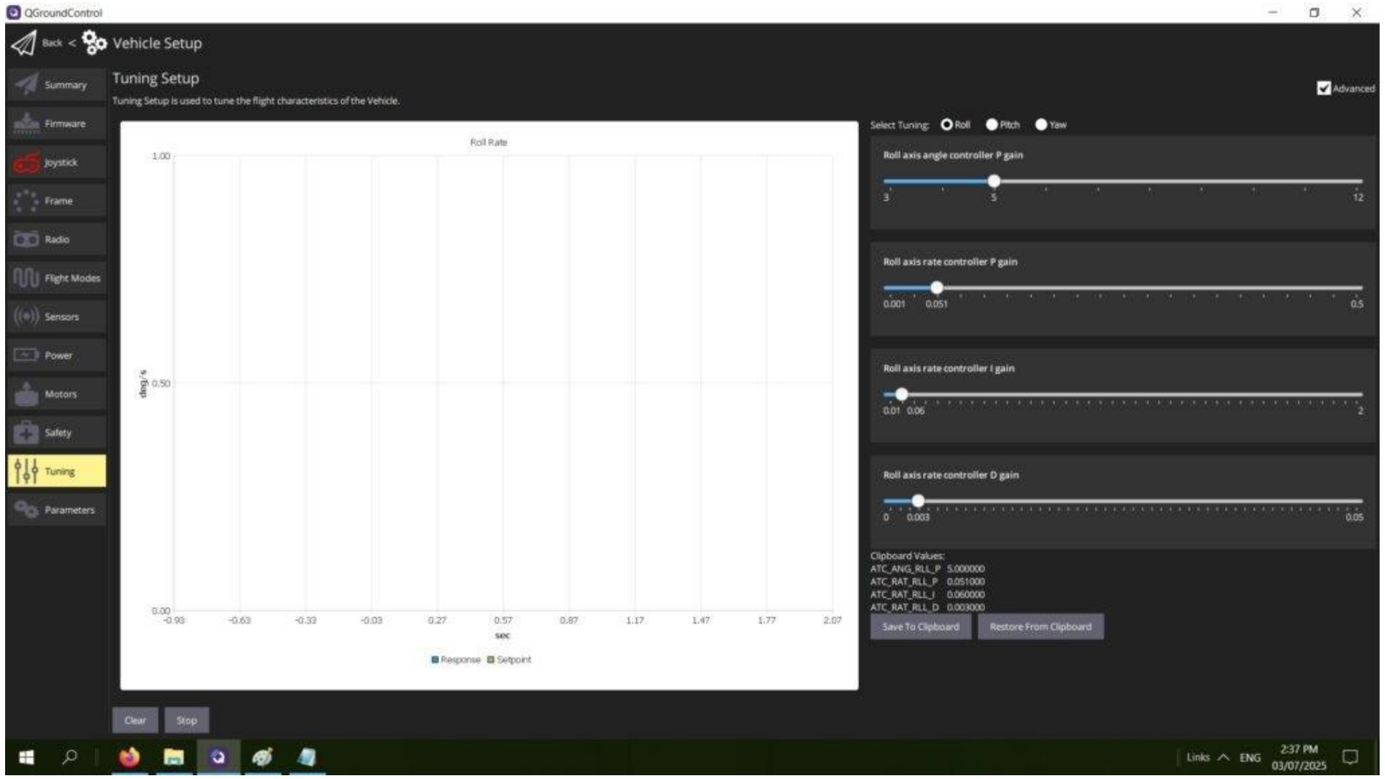
This is refer to the action the drone needs to perform

Arming checks

This checks the condition of your drone status

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/safety.html

TUNING



Tuning

this is where you Tune your PIDS and stability of the drone . NOTE: Ardupilot default are design for 450mm - 650mm 10” -15” drones

Select Advance and set the PIDS from here

Synerduino 250mm Drone PID setting

Roll

ATC_ANG_RLL_P 5.000000
ATC_RAT_RLL_P 0.051000
ATC_RAT_RLL_I 0.060000
ATC_RAT_RLL_D 0.003000

Pitch

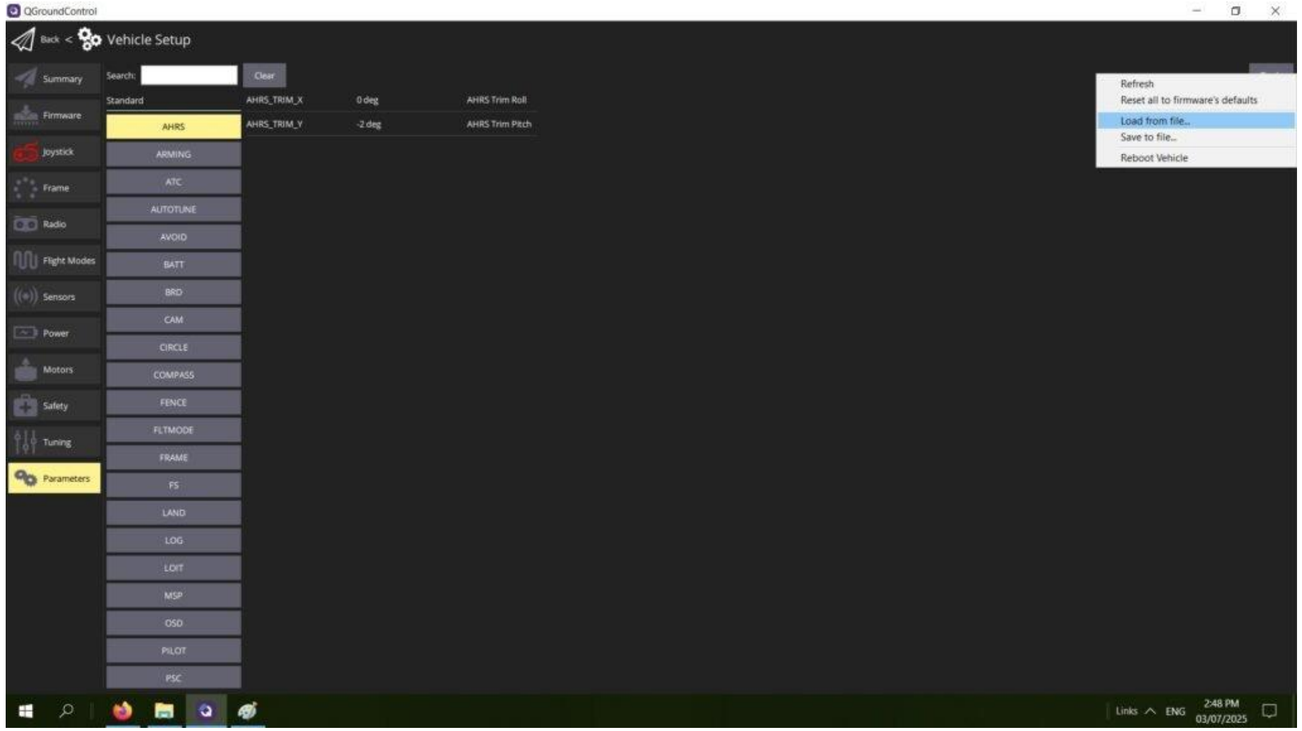
ATC_ANG_PIT_P 5.000000
ATC_RAT_PIT_P 0.051000
ATC_RAT_PIT_I 0.060000
ATC_RAT_PIT_D 0.003000

Yaw

ATC_ANG_YAW_P 4.500000
ATC_RAT_RLL_P 0.180000
ATC_RAT_RLL_I 0.018000

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/tuning_arducopter.html

PARAMETERS



Parameters

For other setting

Sometimes the drone is too large or too small from default , new sensors added , or Pin assignment of your ADC or PWM would require a parameter change

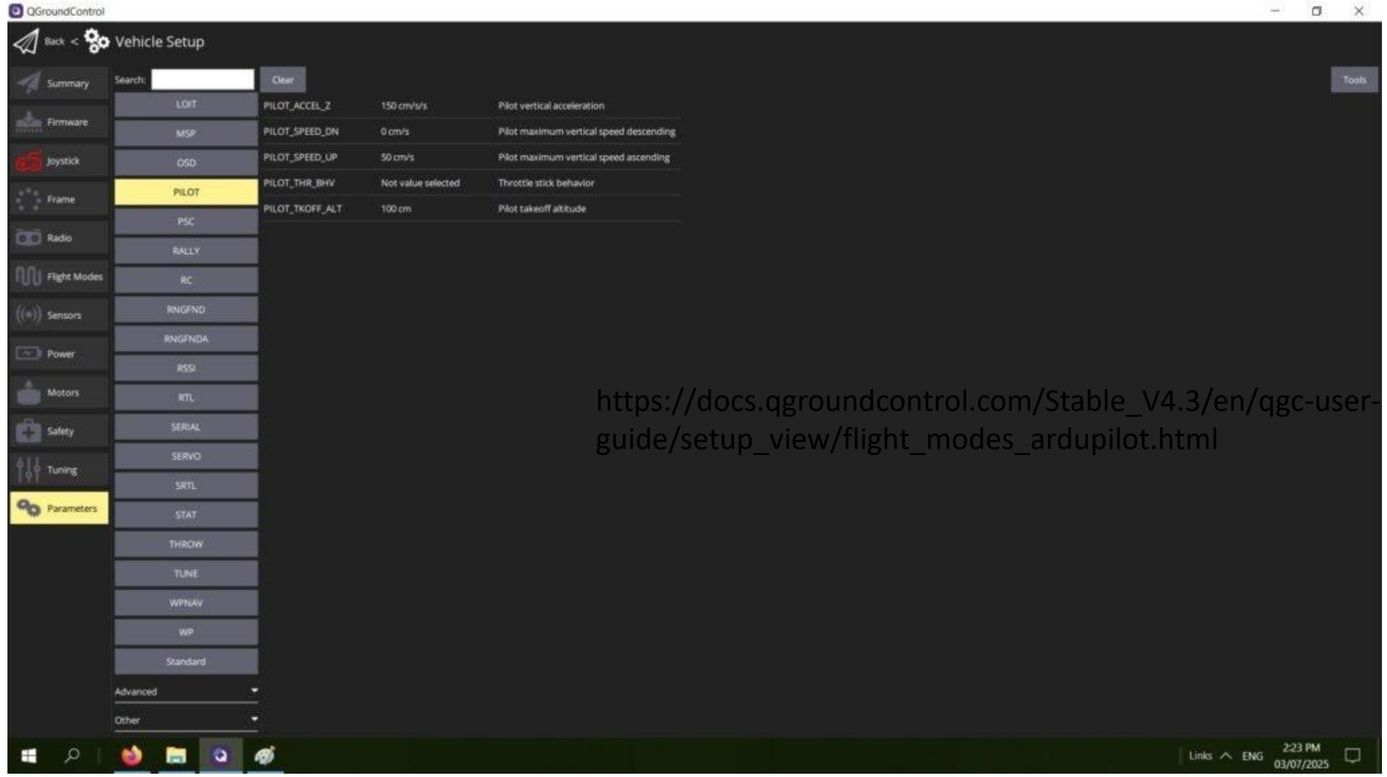
Synerduino 250mm F405 Drone has a downloadable preset of parameter files *Synerduino-250mm-Arducopter-4.7.0.zip*

https://synerflight.com/synerduino-documentation/q-ground-synerduino-quick-setup/

To know more details
https://ardupilot.org/copter/docs/parameters.html#parameters

https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/tuning_arducopter.html

PARAMETERS



https://docs.qgroundcontrol.com/Stable_V4.3/en/qgc-user-guide/setup_view/flight_modes_ardupilot.html

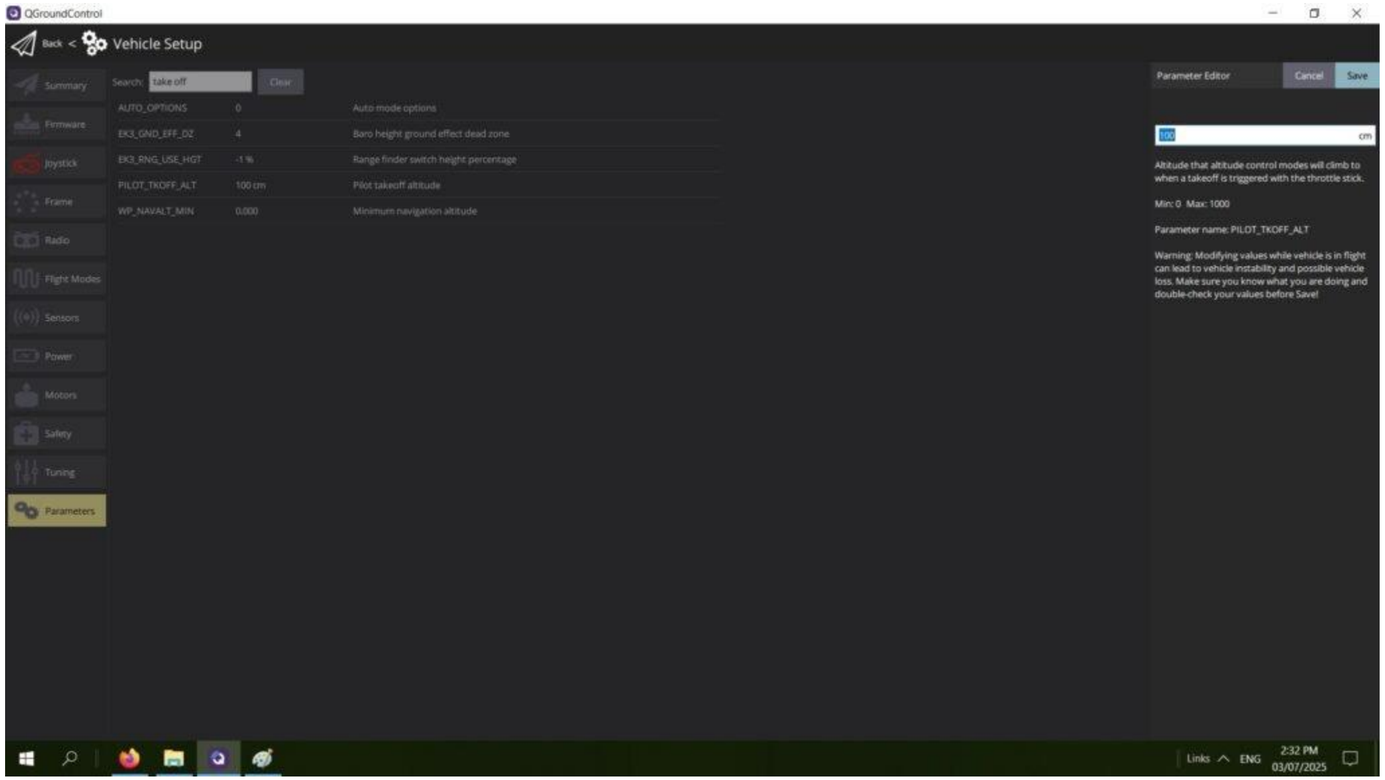
Parameters

Synerduino 250mm drone because of its small size can have some unusual Behavior that is different from default we are going to run over a few of them

PILOT

PILOT_SPEED_UP 50 CM/S – this controls the climb rate of the drone .

PARAMETERS

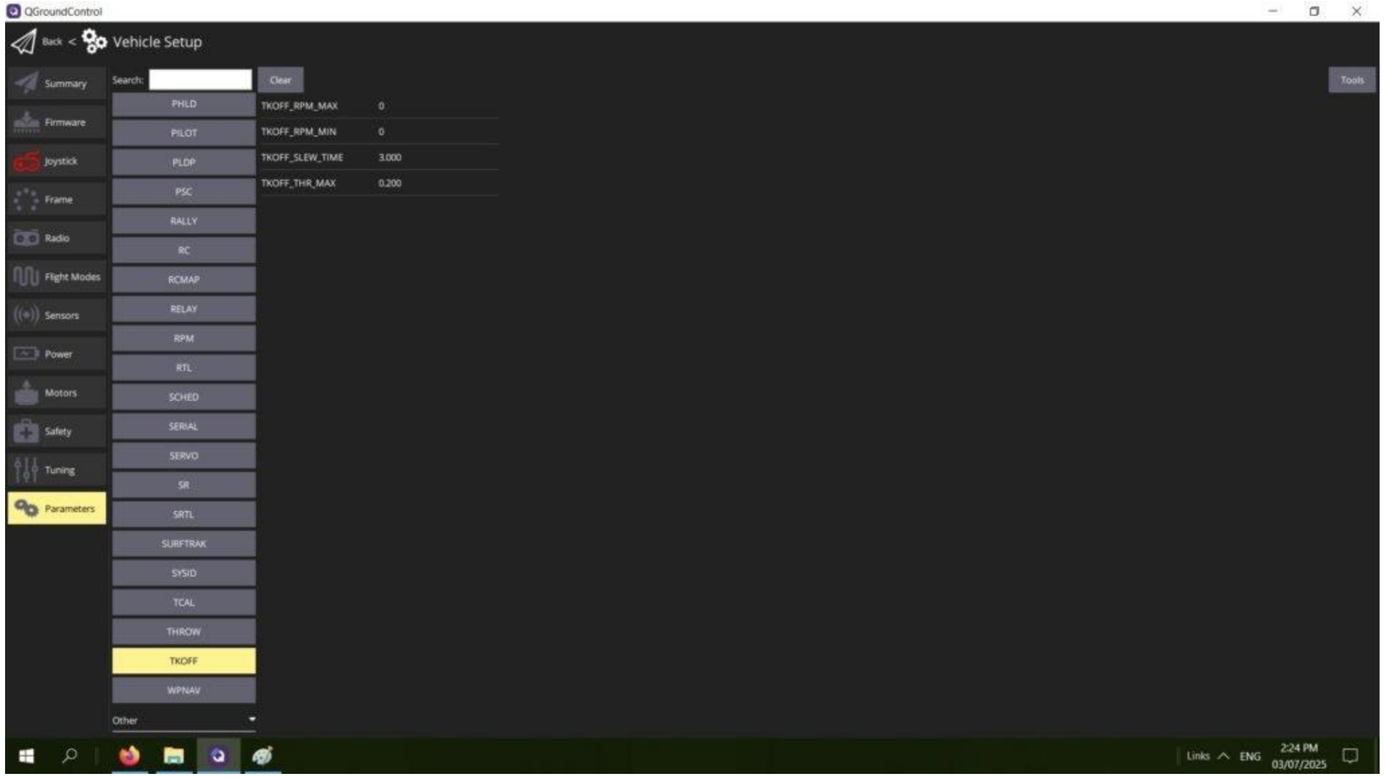


Parameters
Default altitude the drone would climb when auto take off is initiated

PILOT_TKOFF_ALT

PILOT_TKOFF_ALT set to 100cm – this is the Altitude the drone would climb to when auto take off is selected. or in the start of the mission by default

PARAMETERS

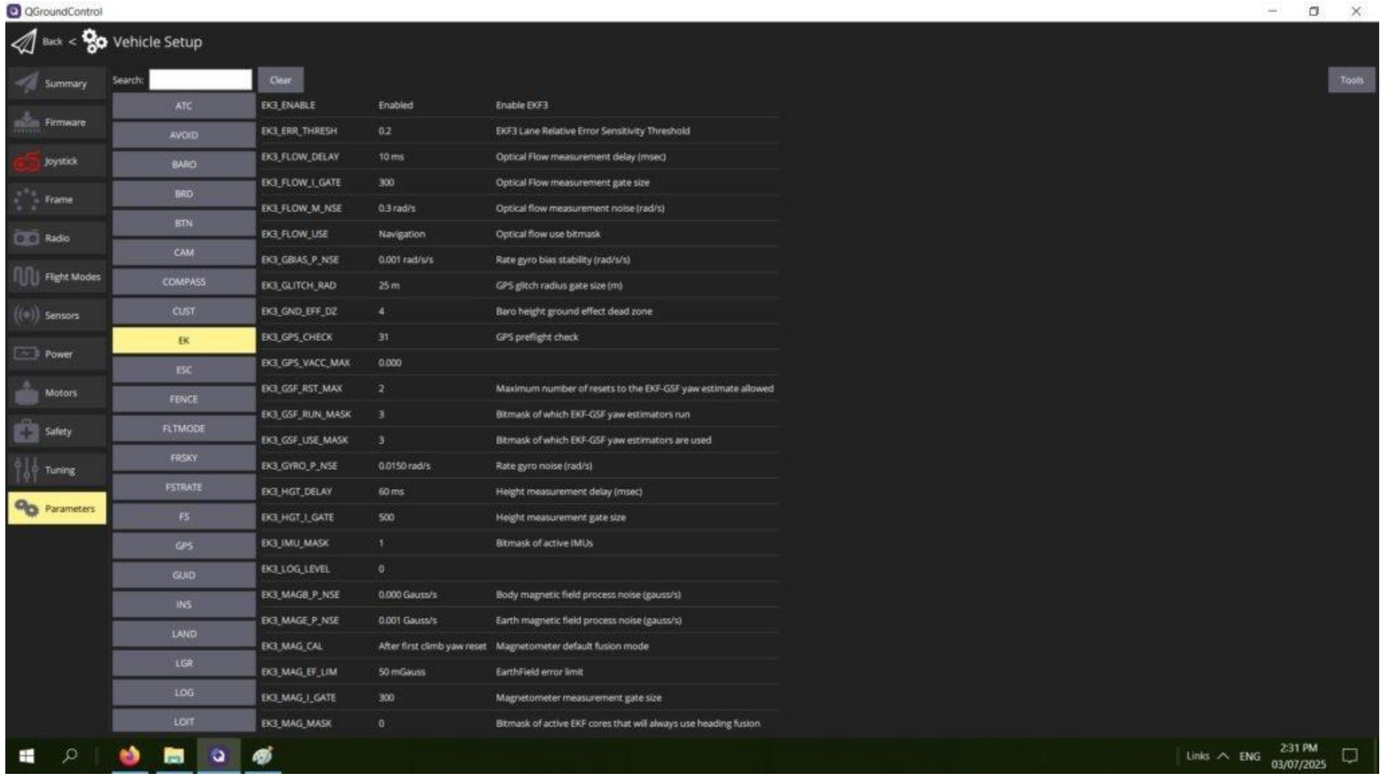


Parameters
Take off settings

TKOFF_SLEW_TIME 3.000 – 3 seconds allow the motor to spool up after arm then take off. this is set to 5 Seconds for Large drones as it takes longer to get the Motors at Idle speed

TKOFF_THR_MAX – 0.200 Synerduino 250 is light so a little throttle is require to take off Maximum throttle engage . this jumps the drone to the determine take off altitude . larger drone may require 0.400

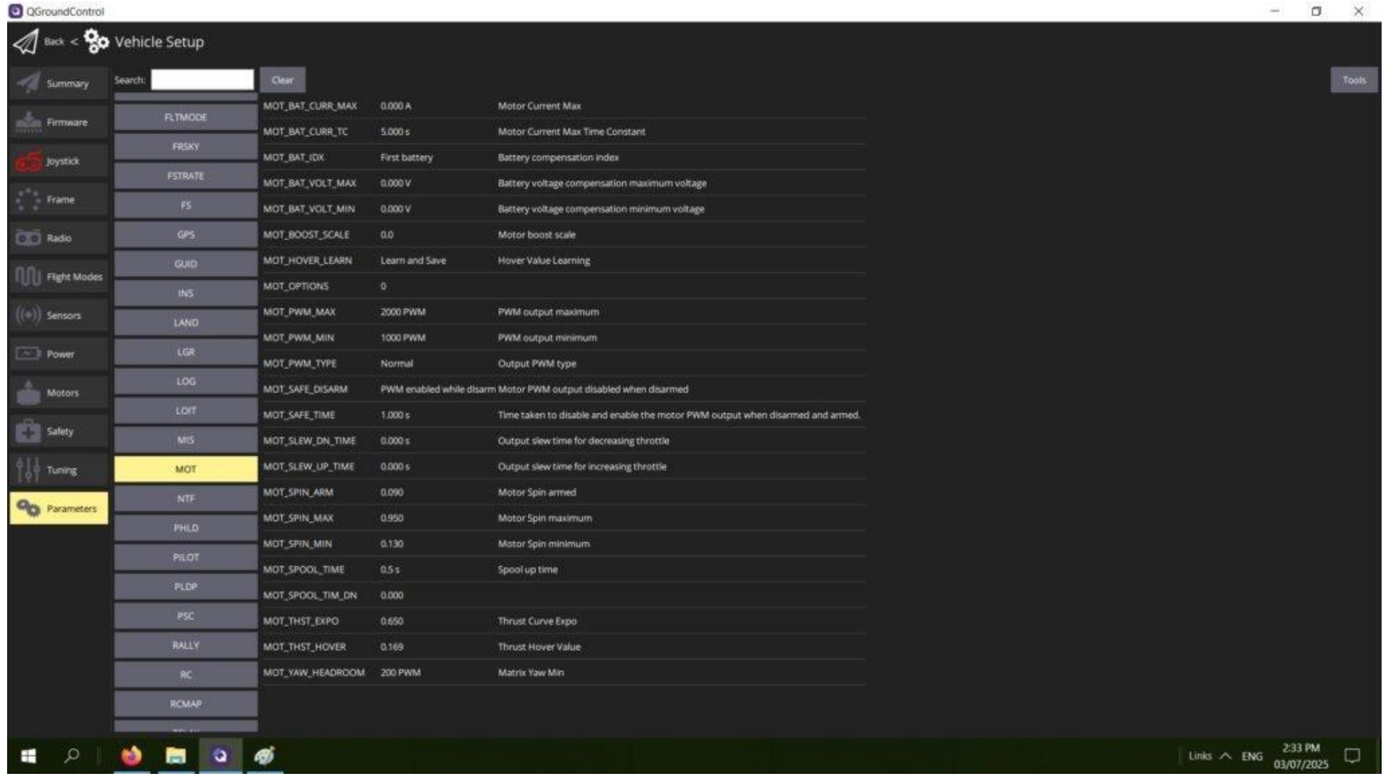
PARAMETERS



Parameters
Take off settings

EK3_GND_EFF_DZ 4 – small drones are affected by ground effect so allowance of a dead zone allow the barometer to adjust and compensate sometimes jumping the copter on takeoff to clear it.

PARAMETERS

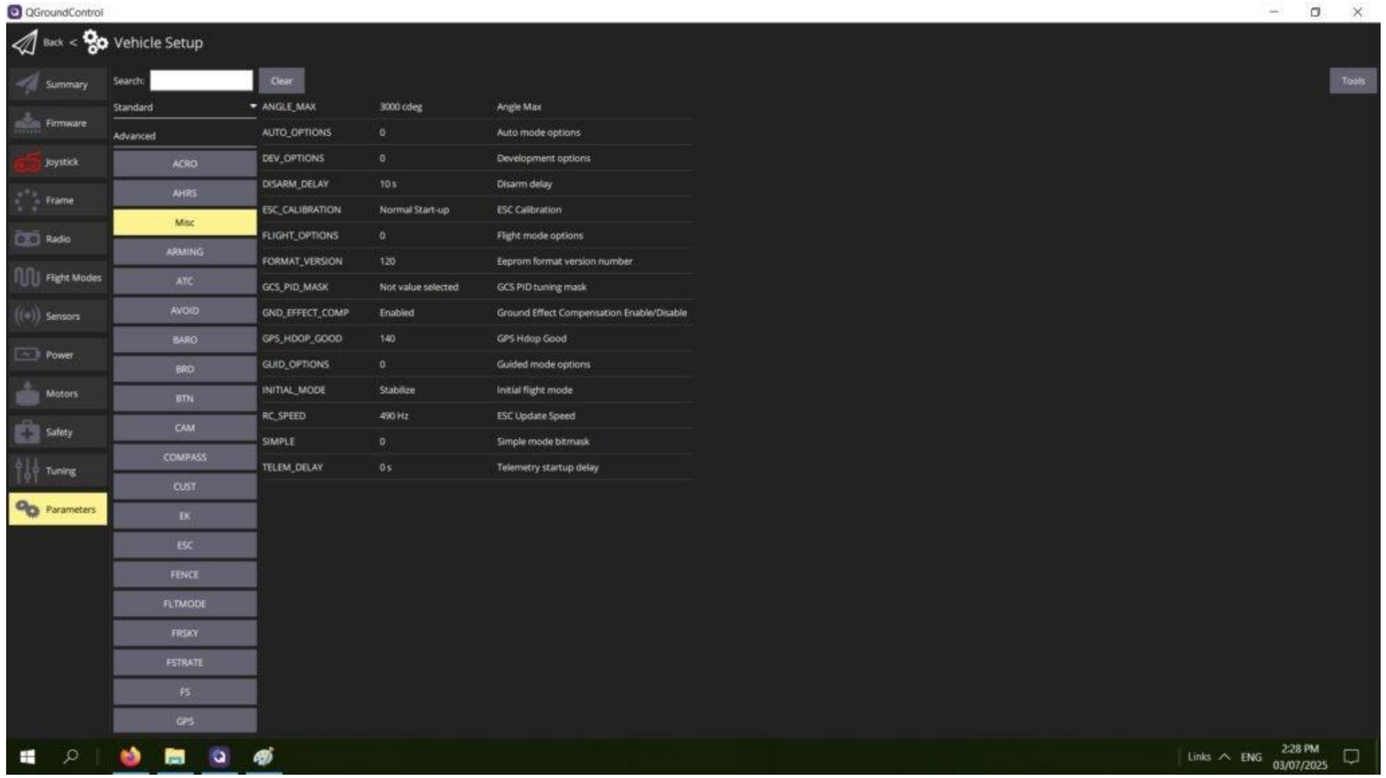


Parameters
Arm settings

MOT_SPOOL_TIME 0.5 – this is ok for small drones however Large drones can take upto 2.0 to spool the motor up to idle mode. the must be set less than TKOFF_SLEW_TIME

MOT_SPIN_ARM 0.090 – Idle Speed of the motor after arming

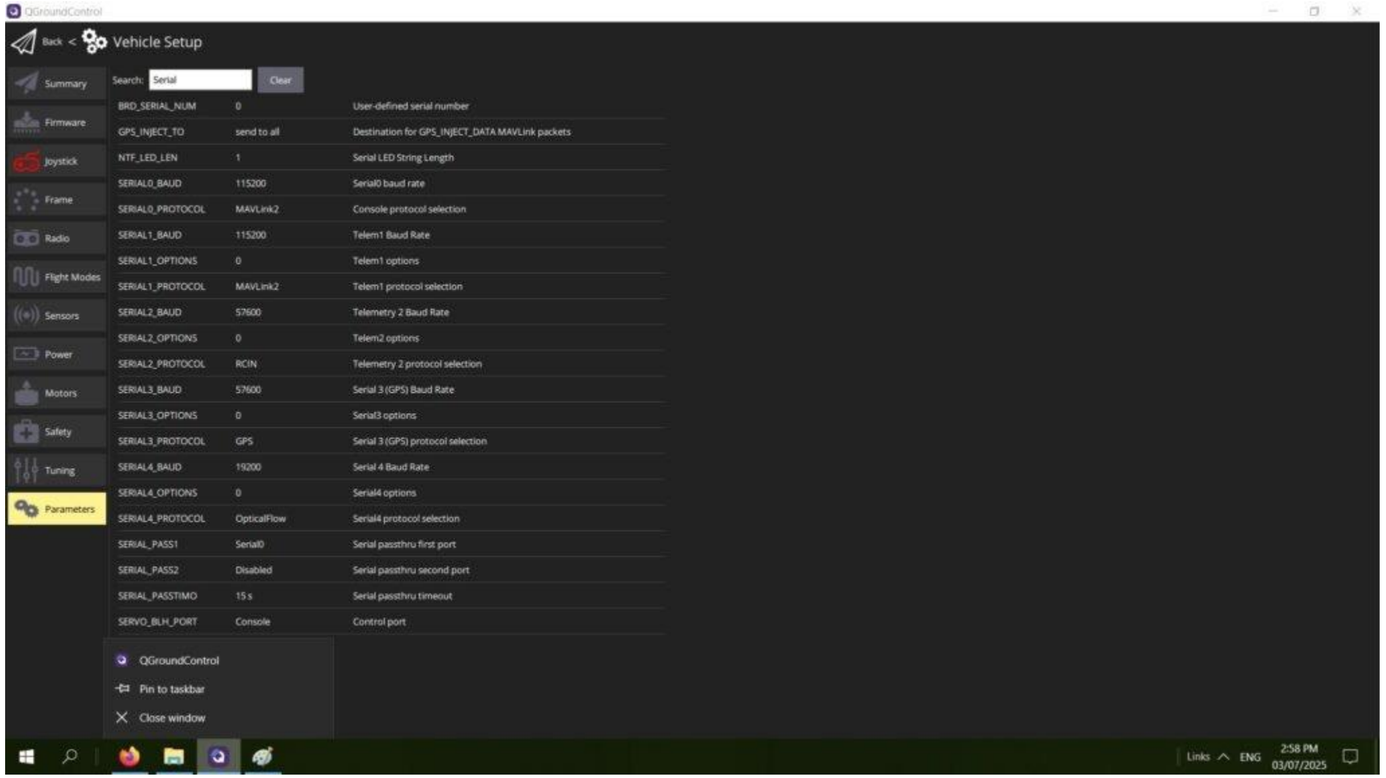
PARAMETERS



Parameters
Ground effect this affect any drones sizes adjust accordingly

MSK
GND EFFECT_COMP – the is active to compensate for ground effect

PARAMETERS



Here you can set the serial assignment which device is connected and its baud rate

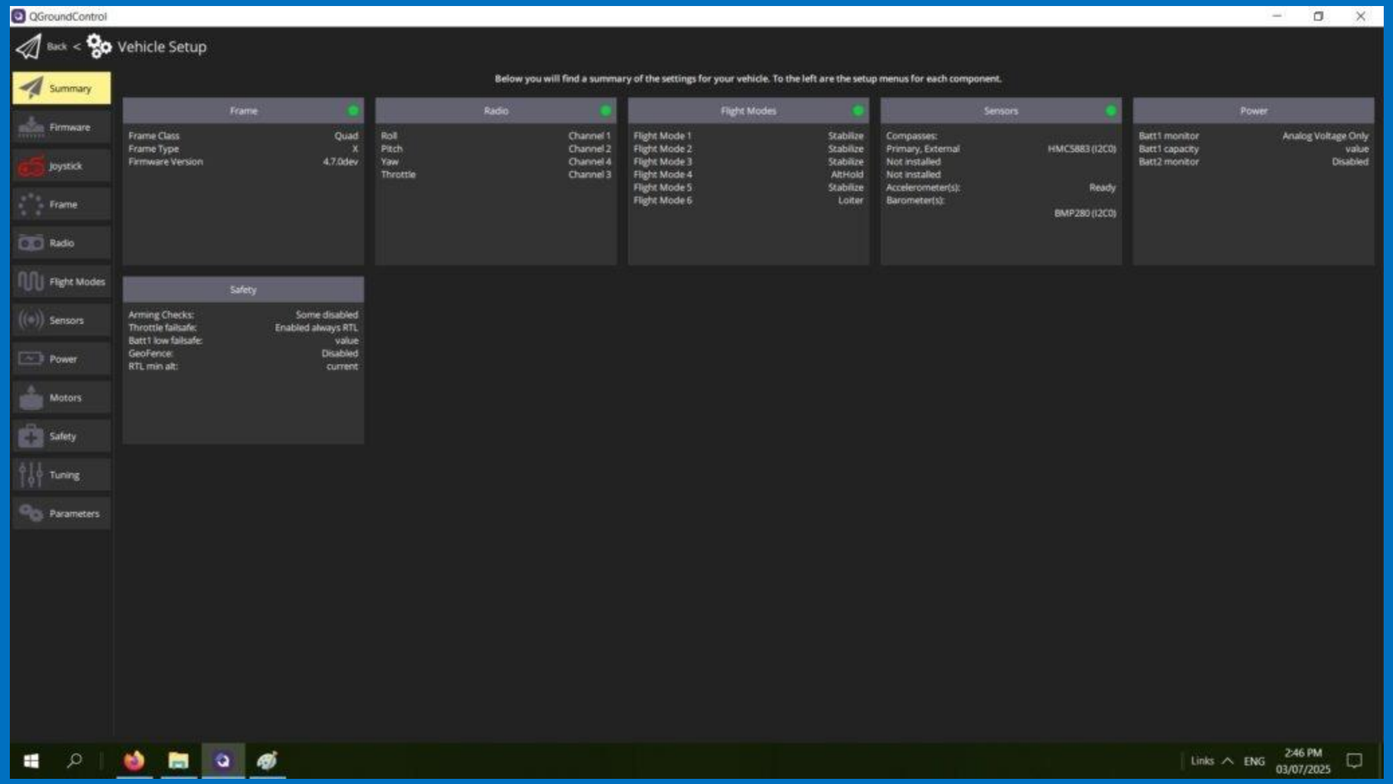
SERIAL
- Serial1 – UART1 – Mavlink2 – Tel
- Serial2 – UART2 – RCIN – SerialRC
- Serial3 – UART4 – GPS – Set Baud 57600
- Serial4 – UART6 – 0

TESTING

SYSTEM CHECKS

NOTE:

- *Ensure all Pre-Arm checks are in the green*
- *Sensor Status are Blue*
- *Heading is Oriented correctly*
  0 North 90 East 180 South 270 West
- *Pitch and Roll at 0*
- *Any Error in this should check their Respective Menu*
- *CLI Terminal type STATUS should show if there are any misconfigurations*



PRE-FLIGHT

PREFLIGHT

NOTE:

- *Check Batteries fully Charge*
- *Motors and Connections in Good shape*
- *Radio and Flight board Failsafe Active*
- *Communication with Ground station working*
- *Flight modes setup correctly*
- *Correct motor and Prop Rotation*