

Operating the multicopter

Starting the multicopter

The engine launch is done by tilting the yaw stick right while having the throttle stick in minimum position.

(An alternative method was also introduced recently: roll stick right while having the throttle stick in minimum position.)

For security reasons, the throttle stick must be set to minimum.

Now motors turn at an idle rate and the tricopter is ready for flight.

If you have no ACC connected (Nunchuk or other individual ACC), it is not necessary for the multicopter to be positioned flat, the angle does not matter.

Once armed, multiwii should permanently switch ON the status LED.

Motor shutdown

Motor shutdown is done by tilting the yaw stick left while having the throttle stick in minimum position.

(An alternative method was also introduced recently: roll stick left while having the throttle stick in minimum position.)

Once disarmed, multiwii should permanently switch OFF the status LED.

Gyroscopes calibration

To calibrate the neutral of gyroscope sensors, you must tilt the yaw stick left, tilt the pitch stick back while having the throttle stick in minimal position.

The multicopter should not move during this stage. However its inclination has no influence.

The status LED will blink to confirm this step.

Accelerometers calibration

This step is relevant only if you have a Nunchuk or an individual ACC.

The multicopter inclination should be as horizontal as possible during this step.

To calibrate the neutral of accelerometer sensors, you must tilt the yaw stick left, tilt the pitch stick back while having the throttle stick in maximal position.

This step must be realized at least once, the acc calibration is then stored in the EEPROM.

This step can also be realized directly from the GUI via the CALIBRATE button.

Note this step is very important and is one of the most common issue we can see in feedbacks, please don't skip it.

If this step is not correctly done, the status LED will blink forever and you won't be able to arm the motors (security).

The status LED will blink to confirm this step.

Accelerometers trim

With the help of your roll and pitch stick you could now trim the ACC mode.

You must first put the throttle stick in maximal position. (obviously with motors disarmed)

full PITCH forward/backward and full ROLL left/right (2 axis possibilities) will trim the level mode according to the neutral angle you want to change.

The status LED will blink to confirm each ticks.

Configuration via GUI

The GUI is a java program that can run on any PC windows/linux/mac computer.

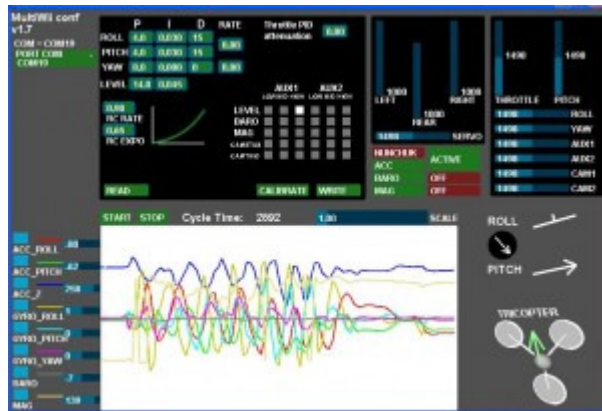
The Arduino must be connected via an USB cable to the computer to use it.

Alternatively, it is possible to use a wireless transmission via bluetooth as data are transported over a simple serial port.

(not documented, but some managed to do it)

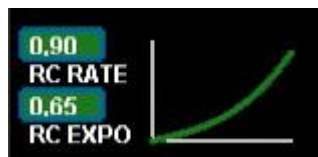
GUI launch procedure:

- 1) You must connect the arduino board to your PC via the USB connection (the same used to inject the software via Arduino IDE)
 - 2) Once it's done, you can launch the GUI, and then select the good PORT COM (the same used by arduino IDE).
 - 3) Once it's done, you have to wait some seconds to let the arduino boot and run the soft. (wait for the LED blink)
 - 4) once the status led is OK (it should blink ans stays off), you can press the START button to see the evolution of values.
 - 5) you must READ the current parameters in the Arduino before configuring it. Default values are set at the beginning.
- The default values can be reset by uploading an old version and then the last version.



Parameter explanation

RC rate and RC expo



RC rate: defines the sensibility of the multicopter for PITCH and ROLL RC stick. If you feel your multi too reactive, decrease it. If you want to improve its responsiveness, increase this parameter.

RC expo: defines a smoother zone at the center of PITC and ROLL RC stick. With this function, it's possible to have both a good precision and a good amplitude.

0 = no expo

1 = full expo

If you don't understand really those parameters, I encourage you to read your TX documentation, as those functions are also generally supported by the TX.

It's better to support them directly in multiwii because the resolution is better this way.

P and I Level

LEVEL 14,0 0,045

Defines the acc influence in stable mode only (this parameter has no effect if the stable mode is disable)

If the multi is not stable once activated, reduce P.

PITCH/ROLL/YAW PID and rate

	P	I	D	RATE
ROLL	4,0	0,030	15	0,00
PITCH	4,0	0,030	15	0,00
YAW	8,0	0,000	0	0,00

For a very stable multicopter with a solid attitude, the PID settings must be set high. But if you want to do some acrobatics with these settings, the multi starts to wobble in fast translation or when you decide to shake it to much. One solution is to decrease the PID, but it is to the detriment of static stability.

So instead of implementing a switch between 2 PID settings, there are now 2 options in the GUI to define the way we should decrease PID, depending on ROLL/PITCH/YAW stick deviation

The two boxes on the right defines the rate of cancellation of the nominal PID (the one which is used on neutral ROLL/PITCH/YAW stick position) in relation with ROLL/PITCH/YAW deviation. In fact only P and D parameters are impacted in the transformation. The purpose of this setting is not really to gain more stability, but to gain more maneuverability. 0 = soft rate (for FPV or beginners); 0.4 = soft acro ; 0.7 = fast acro ; 1 = insane rate

If you are not familiar with this, just keep the default values (0)

THROTTLE rate

Throttle PID
attenuation 0,00

This box defines the rate of cancellation of the nominal PID (the one which is used on neutral ROLL/PITCH stick position) in relation with Throttle stick.

The purpose of this curve is to gain more stability when you are in a situation to use more throttle than needed to just maintain a lift. This is typically the case in fast translation.

If you are not familiar with this, just keep the default values (0)

How to activate options



Depending on your configuration, you can easily activate/deactivate options via 2 switches on your RC TX.
The 2 switches correspond to channel 5 (AUX1) and channel 6 (AUX2).

LEVEL is the autolevel feature (require an ACC)

BARO allows to keep a constant altitude once activated (require a barometer)

MAG allows to keep a perfect heading direction once activated (require a magnetometer)

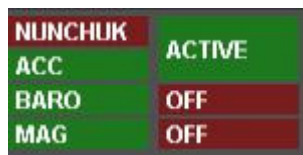
CAMSTAB: if activated, the PITCH&ROLL servo output will follow the inclination of the multi (require an ACC + the code activation via #define statement)

CAMSTRIG: if activated, a servo output will trigger repetitively a sequence where we can define the duration on the HIGH/LOW position.

To activate a function, you must check the white box at the intersection of the required option (row) and at the switch state you want to enable (column).
It's possible to make a complex mix.

If you want to force an option permanently, it's possible to check all the white boxes, even without a RC channel connected.
(=> this way, you don't need a 5 or 6 channels RC receiver)

Sensor detection/usage



On this screen, the left column resumes the detection of sensors.

The right column precises if the sensor is currently use or not (depending on the checked options)

General

LED status signification

At initialization:

- a short blink means there is no ACC connected (Nunchuk or other)
- a long blink means there is an ACC connected (Nunchuk well recognized or other)

During field setup via LCD:

- there is a fast blink at the beginning of the setup mode, and at the end
- there is a fast blink when a parameter is increased/decreased, and when the parameter is changed

After the initialization:

- LED is ON when the motors are armed
- LED is OFF when the motors are not armed

General issues:

- The blinks at the initialization is very long (more than 5s): it is sometimes the case with a WMP+NK configuration. A way to correct this is to increase the INTERLEAVING DELAY in the sketch. (from 3000 to 3500 or 4000)
- The LED is permanently blinking: it indicates a wrong connection between I2C devices and the Arduino (maybe a switch between SCA and SCL lines)
- After trying to arm, the LED stays off: check your RX connection and set correctly the radio end point to match the range 1000-2000 in the GUI

How to trim your Copter: version 1.7 and more

1. Trim in “acro” = headholding mode:

Calibration is made on each power on, but you can do it manually like before:

Full throttle down + full yaw left + full pitch backward

Just fly in acro mode and trim your copter with the trims on your transmitter.

No need to land, just do it in the air and trim as long as it looks good for you.

2. Trim in “stable” = ACC mode:

1. You have to trim your copter in “acro” mode before.

So your copter is perfectly trimmed in acro mode.

Otherwise you are overmixing trims from acro mode to stable mode and you have to trim stable mode again.

2. You have to calibrate ACC.

Copter must be stable and level at the ground.

Motors disarmed.

Full throttle up + full yaw left + full pitch backward

3. Now start motors and fly in stable mode.

Normally its better to start here as normal in acro mode and switch to stable mode while in the air.

Because if stable mode needs much trim, its easier to fly in acro mode.

Okay, so you are now with stable mode in the air and the copter drifts to the right and backwards.
Switch back to acro (easier to land) and land your copter.
Disarm motors.

4. Now trim the ACC mode.

Don't touch your trims on the transmitter.

Give full throttle (must be >1900)

With the help of your roll and pitch stick you could now trim the ACC mode.

full PITCH forward/backward and full ROLL left/right (2 axis possibilities) will trim the level mode according to the neutral angle you want to change.

The status LED will blink to confirm each ticks.

So for instance, you have to move the pitch stick full forward about 4-5x.

That means from neutral to full and back to neutral, 4-5 times.

You will here the buzzer each time beep and see the led each time blink, when move full forward.

The same for the roll axis.

After that start your motors and do again 3. until your copter is complete in level in ACC mode.

If you want to reset the ACC trims, just do step 2. (ACC calibration)