RATE/ACRO MODE VS HORIZON/SELF-LEVEL MODE

When it comes to general multirotors flying, there are two main flight modes we use, one is **acro mode** (AKA **manual mode** or **rate mode**), and the other is **self level mode**.

What is Rate Mode and Self-Level Mode?

Self-level mode is an assisted flight mode where the flight controller would always attempt to put the quadcopter in its neutral position when there is no user control. On the other hand, rate mode, as known as acro mode, doesn't level the aircraft automatically but always requires manual control during flight.

Rate mode uses only the Gyro sensor, while self-level mode uses both Gyro and Accelerometer.

Self-Level Modes: Angle and Horizon

In Betaflight and Cleanflight, there are 2 different self-level modes: Angle and Horizon mode, and there are some differences between them.

Angle Mode

Your stick controls the tilt angle of your aircraft. When your stick reaches its max position the copter will stop and hold there as it has reached the max tilt angle allowed. If you release the stick back to centre, the aircraft would follow and back to horizontal level.

Horizon Mode

Quite similar to Angle mode, but Horizon mode allows you to do flips and rolls when the stick is at full deflection.

What is Rate Mode?

Self-level modes are tempting for beginners: the pilot controls the **angle of pitch and roll** of the multirotor with the stick (radio transmitter), but it returns to the neutral position when the pilot is not controlling it.

Acro mode on the other hand, could be a bit more intimidating.

The pilot uses the stick to control the drone's **angular velocity of rotation, not the angle,** In simple terms, your stick controls how fast your copter rotates. That means if you move your pitch stick forward and hold it, the copter will continue to rotate at a constant rate, instead of just remain at an angle like it would be in self-level mode. If you let go off the stick, the copter will maintain its current attitude (angle) and will not return to level, unless you move your pitch stick to the opposite direction.

Why Fly Acro Mode?

Self-level mode is easier for beginners, because of the predictable behaviour: let go off the stick, and your drone would simply just level and stay there. But I got to tell you Acro Mode is the way to go flying mini quad in FPV, and you should learn it as early as possible in your FPV career.

Here are some of the advantages of Acro mode:

- Acro mode is great for acrobatics such as flips and rolls
- You have more control when flying FPV once you master rate mode, because you don't have to fight with ACC sensor… and you only control the quad whenever needed, it reduces stick input over time, making flying smoother, more fluid, and faster
- Control is intuitive as the craft flies much more natural like a glider (although it takes time to get used at first)
- Flight performance is more stable with less vibration due to the fact that ACC is not used, much better for aerial videos, especially when camera gimbal is not used
- One fewer sensor is involved means fewer failing points, also disabling Accelerometer can free up processing power for something else

So How Can I Hover?

No, we don't hover! :)

Well we do but we rarely need to hover during an FPV flight. I know it's easy and panic free to just let the quad level itself in self-level mode if you don't touch any of the sticks, but it's really bad for your learning progress in the long run and your FPV videos will look very jerky.

You just have to train yourself to get used to how to hover in Acro mode and memorize how much the camera has to point up to for the quad to be leveled.

Learning Rate Mode

Mastering rate mode doesn't happen over night. For beginners, you should expect to crash a number of times before getting a hang of it.

If you could, practise in a simulator first. Then practise with a quadcopter that is tough to break with some cheap/durable propellers. Go somewhere open and without too many obstacles and people. Stick

Also, add some expo on your sticks as well to start with, just to get the feel of how you have to correct for any movements. As you get more used to it then dial the expo down to where you feel comfortable. Later on you might also want to increase RC Rate to make flips and rolls faster.

Here is a great discussion of someone who was learning how to fly FPV in Rate mode.

Flying Rate Mode Line of Sight

Here is the bad news :)

Even if you have mastered flying rate mode in FPV, flying rate mode in LOS is almost completely different. You will be like learning it from the beginning all over again. It's useful to improve your LOS skills in case of emergency situations.

Related

Multiwii Different Flight Modes Names in GUI
When I first started with Multiwii, I was completely lost with all the flight mode names in the GUI. I can roughly figure out or guess some of them, and what they do, but I wasn't
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In "Multicopter"

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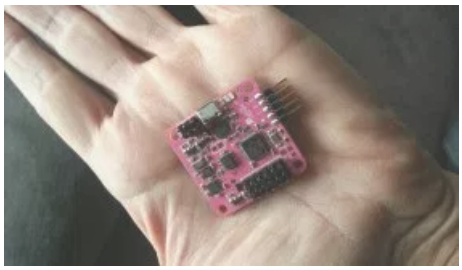

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Posted in Featured, Multicopter, Tutorial and tagged acro mode, beginners, fpv, quadcopter on 15th March 2015 [https://oscarliang.com/rate-acro-horizon-flight-mode-level/] . 24 Replies

24 thoughts on "Rate/Acro Mode VS Horizon/Self-Level Mode"

MrTom
12th August 2017 at 4:18 am

I have a SkyViper V2400HD. Nice machine to learn to fly LOS self-level mode. But I've recently purchased a Wizard x220 and a 4S battery. This thing is a beast! Spent some time programming it. I didn't realize I