* **P** зависи от настоящата грешка
* **I** зависи от акумулирането на стари грешки
* **D** е предсказването на бъдещи грешки, съдейки по настоящата промяна на стойностите

Rate Roll, Pitch, Yaw

* **P** - Най-важният параметър на системата. Управлява колко тяга е необходима за достигане на желаните стойности на ъглова ротация. По тежки апарати, нуждаещи се от повече тяга изискват по-ниска стойност, за разлика от по-леките, за който е необходимо завишение на тази параметър. Прекалено висока стойност ще вкара летателният обект в колабания с честота 5-10hz. Прекалено ниска стойност ще направят трикоптрът тромав и бавно реагиращ на контролните сигнали, особено видимо при по-рязко намаляване на височината. Подходяща стойност за този параметър е малко преди стойността на колебания. Настройка по канал 6 на радио управлението по време на полет е най-подходяща и дава най-добри резултати.
* **I** -  Интегрира грешката и я добавя към пропорционалната съставка.
* **D** - Тази стойност ще забавя ускорение към желаната ъглова стойност. Прекалено висока стойност на този параметър, ще доведе до възникване на трептения. Прекалено ниска стойност ще доведе до невъзможност, за достигането на стойността на Rate\_P и последстията описани при прекалено ниска стойност на Rate\_P.
* **IMAX** – Максималната стойност до която може да се надгражда RATE\_I.

STAB\_ Roll, \_Pitch, \_Yaw

* **P** - Желаната стойност на ротация, с която се компенсират грешките. Колкото е по-висока стойността на този параметър, толкова по бързо трикоптерът ще опитва да достига до желаното държание.

Параметри на тягата

* **P** - Контролира стойността на тягата необходима за промяна във височината.
* **I** – Интегрира грешката и я добавя към пропорционалната съставка. По този начин ускорява значително достигането на установен режим. Компенсира за грешки при промянята на височината.
* **D** -Забавя ускорение предизвикано от интегралната съставка към желаната стойност на тягата.
* **IMAX** - Максималното възможно надграждане на тягата
* Stabilize mode automatically levels the multi-copter and maintains the current heading.
* Stabilize is the primary operating mode and is good for general flying and FPV.
* The APM must always initially be set to Stabilize mode in order to be able to arm the ESCs before takeoff.
* It is VERY important to be able to easily and rapidly switch back to Stabilize mode from any other mode in order to regain control from any unexpected or undesirable flight behavior.
* **Moving the Pitch and Roll** (right) control stick in any direction will cause the copter to tilt and move in that direction.
  + Releasing the Pitch and Roll control stick will cause the multi-copter to re-level itself.
  + Input on the (Pitch and Roll) control stick is approximately equal to the angle of the copter.
  + The default control angles are plus and minus 45 degrees.
  + Prevailing wind is not automatically compensated for and the multi-copter will drift with the wind unless the operator counters with input on the Pitch and Roll control stick.
* **Moving the Yaw** (left) control stick left or right will cause the copter to rotate at a rate based on the amount of stick input.
  + Releasing the (Yaw) control stick will cause the copter to record and maintain the new heading.
  + The current heading is maintained automatically when the Yaw control stick is centered right and left.
* **Moving the Throttle** (left) control stick up or down will cause the copter to ascend or descend accordingly.

**Tuning:**

* **The Stabilize Control PI and Stabilization Angular Rate Control PID** interact to control the copter in Stabilize mode.
* **The Stabilization Angular Rate P value** is the single most important value to set correctly for your copter.
  + The higher performance your copter is, the lower this number should be.
  + A copter that accelerates very quickly might have a number like 0.08 and one that is more sluggish could have a number like 0.18.
  + If you get this right generally your copter will fly acceptably in all modes, but tweaking the PIDs for your copter will let you optimize performance e.
* The RATE\_RLL PID and RATE\_PIT PID are normally locked to the same values as the Angular Rate Control PID in the Mission Planner.
  + The STB\_PIT PI and the STB\_RLL PI are normally locked to the same values in the Stabilize Control PI in the Mission Planner.
  + For most copters the Roll and Pitch PID values should be the same.
* **See** [**AC2\_attitude\_PID**](http://code.google.com/p/arducopter/wiki/AC2_attitude_PID) for more detailed tuning information.
* **Stable\_P** is used input the rate of rotation based on control input.
  + The higher the P the faster the copter will be asked to turn to get to the desired angle.
  + A high P will cause the copter to oscillate back and forth like a seesaw a few times a second.
  + A low P will cause the copter to move very slowly. A very low P will cause the copter to feel unresponsive and could cause a crash if the wind disturbs it.
* **Stable\_I** is used to compensate for outside forces that would make your copter not maintain the desired angle.
  + The I term will ramp to hold the desired angle.
  + Because the copter rotates to new angles constantly, the i term is not that useful in this mode.
  + It is used instead to try and hold the copter perfectly level when hovering.
  + A limit to the ramp up of the I term has been set low to achieve this.
* The output of the Stabilize Control PID is sent to the Angular Rate Control PID whose output directly controls the copters motors.
* **Rate\_P** is used to turn the copter.
  + The higher the P the higher the motor response to achieve the desired turn rate.
    - This is the single most important value to tune correctly for your copter.
    - Default is P = 0.18 for standard Arducopter.
    - A higher performance copter might use a value of 0.08.
* **Rate\_I** is used to compensate for outside forces that would make your copter not maintain the desired rate.
  + A high I term will ramp quickly to hold the desired rate, and will ramp down quickly to avoid overshoot.
  + A low I term will take too long to have an effect and may cause undesirable overshoot. It's better to have an I-term of 0 than a poorly chosen I term.
* **Rate\_D** is used to dampen the response of the copter to accelerations toward the desired set point.
  + A high D can cause very unusual vibrations and a "memory" effect where the controls feel like they are slow or unresponsive.
  + Values of .001 to .008 have all been used, but results will vary according to your multicopters size and performance characteristics.
* **Yaw Angular Rate Control and Yaw Stabilize Control** are also basic functions for controlling the rate of heading change of the copter.
* **Yaw Angular Rate Control** Determines how much throttle is applied to rotate the copter at the desired speed.
  + **Yaw Rate P** should be set higher to turn faster and lower to turn more slowly.
* **Yaw Stabilize Control** Determines how fast the copter responds to user or autopilot input.
  + **Yaw Stabilize P** should be set higher get more aggressive control and lower to slow reaction time.
  + Too high a Yaw Stabilize Control P value will cause slow wobbles.