



## Mini Pix



( Setup with Racing Drone )

## User Manual

RADIOLINK ELETRONIC LIMITED

Technical updates and additional programming examples available at: <http://www.radiolink.com>

## CONTENTS

1. PID Setup.....	3
1.1 Parameter P setup.....	7
1.2 Parameter D setup.....	8
1.3 Parameter I setup.....	9
1.4 PID suggested for racing drone.....	9
2. AltHold.....	10
3. PosHold.....	10
4. Perfecting YAW.....	10
4.1 How to make YAW faster.....	11
4.2 Max Angle.....	11
5. Auto Mode.....	11

## 1. PID Setup

Configuration for this tutorial introduction:

Frame: 210mm

Motor: EMAX RS2205 2300KV

ESC: BLHELIS 30A(brake turn on)

Battery: 4S 1500mAH

Flight Controller: Radiolink Mini Pix

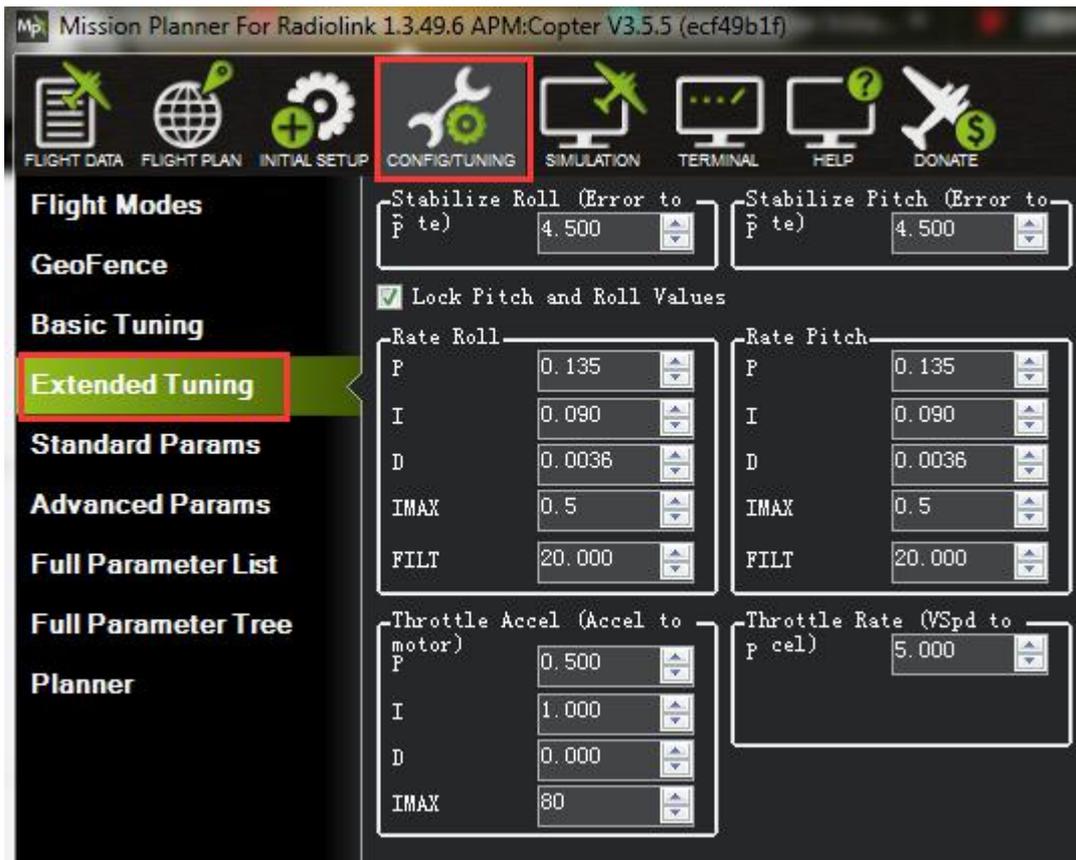
Weight: 602 gram(including battery, mini M8N GPS TS100, camera, image transmission, receiver and wires)



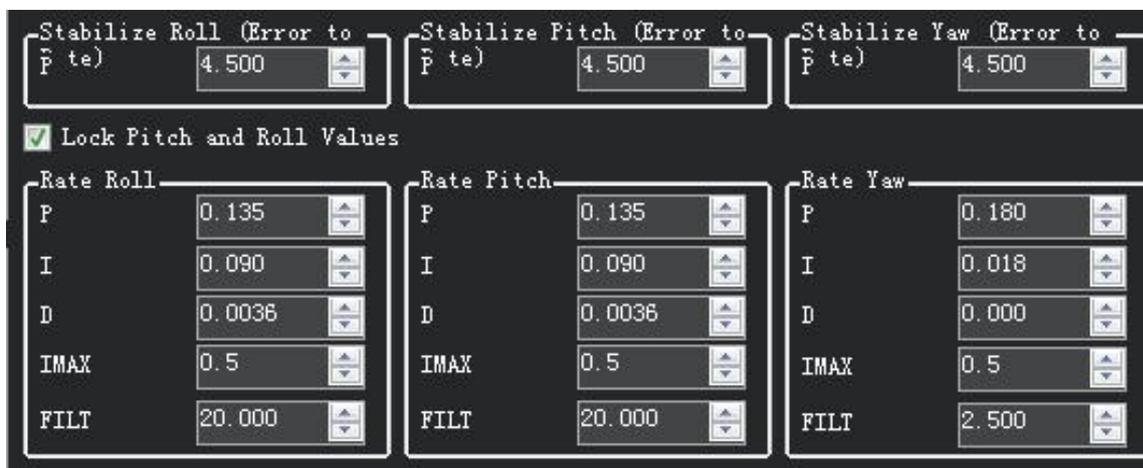
**Stabilize Mode, X frame, have to finish all the calibration steps**

Connect Mini Pix to computer, and setup parameters in Mission Planner

Find CONFIG/TUNING and setup PID parameters as steps below



Original PID as below:



Racing drone will shaking fiercely and will sky up suddenly with the original parameters.

This phenomenon is because of both parameter P and D are too high.

It' s suggest modify parameters in Full Parameter List because there must be cannot setup all the parameters in Extended Tuning.

You can set as these steps:

Mission Planner For Radiolink 1.3.49.6 APM:Copter V3.5.3 (e8ab1c75)

FLIGHT DATA FLIGHT PLAN INITIAL SETUP **CONFIG/TUNING** SIMULATION TERMINAL HELP DONATE

**Flight Modes**  
**GeoFence**  
**Basic Tuning**  
**Extended Tuning**  
**Standard Params**  
**Advanced Params**  
**Full Parameter List** *step 2*  
**Full Parameter Tree**  
**Planner**

Command	Value	Units	Options
ACCEL_Z_D	0		0.000 0.
ACCEL_Z_FF	0		
ACCEL_Z_FILTER	20	Hz	1.000 10
ACCEL_Z_I	0.5		0.000 3.
ACCEL_Z_IMAX	800	d%	0 1000
ACCEL_Z_P	0.25		0.100 1.

115200

DISCONNECT

Load from file  
Save to file  
Write Params  
Refresh Params  
Compare Params

All Units are in ra  
format with no scal

Racing Drone21

Load Presaved  
Reset to Default

Search  
ATC

*step 3*

ATC_ANG_PIT_P	}	correspondence to the parameter P of Roll, Pitch, Yaw
ATC_ANG_RLL_P		
ATC_ANG_YAW_P		
ATC_ANGLE_BOOST	}	correspondence to the parameter PID of Pitch(Elevator)
ATC_RAT_PIT_D		
ATC_RAT_PIT_FF		
ATC_RAT_PIT_FILT		
ATC_RAT_PIT_I		
ATC_RAT_PIT_IMAX		
ATC_RAT_PIT_P		
ATC_RAT_RLL_D	}	correspondence to the parameter PID of Roll(Aileron)
ATC_RAT_RLL_FF		
ATC_RAT_RLL_FILT		
ATC_RAT_RLL_I		
ATC_RAT_RLL_IMAX		
ATC_RAT_RLL_P	}	correspondence to the parameter PID of Yaw(Rudder)
ATC_RAT_YAW_D		
ATC_RAT_YAW_FF		
ATC_RAT_YAW_FILT		
ATC_RAT_YAW_I		
ATC_RAT_YAW_IMAX		
ATC_RAT_YAW_P		

Find out the corresponding parameters and then setting.

**Final Parameters for 210 racing drones Setup as below:**

The screenshot displays a drone parameter configuration interface with the following settings:

- Stabilize Roll (Error to p te):** 6.000
- Stabilize Pitch (Error to p te):** 6.000
- Stabilize Yaw (Error to p te):** 12.000
- Position XY (Dist to p eed):** 1.200
- Lock Pitch and Roll Values
- Rate Roll:** P: 0.040, I: 0.100, D: 0.0012, IMAX: 0.5, FILT: 90.000
- Rate Pitch:** P: 0.040, I: 0.100, D: 0.0012, IMAX: 0.5, FILT: 90.000
- Rate Yaw:** P: 0.110, I: 0.040, D: 0.000, IMAX: 0.5, FILT: 25.000
- Velocity XY (Vel to p cel):** P: 1.500, I: 0.750, D: 0.000, IMAX: 100
- Throttle Accel (Accel to motor):** P: 0.250, I: 0.500, D: 0.000, IMAX: 80
- Throttle Rate (VSpd to p cel):** 7.000
- Altitude Hold (Alt to p imbrate):** 1.000
- WPNav (cm's):** Speed: 500.000, Radius: 200.000, Speed Up: 250.000, Speed Dn: 150.000, Loiter: 500.000
- Ch6 Opt:** None
- Min:** 0.000 to 1.000
- Ch7 Opt:** Do Nothing
- Ch8 Opt:** Do Nothing

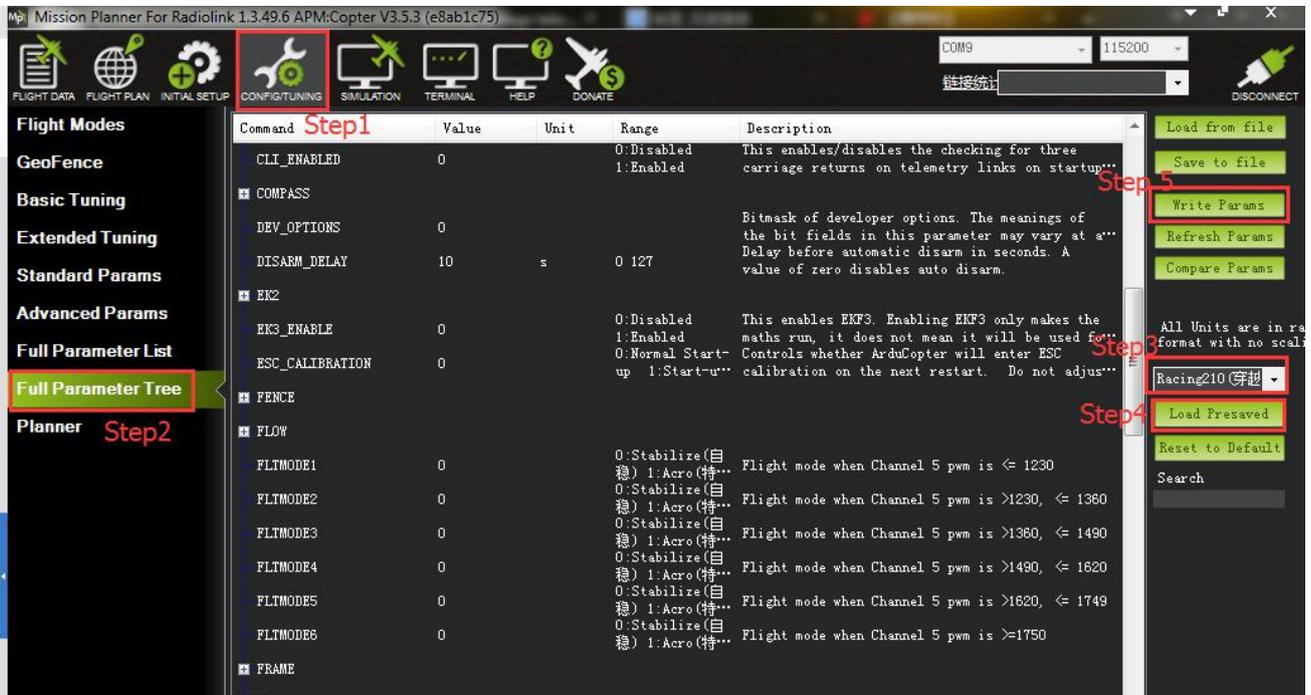
Buttons: Write Params, Refresh Screen

You also can download from the mission planner directly as these steps:

Step1: choose CONFIG/TUNING

Step2: choose Full Parameter Tree

Step3: choose "Racing210(穿越机)-1.param" --click Load Presaved--click Write Params--click Load Presaved



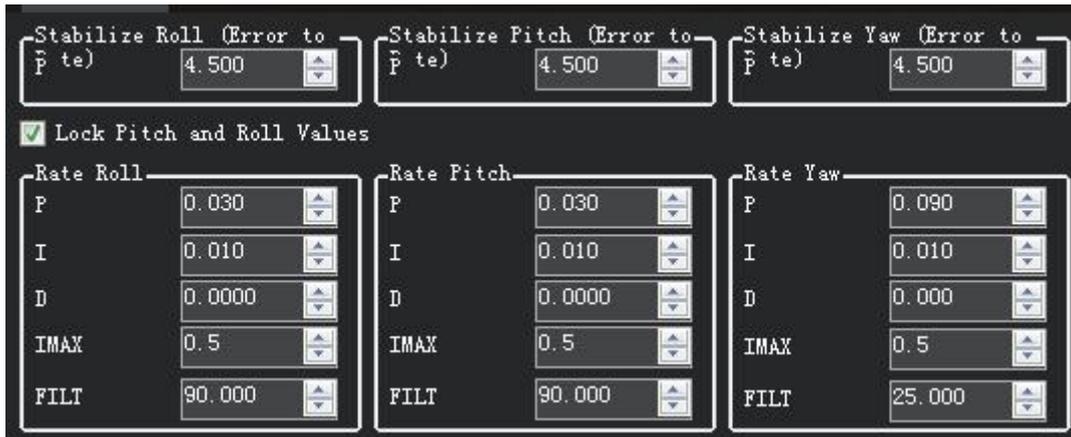
## Setting Details as Steps Below

We have tried many times before getting the perfect parameters. P, I, D have considering separately till find out the best value for the sample racing drone. Setting steps as below, you can find out the perfect value as these steps when you use Mini Pix for other frame drones.

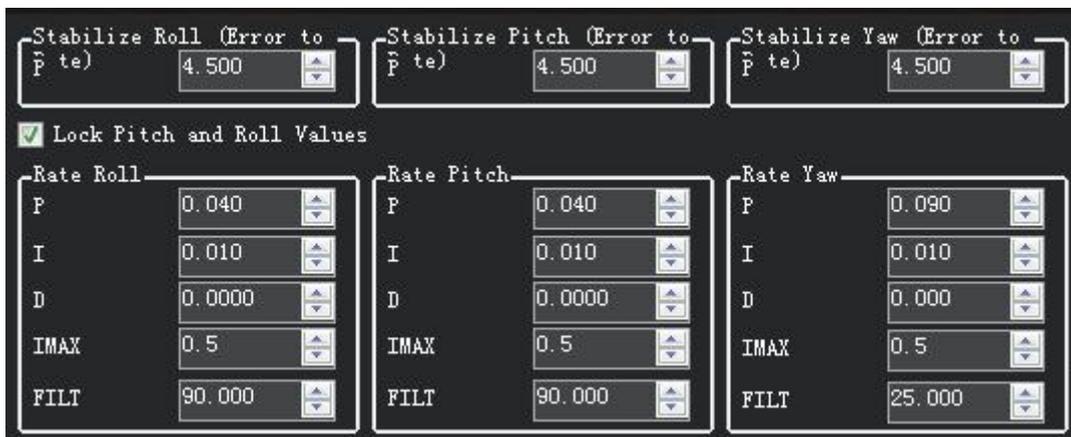
### 1.1 Parameter P setup

First, have to find out the suitable numerical value of P, setup the parameter I as the minimum value and parameter D as zero.

You can set the rate of Roll and Pitch to the 1/4 of original parameter P and setup the rate of Yaw to the half of original parameter P.



You can find out the Roll and Pitch still not normal at this time. Change the parameter P, add 0.01 every time till the 1/3 of the original parameter to check the attitude of drone, if still cannot fly smoothly then add 0.005 every time till the drone can fly perfect.



## 1.2 Parameter D setup

Setup parameter D after parameter P have determinate, parameter D will make your drone more stabilized.

Add parameter D value from 0.0000 and then 0.0005 every time till get the perfect value.

For 210 frame racing drone, it maybe vibrate frequency and you can hear some sounds when the parameter D higher than 0.0015. Then, you have to lower the parameter D.

Drone will very stability when flight and the voice will very clear(you can heard A loud voice that regulates speed, without any noise).

Stabilize Roll (Error to $\bar{p}$ te)	4.500	Stabilize Pitch (Error to $\bar{p}$ te)	4.500	Stabilize Yaw (Error to $\bar{p}$ te)	4.500
<input checked="" type="checkbox"/> Lock Pitch and Roll Values					
Rate Roll		Rate Pitch		Rate Yaw	
P	0.040	P	0.040	P	0.090
I	0.010	I	0.010	I	0.010
D	0.001	D	0.0012	D	0.000
IMAX	0.5	IMAX	0.5	IMAX	0.5
FILT	90.000	FILT	90.000	FILT	25.000

### 1.3 Parameter D setup

Parameter I is not have a such obvious effect relative to P and D. Parameters I can improve the precision of stability and also improve the response of the racing drone when move the sticks at the super speed.

Stabilize Roll (Error to $\bar{p}$ te)	4.500	Stabilize Pitch (Error to $\bar{p}$ te)	4.500	Stabilize Yaw (Error to $\bar{p}$ te)	4.500
<input checked="" type="checkbox"/> Lock Pitch and Roll Values					
Rate Roll		Rate Pitch		Rate Yaw	
P	0.040	P	0.040	P	0.090
I	0.090	I	0.010	I	0.010
D	0.001	D	0.0012	D	0.000
IMAX	0.5	IMAX	0.5	IMAX	0.5
FILT	90.000	FILT	90.000	FILT	25.000

### 1.4 PID parameters suggested for 210 racing drone

Stabilize Roll (Error to $\bar{p}$ te)	6.000	Stabilize Pitch (Error to $\bar{p}$ te)	6.000	Stabilize Yaw (Error to $\bar{p}$ te)	12.000
<input checked="" type="checkbox"/> Lock Pitch and Roll Values					
Rate Roll		Rate Pitch		Rate Yaw	
P	0.040	P	0.040	P	0.110
I	0.090	I	0.090	I	0.040
D	0.001	D	0.001	D	0.000
IMAX	0.5	IMAX	0.5	IMAX	0.5
FILT	90.000	FILT	90.000	FILT	25.000

This parameter list is compatible with most of the 210 racing drone, or you can setup as these steps and then find out the best parameters according to your drones, but the method is the same.

## 2. AltHold

Mini Pix is built-in a barometer and vibration damping by software.

Radiolink Mini Pix, with shell completely closed to protect, the interaction effects of air current wake on air pressure when flight. The main board has air pressure vent to ensure the accuracy of the barometer testing. Shell design and vibration damping by software make it achieved better Altitude Hold effect.

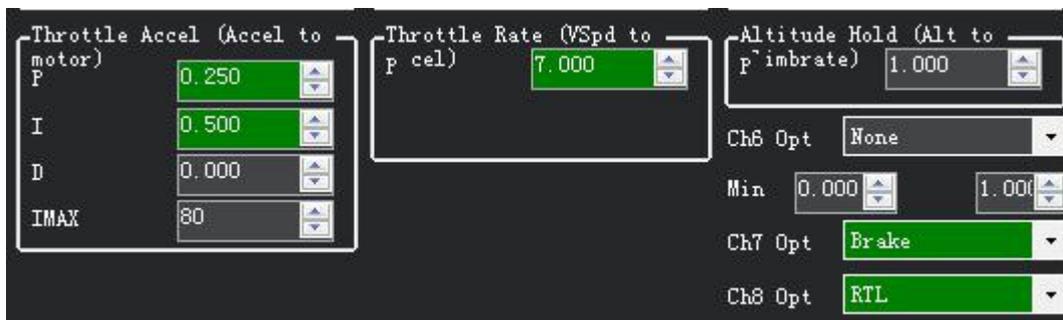
If you flight in AltHold Mode, it will make the altitude of your drone easier to control, especially for the RC freshman.

The PID of AltHold Mode also need set the appropriate value.

If the value of throttle acceleration is too big that will make your drone up and down vertical.

If the value of throttle acceleration is too big that will make your drone cannot in a position.

The following parameters are available for reference



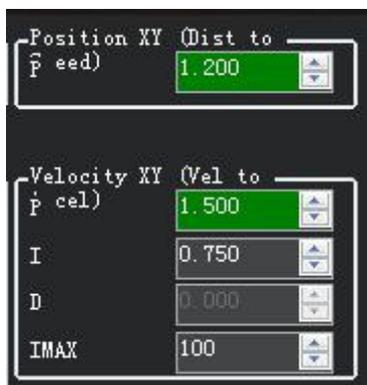
## 3. PosHold

PosHold function need Mini Pix work with GPS.

Please make sure that GPS have positioning more than 6 satellites, less than 1.4 meters position accuracy and most important that drift velocity is less than 10 meters per second when you flight with PosHold mode.

The effect of PosHold is also affected by Position PID. If value of P is too small that may cause your drone cannot keep stability while if the value of P is too big that may cause your drone will shake or drift.

The following parameters are available for reference.



## 4. Perfecting YAW

#### 4.1 How to make YAW faster

You can setup parameters as these steps below if you felt the YAW is response too slow.

**Steps 1:** ACRO\_YAW\_P is decided for the speed. Setup ACRO\_YAW\_P to 10 is enough, if you need make your drone flight more faster, you can setup it to 15 or more higher.

ACRO_YAW_P	10		1 10
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**Steps 2:** ACRO\_Y\_EXPO is setup for adjustment curve. The value is positive, the larger of servo value, the more obvious accelerated.

ACRO_Y_EXPO	0.5		-0.5 1.00:Disabled 0.1:Very Low 0.2:Low 0.3:Medium 0.4:High 0.5:Very High
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ATC\_ACCEL\_Y\_MAX is limits the maximum rate of change in angular velocity.

ATC_ACCEL_Y_MAX	150000	cdeg/s/s	0 720000:Disabled 18000:Slow 36000:Medium 54000:Fast
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#### 4.2 Max Angle of Inclination

ANGLE\_MAX means the max angle of inclination for all the flight mode, 5000 means 50 degree. The larger the Angle, the faster you can fly, and the more difficult it is to control.

ANGLE_MAX	5000	cdeg	1000 8000
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### 5. Acro

Acro mode is necessary for racing drone.

You have to setup as below when you flight with Acro Mode.

Setup ACRO\_TRAINER is 0 means pure Acro Mode that only gyro helps keep stability, setup ACRO\_TRAINER is 1 means your drone can back to Leveling automatically and fly in any angle, setup ACRO\_TRAINER is 2 means your drone can back to Leveling automatically but the flight angle is limited.

ACRO_TRAINER	0		0:Disabled 1:Leveling 2:Leveling and Limited
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You can change the value of the ACRO\_RP\_P if the speed of rotation is too slow.

ACRO\_RP\_P is decided the angular velocity.

ACRO_RP_P	10		1 10
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ACRO\_RP\_EXPO is setup for adjustment curve. The value is positive, the larger of servo value, the more

obvious accelerated. We setup 0.5 for 210 racing drone.

ACRO_RP_EXPO	0.5		-0.5 1.00:Disabled 0.1:Very Low 0.2:Low 0.3:Medium 0.4:High 0.5:Very High
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ATC\_ACCEL\_R\_MAX , ATC\_ACCEL\_P\_MAX is limits the maximum rate of change in angular velocity. You can setup larger value of ATC\_ACCEL\_R\_MAX , ATC\_ACCEL\_P\_MAX if you want the motor goes faster.

ATC_ACCEL_P_MAX	162000	cdeg/s/s	0 1800000:Disabled 72000:Slow 108000:Medium 162000:Fast
ATC_ACCEL_R_MAX	162000	cdeg/s/s	0 1800000:Disabled 72000:Slow 108000:Medium 162000:Fast