

CC3D flight control board

Users Manual

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1 Introduction

The CC3D board is an all-in-one stabilization hardware which runs the OpenPilot firmware. It can fly any airframe from fixed wing to an octocopter and is configured and monitored using the OpenPilot Ground Control Station (GCS) software. The CC3D boards have gained great popularity among UAV fans for its small volume, tidy circuit and affordable price.

1. Powerful STM32 32-bit micro controller running at 72MHz, and can reach at 1.25DMips/MHz when performance at 0 wait state memory access.

2. Integrated with MPU6000 (3-axis high-performance gyros and 3-axis high-performance accelerometer), with 16M IC

- 3. Support GPS and data transmission
- 4. Operating voltage: 5V

Safety

Operating a powered vehicle of any kind can be a lot of fun. However, nothing will ruin your day at the park more quickly than an accident or running afoul of the law. Since we want you to have a great experience, please make sure that you do all of the following:

- Operate within all local laws and regulations. For example, in the United States, current regulations require you to operate most UAVs under 400 foot above ground level, within line of site, and away from obstructions and populated areas. Since these regulations vary from place to place, even within the same country, ensure that you understand what you need to do to stay compliant.
- Never operate the vehicle or software in a way that could be dangerous to you, other people, or property. Propellers, while rotating, could easily cut you; if a UAV fell on a person or object, it



could cause injury; a UAV caught in power lines could cause an outage. As Ben Franklin said, "An ounce of prevention is worth a pound of cure."

- Always keep in mind that software and hardware failures happen. Although we design our products to minimize such issues, you should always operate with the understanding that a failure could occur at any point of time and without warning. As such, you should take the appropriate precautions to minimize danger in case of failure.
- Never use the software or hardware for manned vehicles. The software and hardware we provide is only for use in unmanned vehicles.

1.1 Overview and Hardware Resources



Figure 1-1(front and rare side of CC3D)

CC3D contains:

- 1. STM32F103, integrated with 16M FLASH
- 2. MPU6000:3-axis high-performance gyros and 3-axis high-performance accelerometer

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3.6-channel signal input
4. 6-channelinput for servo and ESC.
5. External interface for GPS
6. External interface for data transmission dimension: 36mmx36mmx5mm weight: 12.6g

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1.2 Software Resources

Firmware upload: OpenPilot GCS Host software: OpenPilot GCS

1.3 Source

OpenPilot GCS :

https://wiki.openpilot.org/display/WIKI/Downloading+and+Installing+the+Ground+Control+St ation

2 Interfaces



2.1 Interface Layout



2-1

Please note the + and – of the power port, the inverse may burn the chip and circuit board.

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2.2 Interface specifications

The main port and the flex port are the GPS and data transmission interfaces of CC3D, when you are using one external port, please choose main port as priority.

3 Development Environment setting

3.1 File Burning

All CC3D board has been through rigorous test and the BOOTLOAD and firmware for X-model has been uploaded, you can use directly.

3.2 Software Setting

1. Connect your CC3D to computer with USB cable, open OpenPilot GCS, then click vehicle setup wizard.





Figure 3-1

2. Click Next





3.If you need to upgrade the firmware, please choose Upgrade, or you can choose Next to

continue.

😢 OpenPilot Setup Vizard 🛜	×
Firmware Update	
It is necessary that your firmware and ground control software are the same version.	
When you are ready you can start the upgrade below by pushing the button. It is critical that nothing disturbs the board while the firmware is being written.	
It is recommended that you erase all settings on the board when upgrading firmware. Using saved settings fo a previous version of the firmware may result in undefined behaviour and in worst case danger. It is possible to suppress the erase by deselecting the check box below.	r
✓ Erase all settings	
Legrade	
Ready	_
	J
< Back Mext > Cancel	

Figure 3-3

4. Choose input signal, please choose PWM as default.



🞦 OpenPilot Setup Vizard

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OpenPilot Input Signal Configuration

The OpenPilot controller supports many different types of input signals. Please select the type of input that matches your receiver configuration. If you are unsure, just leave the default option selected and continue the wizard.

Some input options require the OpenPilot controller to be rebooted before the changes can take place. If an option that requires a reboot is selected, you will be instructed to do so on the next page of this wizard.





5.Choose vehicle type, the default one is Quadcopter. The current version of CC3D only provides functionality for multirotors and fixed-wing aircraft and surface, the helicopter is not applicable for the moment.



OpenPilot Setup Vizard			2 2
	Vehicle Typ	e Selection	
To continue, the wizard needs used with. This step is cruci	to know what type of vel al since much of the fol:	nicle the OpenPilot contro lowing configuration is un	ller board is going to be ique per vehicle type.
Go ahead and select the type	of vehicle for which you	want to create a configur	ation.
The current version only prov	des functionality for M	ultirotors and Fixed-wing	aircraft.
00			and the second sec
00			
Multirotor	Fixed wing	Helicopter	Surface
		< <u>B</u> a	ck Next > Cancel



6. Click Next to continue to choose flight mode. Users can choose flexibly as you like. If you are using Quadcopter like our FE500, please choose X-model.

Tricopter					
Quadcopter	Х				
Quadcopter	+				
Hexacopter					
Hexacopter	Х				
Hexacopter	н				
Hexacopter	Coax	(Y6)			



7. Choose ECS mode, you can choose from standard esc and rapid esc, if you are not sure about this, please chooses Next to continue.

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🐕 OpenPilot Setup Vizard

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OpenPilot Output Signal Configuration

To set an optimal configuration of the output signals powering your motors, the wizard needs to know what type of Electronic Speed Controllers (ESCs) you will use and what their capabilities are.

Please select one of the options below. If you are unsure about the capabilities of your ESCs, just leave the default option selected and continue the wizard.





8. Calibration: click calculate and keep the board level, when you see done, the calibration is finished.



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2 OpenPilot Setup Vizard	2 🛛
OpenPilot Sensor Calibration Procedure	
The wizard needs to get information from the controller to determine in which posi normally considered to be level. To be able to successfully perform these measurem the vehicle on a surface that is as flat and level as possible. Examples of such s top or the floor. Be careful to ensure that the vehicle really is level, since thi accelerometer and gyro bias in the controller software.	ition the vehicle is ments, you need to place surfaces could be a table is step will affect the
To perform the calibration, please push the Calculate button and wait for the proc	cess to finish.
Calculate gyro and acceler	rometer bias
Done!	
< <u>B</u> ack	Next > Cancel

Figure 3-8

9. Calibrate the ESC signal:

Click Next to continue.

Connect the battery and the ESC, (do not mount the syrup now to avoid danger).

If you are just testing the CC3D board, you can skip this step.



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Connect the motor and ESC, make sure power supply is normal. Click start button below and slide the slider to the right until the motor starts to spin stable.



After the calibration, the motor will stop and the calibrated data will be saved. You can click Next to continue with the other 3 ESC.

10. Choose the flight model and click SAVE, all the parameters will be saved into CC3D board.



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🎦 OpenPilot Setup Vizard



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Figure 3-10



DenPilot Setup Vizard	
OpenPilot configuration ready to save	
The wizard is now ready to save the configuration directly to your OpenPilot controller.	
If any of the selections made in this wizard require a reboot of the controller, then power cycling the OpenPilot controller board will have to be performed after you save in this step.	;
Press the Save button to save the configuration.	
Save	
Done!	
	$\prod $
< Back Dext > Can	cel

Figure 3-11

3.3.2 RC calibrate

1. Connect your CC3D to the receiver and operate as the following steps in the picture:





Figure 3-12

🔀 OpenPil	lot G	cs													
<u>F</u> ile <u>E</u> dit	Tool	s <u>W</u> indow]	Help												
		RC Input	Flight M	ode Switch Sett	ings	Arming Sett	ings								
		Calibrati	on and Conf	iguration Opti	ons	3									-
Hardware				Start	Transmi	tter Setup W	izard]		Start Ma	mual Calibr	ation			
		Input Char	nnel Config	puration											
Vahicle		Fun	ction	Туре		Hunber		lin	Channe	l Value	Neutral	lax	Reversed	RT	
5		Throttle	•	PWM	•	Disabled	•	1000 🗘			1500 🌲	2000 🌲			
	2	Roll		PWM	•	Disabled	*	1000 🗘			1500 🌲	2000 🗘		0	
Input		Pitch		PWM	•	Disabled	•	1000 🗘			1500 🌲	2000 🗘		0	
-		Yaw		PWM	•	Disabled	•	1000 🗘			1500 🗘	2000 🗘		0	
Orderet		FlightM	ode	PWM	*	Disabled	*	1000 🗘	19	2 3	1500 🌲	2000 🗘			
Gatpat		Collect	ive	None	•	Disabled	*	1000 🗘			1500 🗘	2000 🗘		0	
		Accesso	ry0	None	•	Disabled	*	1000 🗘	-		1500 🌲	2000 🗘		0	
Attitude		Accesso	ry1	None	•	Disabled	•	1000 🗘			1500 🌲	2000 🗘		0	
R		Accesso	r y 2	None	•	Disabled	•	1000 🗘			1500 🌲	2000 🗘		0	
Q		Roll/Pi	tch/Yaw sti	ck deadband	2.0	\$									
Stabiliz…		Assiste	d Control s	tick deadband	8.0	\$									v
													(Sav	e
Velc	6	Flig	🖡 Confi…	🍄 System	/⊷ s	copes 🕅	HITL		Tx Rx	10 12	1.25 16.75 Connec	tions: US): CopterContr	- Disco	nnect

Figure 3-13

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2. click next to continue with the flight mode switch setting, as shown in the picture, the default mode is for American: Throttle and Rudder are on the left hand, if you are used to Japanese mode, please choose the one with Throttle and Rudder on the right hand. You can choose as you like.

Then click Next to continue.



Figure 3-14

3. Move the joystick according to the picture on the screen, after you finished, you will see next/skip.





Figure 3-15

Keep the joystick at neutral, as shown in the following picture, click next, then you will be reminded to move the stick to their Maximums and minimums.







4. Arm airframe using throttle off and YAW left, arming timeout in 30seconds as default, click





4 Extensible Applications

Support GPS and data transmission.