

# TOTAL CONTROL!

## THE INSIDE SCOOP ON EIGHT GREAT FLIGHT CONTROLLERS

BY TEAM ROTORDRONE PHOTOS BY JOHN REID

A flight controller is the brain of your multirotor: it keeps your aircraft level, allows you to use different flight modes and may even let you customize your flight patterns. Here's the inside scoop on eight popular units, from lightweight controllers that are ideal for smaller drones to mid-level units with GPS stabilization to high-end, professional machines.

### Lightweight Powerhouses

This first group of controllers is very lightweight and perfectly suited to small multirotors like FPV racing quads. But don't let their size fool you, these machines have a lot of features and can control much larger aircraft.

### AbuseMark Acro Naze32

#### LIGHTWEIGHT

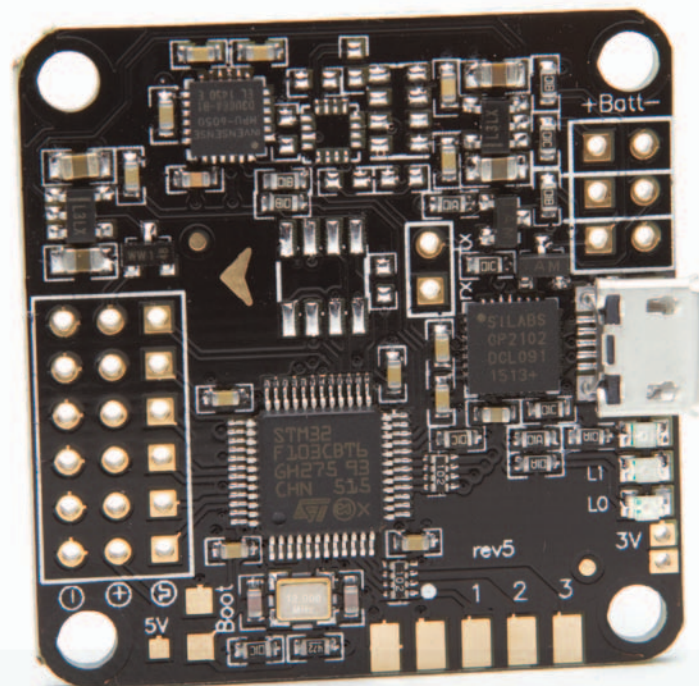
This is a very popular flight controller board that has a 32-bit ST microprocessor, along with a memory and CPU power that can host a number of sensors. This board has some great programs and features that aid pilots in getting the most out of their multirotors. This board does require some soldering of the pins before it is ready to use, which is a very simple process. The Acro Naze32 version has many of the same features as the full Naze32, which costs slightly more. [abusemark.com](http://abusemark.com)

#### WE LIKE

- › Easy to configure software
- › Acrobatic, auto-level, heading hold, head-free and altitude hold flight modes.
- › Fully customizable motor mixer for any airframe type
- › Built-in micro-USB for programming/firmware updates

#### SPECS

- › 36x36 mm (30.5mm mounting)
- › 7.3 grams with headers
- › 2000 degrees/second three-axis MEMS gyro and accelerometer
- › Max 16V on input rail and up to 35V 6S on the voltage sense line
- › \$24.99



### Graupner GR18

#### LIGHTWEIGHT

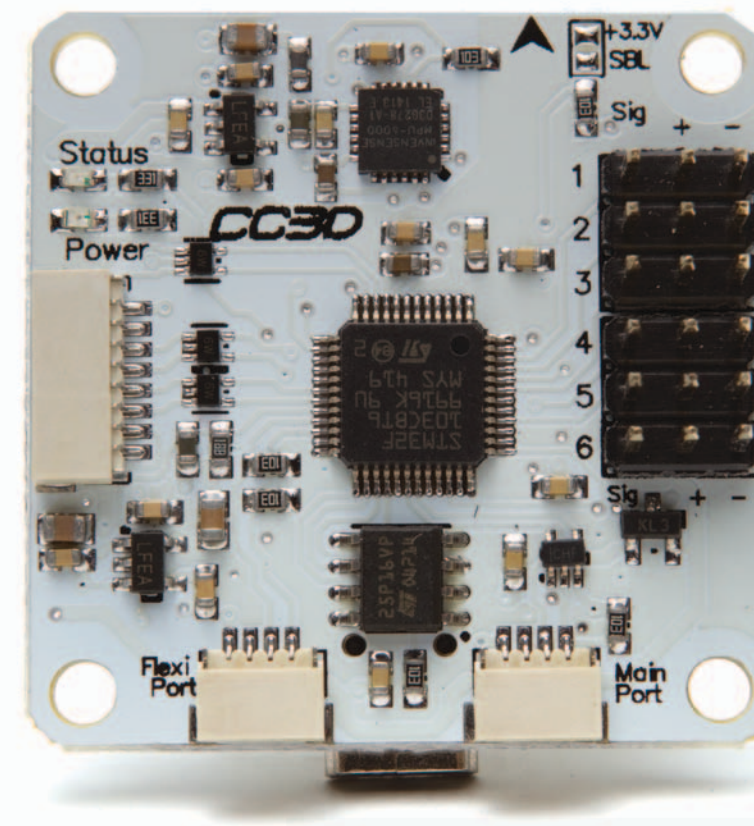
This compact receiver has an integrated flight controller and real-time telemetry on board; you will need a Graupner transmitter. One big advantage is that no computers, programming boxes or complex wiring is needed to set up your multirotor; you can do it all at the field using the transmitter. Real-time telemetry notifications appear on the transmitter, making it easy for pilots to know exactly what is happening during the flight. The three-axis gyro stabilization can be adjusted with remote gain control from the ground. We found the stabilization to be solid, responsive, crisp and easy to adjust to our flying skills. [openhobby.com](http://openhobby.com)

#### WE LIKE

- › Very easy to use; can be configured
- › Two flight modes
- › Usable telemetry features with extra expansion possible
- › Over-the-air setup of all controller features and functions

#### SPECS

- › 46x21x14mm
- › 14 grams
- › 3-axis ultra-fast gyro and accelerometer
- › 3.6- to 8.4-volt input
- › \$149.99



### Open Pilot CC3D

#### LIGHTWEIGHT

We used the CC3D board in an FPV racer and noticed the quad's crisp response throughout the flight (and we can say from our experience that this board is durable!). The ground control software is very easy to program and set up (via USB connection) to your specifications. This board comes fully assembled and does not require any soldering, and its included RC harness can connect to any standard receiver. The CC3D supports Spektrum satellite receivers and Futaba S-Bus hardware. [openpilot.org](http://openpilot.org)

#### WE LIKE

- › Software support for Windows, Mac and Linux (easy to program)
- › Three-axis, high-performance MEMS gyros and accelerometer
- › Innovative Flexi-port technology
- › High-speed USB support (no drivers required), a true plug and play device

#### SPECS

- › 36x36mm (30.5mm mounting)
- › 4.8- to 15-volt input
- › 3-axis MEMS gyro and accelerometer
- › \$34.99

**Mid-size Workhorses:** This group of controllers is designed for larger multirotors in the range of 350 to 900mm. These full-performance controllers have a wide array of programming features and will generally include GPS stabilization. Many of them allow you to select the type of aircraft and features you need and make any adjustments using a computer program or app.

### DJI Naza-M V2

#### MID-SIZE WORKHORSE

This all-in-one controller has an inner-damping three-axis gyro, a three-axis accelerometer, and a barometer. It can measure flying altitude and attitude and can be used for autopilot/automatic control. Naza controllers have been around for a while and they now have a fourth generation attitude stabilization algorithm that provides outstanding flight stability. Programmable through a computer or app, this controller has a long list of features to fit any pilot's needs. After flying with this controller in a number of different multirotors, we feel that its flight performance is second to none. [dji.com](http://dji.com)

#### WE LIKE

- › Software for smartphone and tablets
- › Supports nine types of multirotors
- › Takeoff assistance
- › Multiple flight control modes with intelligent switching

#### SPECS

- › 45.5x32.5x18.5mm
- › 27 grams
- › 3-axis gyro and accelerometer w/GPS
- › 7.4- to 26-volt input
- › \$299.99





## Eagle Tree Vector

### MID-SIZE WORKHORSE

This is the perfect controller for pilots who want a lot of information while flying FPV. The Vector includes full color OSD with sharp color graphics, voice alerts and has a fast, easy menu system. The flight controller has a number of flight modes to choose from and everything can be adjusted from the onscreen menus. The Vector comes with an input harness that can be connected to any type of receiver and it supports three different types of RC inputs, standard/PCM, SPPM and S-Bus. This flight controller will fit the needs for many different types of multirotors, is very easy to set-up and is perfect for the video/FPV pilot. [eagletreesystems.com](http://eagletreesystems.com)



### WE LIKE

- › Built-in flight data recorder
- › Expandable with additional sensors, accessories and firmware updates
- › Built-in OSD with color graphics
- › Simple to set-up and operate out of the box

### SPECS

- › 65x33x14mm
- › 21grams
- › 3-axis gyro + accelerometer w/GPS
- › 11.3- to 22.6-volt input
- › \$279.99

## Robot Shop Lynx Motion Quadrino Nano

### MID-SIZE WORKHORSE

The Lynx Motion Quadrino Nano is a relatively new addition to the multirotor controllers, but from early examination it looks to be a nice unit. This compact controller comes with a number of extras that make it easy to adapt to your particular needs. Using the MultiWii software, it has onboard three-axis gyroscope, three-axis accelerometer, three-axis magnetometer, barometer and GPS. It is mainly designed for quadcopters and hexacopters, and the controller has eight speed controller outputs and radio inputs. [robotshop.com](http://robotshop.com)

### WE LIKE

- › Vibration-dampening mount
- › Arduino bootloader allowing for DIY/hacking projects
- › Integrated sensors
- › Built-in GPS module with external antenna

### SPECS

- › 53x53x17mm
- › 28 grams
- › Three-axis gyro, accelerometer, and magnetometer w/GPS
- › 3.3- to 5-volt input
- › \$149.99



## EIGHT GREAT FLIGHT CONTROLLERS

**Top of the line:** These controllers are designed for the large multirotors in the range of 900 to 1000mm+ and with four, six or eight motors. These full-performance controllers offer many standard multirotor types, GPS stabilization and in-depth pre-programmed features. Some of them allow you to select different waypoints and let the multirotor fly autonomously. Pilots will find many different programming features they can adjust to fit their needs, and these controllers have some redundancy and safety systems to guarantee a successful flight.

### 3D Robotics Pixhawk

#### TOP OF THE LINE

This system includes new autopilot functions that allow sophisticated scripting of missions and flight behaviors. The custom PX4 driver layer ensures tight timing across all processes, and there are basically no limitations to programming for autonomous aircraft. A backup system provides in-flight recovery and the unit has a manual override with a dedicated processor and standalone power supply. Some peripheral options include digital airspeed, support for external multi-color LED indicator. This is an impressive, compact controller that can easily adapt to whatever configuration needed. [3drobotics.com](http://3drobotics.com)

#### WE LIKE

- › External safety button for easy motor activation
- › High-power audio indicator
- › Redundant power supply inputs and automatic failsafe
- › Abundant connectivity options for add-ons

#### SPECS

- › 50x81.5x15.5mm
- › 38 grams
- › Three-axis 16-bit gyroscope and three-axis 14-bit accelerometer/magnetometer
- › 5.3-volt input
- › \$199.99



### DJI A2

#### TOP OF THE LINE

The A2 is designed for the Spreading Wings group of multirotors but will work on other 800-1000mm multirotors. It can support nine multirotor configurations and has a customized motor mixer. A great feature is the intelligent orientation control system that will lower the landing gear during an emergency, motor failure or auto landing to protect the aircraft and gimbal. Of course it also has DJI's intelligent return-to-home function. This advanced multirotor stabilization controller provides total ease of flight with stability and reliability for just about any situation. We like its compact design and easy set up. [dji.com](http://dji.com)

#### WE LIKE

- › Point of interest flying fix
- › Banked turn mode to make turning easy and smooth
- › Cruise control feature
- › One motor fail protection

#### SPECS

- › 54x39x14.9mm
- › 35 grams
- › Three-axis gyroscope and three-axis accelerometer/magnetometer
- › 7.4- to 22.2-volt input
- › \$1299.99

