# Braincube Aeromodels

# BrainCube

# FlightLights

Version 6 - Owners Manual

## Introduction

Thank you for purchasing a set of FlightLights, a high performance LED system for model aircraft designed and manufactured by BrainCube Aeromodels Ltd.

This manual will describe how to safely use the various features of the FlightLights 6 controller and how to install the controller in a model aircraft. **Please ensure you read this manual in full before fitting or operating your lighting system.**

## Safety

It is your responsibility to ensure that you operate the FlightLights 6 controller and BrainCube LED modules within their stated specifications. Failure to do so could result in permanent damage to components, battery packs, property or personal injury. Neither BrainCube Aeromodels Ltd or Touchdown Solutions Ltd can be held responsible for misuse, intentional or otherwise, of our products. Please ensure you observe the following safety points:

- The FlightLights 6 controller can reach temperatures in excess of 80°C under high loads (ten light modules or more, total load over 2.5A) and may burn skin or damage heat sensitive components.

- BrainCube lighting modules can reach 60-80°C during operation. This is normal, due to the very high light output and high current operation.

- Disconnect the LED battery when storing your model to prevent over-discharge.

- Do not stare into the light modules or view through optical instruments whilst on - they are intensely bright and may hurt your eyes.

- Always range check your model with the lights running after installation to ensure there is no interference.



**Caution! Hot**

**CLASS 1 LED PRODUCT**
DO NOT STARE INTO LED OR VIEW THROUGH OPTICAL INSTRUMENTS

## Technical Support

If you have any problems, queries or suggestions regarding FlightLights, please do not hesitate to contact Touchdown Solutions Ltd :-

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The FlightLights v6.0 controller is a high performance microprocessor controlled, remotely operated LED driver and light sequencer. It contains an integral high voltage, high current switching power regulator and drives four output channels for navigation, landing, upper strobe and lower strobe lights.

The controller will convert a wide input voltage range into the 5V supply the LEDs require, and can supply up to 3A of current. The LED power supply is isolated from that of the receiver to protect your radio gear from the high current draw of the light modules. All battery types are supported, including Lithium Polymer, with a voltage range of 6 - 42 volts (2-10S LiPo packs).

The controller can learn the transmitter signals you want to use to switch the lights, making it easy to integrate with your model (see page 4). There are 10 flash patterns pre-programmed, some of which include Rotating Beacon simulation (see page 5).

The controller's operation is set via the small rotary control dial located on the front top right side of the controller. A small, flat-head screwdriver is needed to move the dial. It can turn approximately 3/4s of a turn between the end-stops - be gentle, **excess force will damage the dial**.

The unit should be fixed in position with double-sided foam tape, self-adhesive Velcro or using the supplied mounting feet and grommets.

The feet can be carefully pushed in the sockets in each side of the case and fixed in place with a small drop of Superglue. Make sure that they are the correct way up before doing so !

When screwing down, make sure the system is turned off before inserting the screw at the terminal end.

Try and avoid placing the controller or it's leads too close to your receiver or receiver aerials to minimise the risk of interference. Remember to range check your model with the lights running.

It is important to remember that the controller generates heat during operation, proportional to the number of lights it is running. Mounting it where cooling air can flow over it is required if running more than 10 light modules (2.5A total load).

The light modules should be plugged in with the connector vertical and black wire on top. The light modules will only work if the polarity is correct, but they will not be damaged if they are briefly

plugged in backwards. There are three sets of pins for the navigation lights, one pair for each of the strobe channels and one pair for the landing light channel.

The six pairs of output pins will also accept normal servo plugs inserted vertically with the black (negative) wire on top. If you require more lights than there are sockets, you can use the available Y-lead, providing you do not exceed the current handling capabilities of the controller.

## Operating Modes

The controller has three modes of operation, which are described in the following sections. The position of the control dial when receiver power is turned on determines which mode the controller starts in.

The controller recognises three control dial positions:

Position 1: Anti-clockwise limit

Position 2: Centre position – slot horizontal

Position 3: Clockwise limit

Remember not to force the dial - if you feel resistance you have reached an end-stop.

## Position 1 - Learning Mode

The controller can learn the transmitter signal levels that you want it to switch at, as well as the safe cut-off voltage for your chosen power source. Please note that some radio systems may require the operating channel to be set to Reverse!

The learning procedure is as follows:

1. Plug everything in as it will be set-up on the model. Ensure your LED battery is fully charged, and is the same one that you will use in the model.

2. With the power OFF, turn the control dial to position 1.

3. Turn on your transmitter and configure the channel you wish to use to control the lights.

4. Set the transmitter channel to the "lights off" position.

5. Turn on LED power followed by receiver power. All the LEDs will flash 5 times to indicate you have entered learning mode. We recommend a separate switch be used for the LED power

6. The controller will measure the LED battery voltage and remember a safe lower voltage limit derived from this (75% of the measured voltage or 3.15V per cell for LiPo batteries).

7. After 6 seconds, the controller will record the "lights off" value and flash all LEDs once.

8. Move the transmitter control to the "nav and strobes on" position. After 3 seconds the controller will record this value and flash all the LEDs twice.

9. Move the transmitter control to the "landing lights on" position. After 3 seconds the controller will record this value and flash all the LEDs three times.

10. All LEDs will then light for a one second long flash to indicate that you have finished.

11. If you are happy with the settings, move the control dial to position 2 and the controller will store the settings and move to normal operation. If you are not happy with the settings, remove receiver power without moving the control dial and the new settings will be discarded. If you accidentally save incorrect settings, see page 5 to reset to the factory defaults.

## Position 2 – Normal Operation

During normal operation, the controller will switch the navigation, strobes and landing lights based on the stored transmitter signal levels. If you haven't gone through the learning mode, these will default to values that are compatible with a transmitter channel operating from a three position switch, and a 2 cell lithium polymer battery pack.

The controller constantly monitors the voltage level of the LED power source. If this level drops below the stored cut-off voltage (by default 6.3V - safe for a 2S LiPo battery), the power supply is placed into standby, the LED modules are turned off and the controller's status LED will flash twice a second. The LED battery should be disconnected to prevent over-discharge.

The controller will go into standby mode if it has been powered up for more than thirty minutes (even if the LEDs are turned off) to prevent excessive heat build up. The status LED will flash once every two seconds. Even when the LEDs are off, the power supply draws a small current from the LED battery pack - please make sure that you switch off the LED input supply when finished..

The controller comes with 10 flash patterns programmed, some of which incorporate "rotating beacon" functionality – this simulates a light with a rotating mirror that some aircraft use instead of a strobe light. To select the flash pattern, turn the control dial to position 1 or position 3 to move up and down (respectively) through the flash patterns. Each pattern will run for five seconds before moving on to the next so you have time to see what it looks like. If you want to keep the current pattern, move the dial to position 2 and the controller will store the setting and resume normal operation.

## Flash Patterns

| Program | Strobe 1 | Strobe 2 | Notes |
|---------|----------|----------|-------|
| 1 | Long Flash | Long Flash | |
| 2 | Double Flash | Double Flash | |
| 3 | Short Flash | Short Flash | Out of phase |
| 4 | Short Flash | Double Flash | |
| 5 | Long Flash | Double Flash | |
| 6 | Rotating Beacon | Double Flash | |
| 7 | Double R.B. | Long Flash | |

| 8 | Rotating Beacon | Rotating Beacon | Out of phase |
| 9 | Long Flash | Double Flash | Nav lights pulse off (as per RAF Hawk) |
| 10 | Double R.B. | Rotating Beacon | Out of Phase |

## Position 3 - Reset to Defaults

Selecting this mode on start up will reset the controller to the factory default settings for flash pattern, receiver signal levels and battery cut-off voltage. Use this mode if you accidentally store incorrect settings during the learning mode. The LED output when this mode is selected is a test pattern that is used to ensure the circuitry is fully functional for quality control after manufacture and can be ignored.

## Light Positions

According to the FAA regulations, civil aircraft navigation lights should be positioned thus:

> (b)　*Left and right position lights.* Left and right position lights must consist of a red and a green light spaced laterally as far apart as practicable and installed on the airplane such that, with the airplane in the normal flying position, the red light is on the left side and the green light is on the right side.
>
> (c)　*Rear position light.* The rear position light must be a white light mounted as far aft as practicable on the tail or on each wing tip.
>
> - FAR Part 23 Sec. 23.1385

Note that "left" and "right" refer to the aircraft from the pilots view point, not an external observer. The anti-collision strobe lights have the following requirements:

> (b) *Field of coverage.* The system must consist of enough lights to illuminate the vital areas around the airplane, considering the physical configuration and flight characteristics of the airplane. The field of coverage must extend in each direction within at least 75° above and 75° below the horizontal plane of the airplane, except that there may be solid angles of obstructed visibility totalling not more than 0.5 steradians.
>
> (d) *Colour.* Each anti-collision light must be either aviation red or aviation white and must meet the applicable requirements of Sec. 23.1397.
>
> - FAR Part 23 Sec. 23.1401

The strobe lights outputs can be used with any of the red, green or white modules – additional light modules can be purchased individually from the BrainCube Aeromodels website – http://www.scale-helicopters.com

Modern military aircraft generally follow the same guidelines. These rules only cover the minimum requirements, a lot of aircraft have significantly more lights. Landing lights, taxi lights, formation lights, livery illumination lights can all be seen on commercial and military aircraft.

Older aircraft generally had a more relaxed approach to lighting, and there is little consistency – Google image search can be a big help getting a scale model lit correctly!

## Technical Specifications

| FlightLights v5.0 Controller | |
|---|---|
| Receiver Supply Voltage | 4V - 13V |
| Receiver Supply Current Draw | 100mA |
| LED Supply Voltage | 6 - 42V |
| LED Power Output | 5V, 3A MAX |
| Dimensions | 75 x 24 x 17mm |
| Weight | 35g |
| | |
| | |
| | |

## Light Modules



BrainCube Aeromodels manufacture a range of high performance LED modules compatible with the FlightLights system.

All BrainCube systems are fully checked and tested before packaging

to ensure the customer receives a fully functioning system.

BrainCube Aeromodels products are designed and manufactured using high quality components
and materials sourced from suppliers around the world.