



LIGHT MAGIC LIGHT CONTROLLER

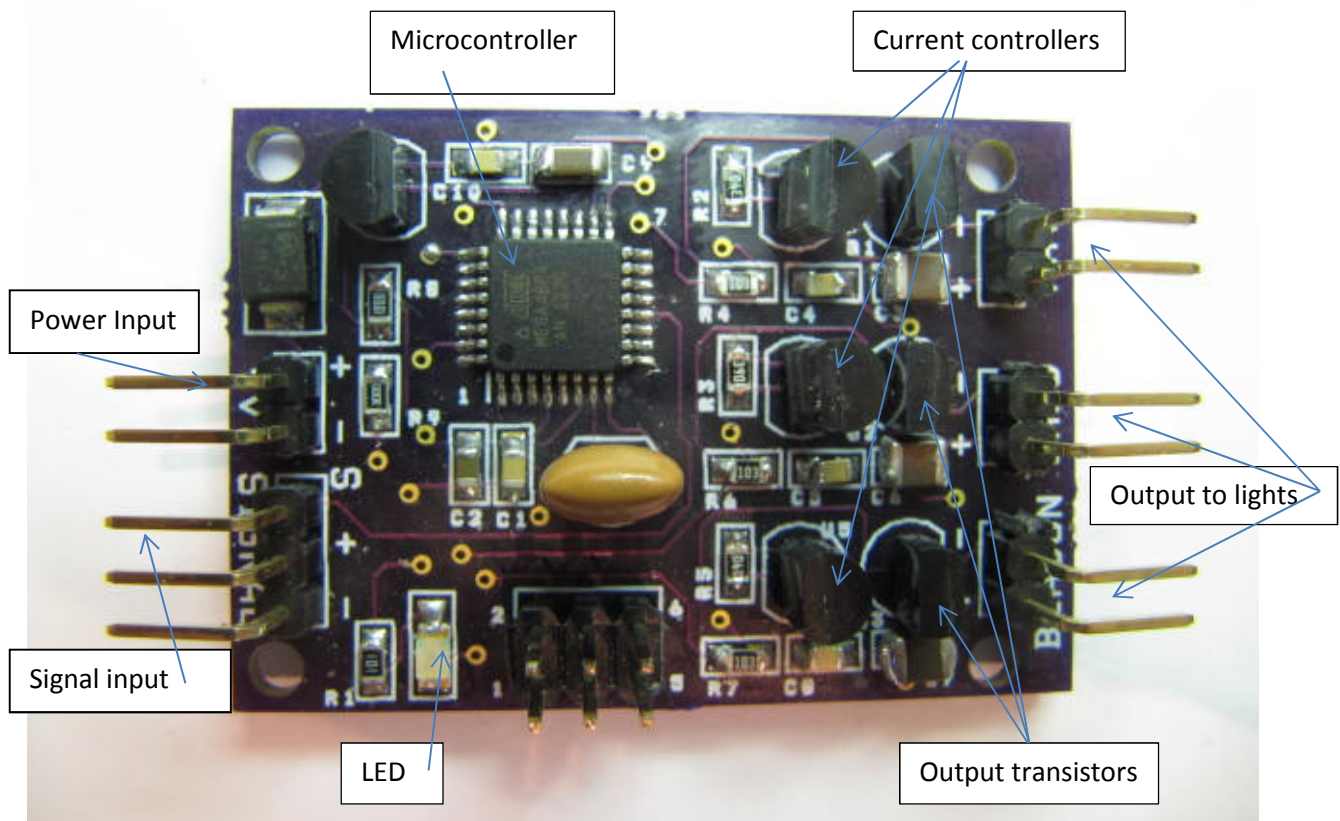
OVERVIEW

AIRCRAFT LIGHTING -

Light Magic gives you control of your R/C airplane's LED lighting. Light Magic allows you to separately control your airplane's navigation lights, flashing beacon and landing lights from your transmitter using any two position switch. Simply flip the switch once, and the navigation lights will light up. Flip it again and the beacon will begin to flash. flip a third time, and the landing lights come on. flip the switch once more and all of the lights will go off.

Light Magic is powered by either your electric airplane's main propulsion battery or a separate battery for the gas and glow fuel airplanes. Plug the battery into the 2 pin connection (header) labeled BATT (some versions may be labeled 9V, but it is permissible to use voltages as high as 30V). Be sure to observe the correct polarity or Light Magic will not operate. Light Magic allows you to use aircraft propulsion batteries of up to 30VDC(volts direct current). Do not exceed 30V or Light Magic will be damaged and the warranty voided.

Figure 1. Light Magic



INSTALLATION AND OPERATION

CONFIGURING THE TRANSMITTER AND RECEIVER -

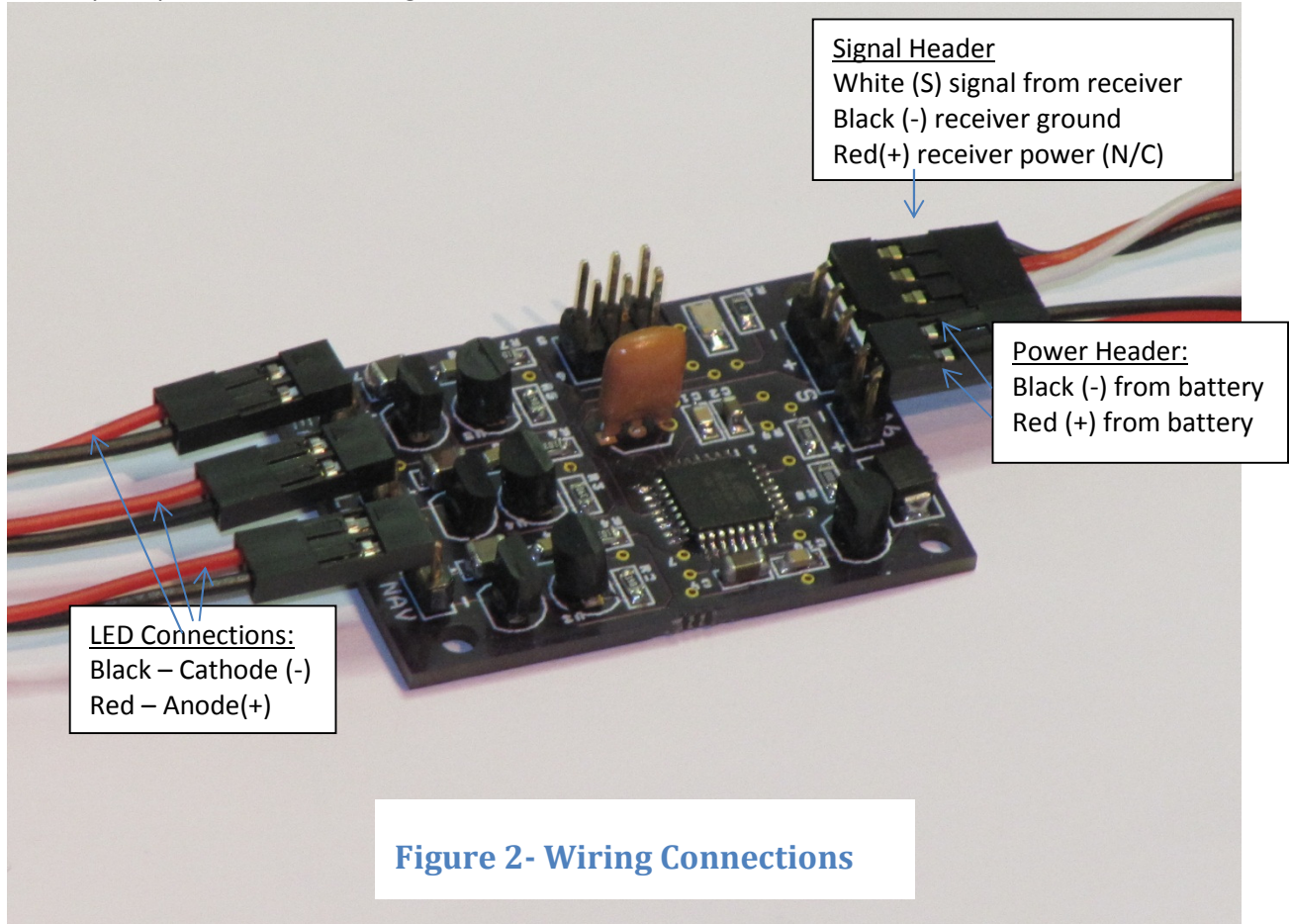
You must configure your transmitter and receiver to allow Light Magic to work. Following the instructions in the transmitter operator manual, configure any two position switch on your transmitter to control an unused channel on your receiver. It is common to choose to use channel 5 or channel 7

Connect the channel you have selected on the receiver to the SIGNAL header on Light Magic (Figure 1). Use the three conductor wire with three position female headers. Be sure to observe correct polarity. The black wire connects to the (-) post and the wire containing the signal connects to the (S) post.

OPERATION – When Light Magic has power, the on board controller LED will flash twice. When it senses the correct signal from the switch, the controller will flash the on board LED once every time it receives a signal from the switch on the transmitter and turn on the aircraft lights, in sequence, as described above.

CONNECTION- You must install the wiring between your propulsion battery and Light Magic. If you elect to use a separate battery, connect the battery (not supplied) to the BATT connector (may be labeled 9V). If you elect to power Light Magic with the airplane propulsion battery, you must fabricate and install a power lead from the battery harness. Connect into the main motor power supply of the R/C airplane as shown in Figure 1. Be sure to observe the correct polarity. Connect the red wire to the battery positive (+) terminal and the black wire to the battery negative (-) terminal. Be sure to make the battery connection between the battery and the motor ESC (electronic speed controller). Most users prefer to solder a permanent connection right to the battery terminal connection wiring on the ESC. Be sure that the connection is securely soldered and insulated to prevent short circuits. Maximum battery voltage is 30VDC (volts direct current). If you connect a battery with voltage higher than 30 VDC, Light Magic will be damaged. If you inadvertently connect Light Magic backwards (reverse polarity) its protection

circuitry will protect it from damage, but it will not work.



When you connect a battery to Light Magic, the LED will flash twice to let you know it is properly connected.

BATTERY USAGE - Remember, LEDs use electrical energy. IF you are using your propulsion battery for power, depending on the number of LEDs, your main battery will be depleted faster than it would if you have no lights. In the usual installation, navigation lights, flashing beacon and landing lights will consume approximately 75 milliamps of current. This is normally only about 5% of the energy consumed by the motor, but it will decrease the amount of time you can fly after reaching a low battery condition. Experimenting with the system while the R/C airplane is safely on the ground will assist in determining the right timing and battery reserve required.

WIRING YOUR LED'S- If you are supplying your own aircraft lights, remember that Light Magic is factory set to supply approximately 25mA of current on each circuit. This is appropriate for most 5mm "superbright" LEDs wired in series. However, the current controllers on Light Magic have the capacity to supply up to 100mA per circuit. If you need the higher current capacity, send your Light Magic to the address shown below with a letter stating your current requirements, and we will modify it and return it to you free of charge.

Each set of aircraft LED's should be connected to the labeled connector header on Light Magic. Power for each LED string is supplied by a separate constant current controller which has been factory set to provide 25 milliamps of current. This insures that each LED string is supplied with the amount of current that is optimal for its operation. The LED strings require a minimum battery voltage of 12VDC to operate at full brightness.

Light Magic can operate other LED configurations as long as all LED's on the string are rated for continuous current greater than 25milliamps. The constant current controllers on Light Magic are designed to drive LED's wired in series, as shown on Figure 2. The number of LED's that each output circuit on the unit can drive is dependent on the forward voltage drops of the individual LED's in the string. The voltage available from the battery should be 1.5 volts higher than the sum of the forward voltage drops of all the LED's on a string of LED's. If you need to wire any LED's in parallel to meet total voltage drop requirements, be sure that LED's with same forward voltage are placed in parallel with each other, and LEDs with different forward voltages are placed in series with them. LEDs in parallel will divide the 25mA between them.

Color	Forward Voltage
White	2.5-3.5
Red	1.7
Green	2.5
Blue	5.5
Yellow	2.2

Typical forward voltages for common LEDs

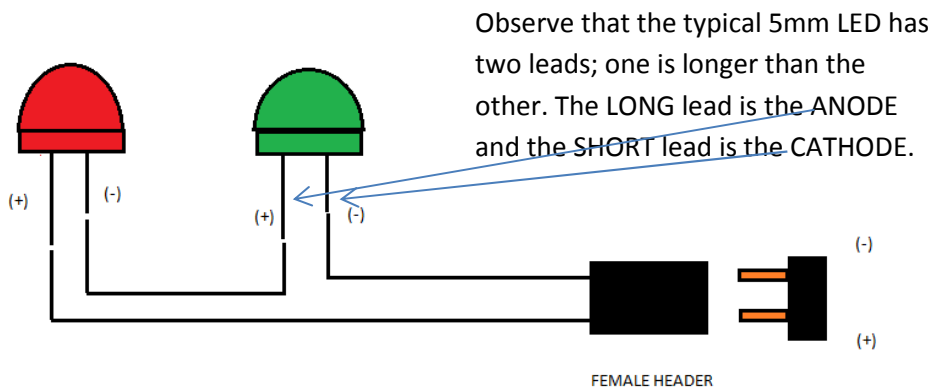


Figure 3- Series Connection of LEDs.

TROUBLESHOOTING-

Board LED does not flash twice when connected to power:

1. No power to board. When you first power up Light Magic, the on board LED will flash twice indicating that the board has successfully powered up. If the LED does not flash twice, there is a problem with the power supply to the board.

Possible Causes:

- a. Wiring incorrect, no continuity between battery and board
- b. Low battery voltage
- c. Battery polarity reversed

Lights will not turn ON/OFF:

1. No signal from the transmitter or the signal has not been received by receiver. When Light Magic receives the correct signal from the transmitter, it flashes the on board LED once for every activation of the switch. If the LED does not flash the switch is activated, the board has not received a signal from the transmitter.

Possible Causes:

- a. Transmitter is not ON.
 - b. Transmitter is not correctly programmed to send the signal from switch you have selected to the channel you are connected to on the receiver.
 - c. No power to the receiver or the receiver is wired incorrectly. The LED on the receiver must be ON. Check the receiver wiring to assure that the receiver is getting the proper voltage and polarity.
 - d. Signal wiring to Light Magic SIGNAL pins not connected or incorrectly connected. Insure that the 3 pin connector from the receiver is on the correct channel and that the connector is correctly placed on the SIGNAL pins (See Figure 2).
2. Wrong signal received. If the wrong signal is received, the LED on the Controller will not flash when the switch is moved. If this happens, review the transmitter operator's manual to make sure that you have programmed the transmitter correctly. Also, insure that the signal wire from Light Magic is inserted into the correct channel on the receiver.
 3. LED's wired incorrectly. The LED's must be wired such that the (+) side of the LED connector on the board connects to the anode of the first LED. Subsequent LED's are in series with the first LED, as shown in Figure 1.
 4. LED's failed. A typical 5mm LED that is exposed to continuous current in excess of 25mA will fail permanently. Actions such as testing an LED with a battery will kill the LED unless there is a current limiting resistor in the battery circuit.