

How to make more efficient LED bead lighting that runs on 12v DC

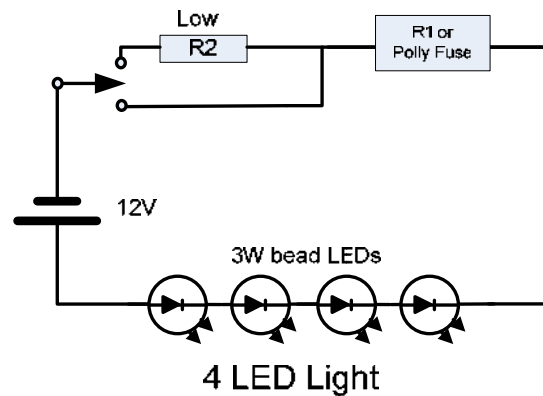
The design philosophy and why this works is in the file “Design_Mods_to_Improve_LED_Light_Output_Efficiency-2016.pdf”.

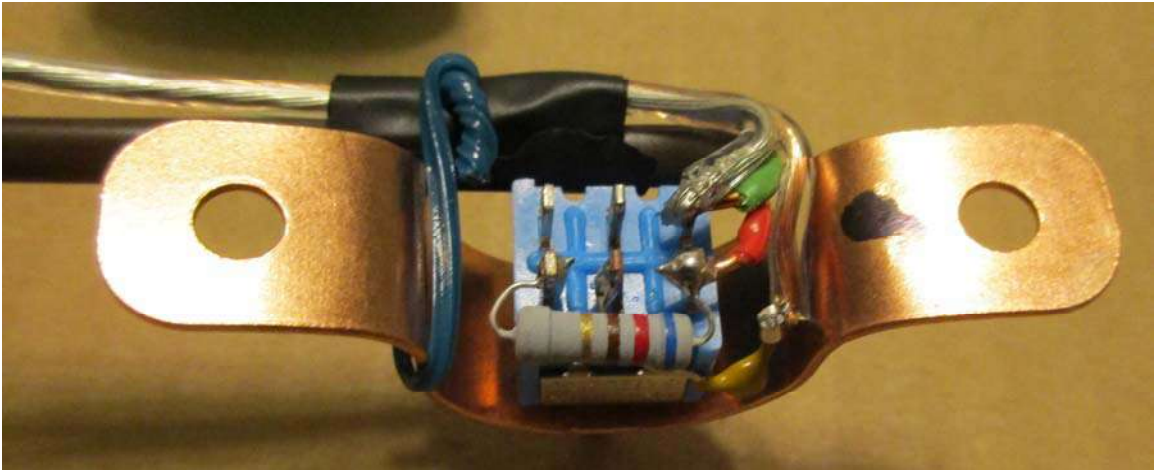
How this was made: Find or choose LEDs that starts out very light efficient, like the 3W bead LEDs that produce 280 LM of cool white light (sold on eBay). Find the most efficient light output/watt point to drive the LED beads. Usually at a low voltage-current, maybe 1/10 to 1/20 of max. Find R1 so that max LED light-output/watt and minimum heat dissipation and does not over power at 15-16v dc. Then match a polyfuse to work in place of R1 and will trigger at or near 13v.

4-LED Design

A plastic orange juice bottle lid was used. R1 is in the order of magnitude of 20 to 22 ohms. The Polyfuse found to work was a 50ma 60v that tested to trigger at around 70-80ma. When put in series with 4 bead LEDs at normal battery voltage would draw between 55ma and 70ma.

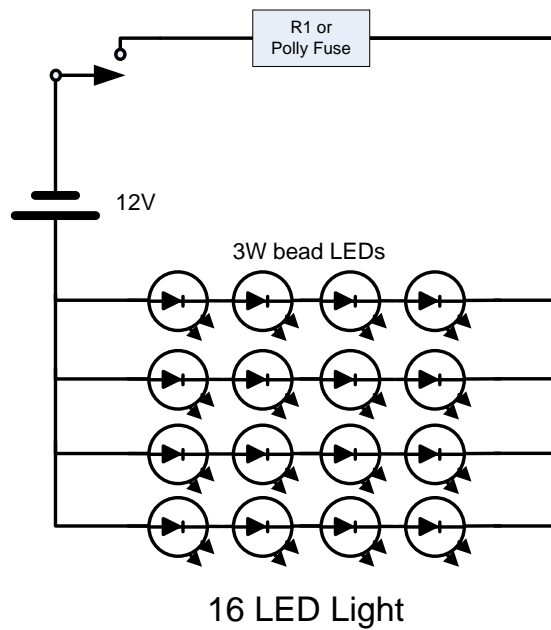
No heat sink on the back on these units is needed. R2 could be a pot for individual controls, or what I found to be 620 ohms seems to work best for low light. On low it uses $3.5\text{ma} \times 12.6\text{v} = 47\text{mw}$. On high it uses $66\text{ma} \times 12.6\text{v} = 832\text{mw}$.

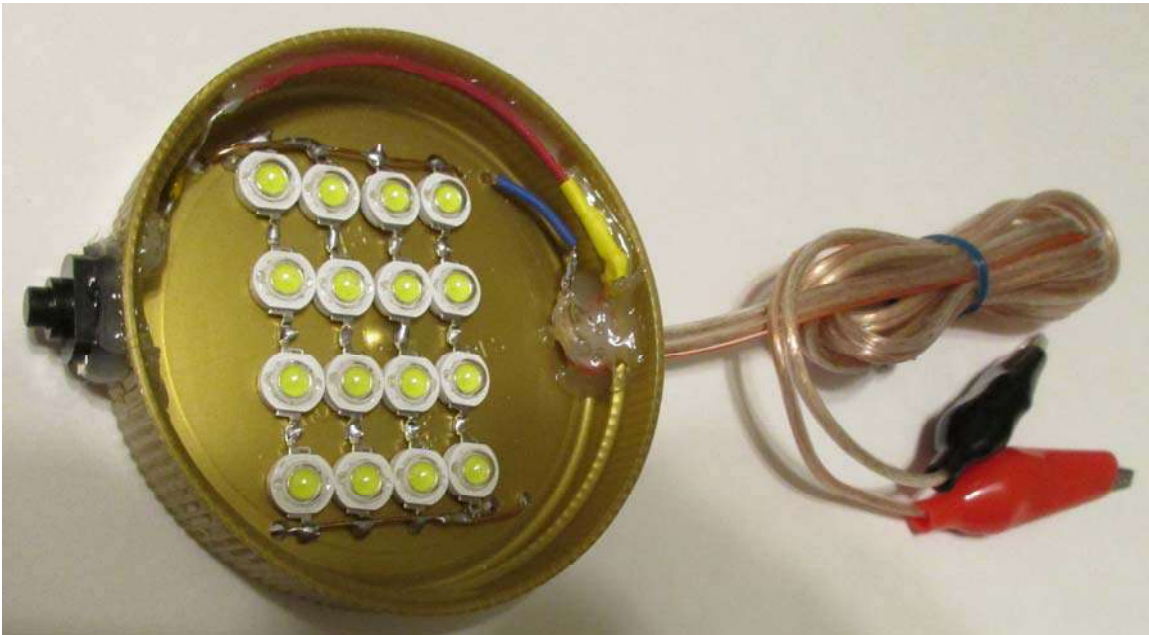




16-LED Design

Mayonnaise jar lid was used. R1 is in the order of magnitude of 20 to 22 ohms. The Polyfuse found to work was another vendors 50ma 60v that tested to trigger at around 180-200ma. When put in series with 16 bead LEDs at normal battery voltage would draw 200ma. When turned on it draws $200\text{ma} \times 12.6 = 2.5$ watts.





Summary of Light output/watt of input: Most commercial off the shelf LED 120v AC bulbs are 9-12 times more efficient than incandescent bulbs at converting a given input power to light. 12 volt DC non-modified camping bulbs are about 15 times, and modified camping bulbs are about 25 times more efficient. The above two configurations are about 66 times more efficient at converting a given amount of input power to light.

This is useful in a survival situation of limited power. Also the LED lighting industry needs training on producing this “4 series LEDs and a polyswitch” configuration over the past “3 series LEDs an a resistor” configuration. Yes it cost more because one is running at lower than max power for each LED. On the positive side the LEDs will last a whole lot longer than at full power.