

## Emergency Light by Killing old AA-AAA cells

(5/5/2016)

To use the power of a single cell all the way down to .2 volts is usefully in an emergency. Many of us have some old used AA or AAA non-rechargeable cells that still have energy in them and for that reason we have saved it in a box or some location where we can possibly use it if a lower voltage circuit needs a cell. For example wall clocks will take a cell down to 1.3 to 1.4 volts radios and LED flash lights may take it down further but not much more. Most cells are capable of putting out energy down to about .9V and then it rapidly decreases. A way to use this energy is available. These are affectionately called "kill a cell fast" and "kill a cell slowly" while producing light as efficiently as possible. The following two circuits are designed to do just this.

Before we start it is desirable to mention that one should not kill a single rechargeable cell below .9 volts and that one does not want to kill rechargeable batteries that are made of multiple cells down to a very low voltage. One or more of the weak cells will reverse and become charged in reverse voltage. The stronger cells pump electrons in a given direction the weaker cell first goes to zero then charges up in reverse. This effectively ruins the cell and it becomes leaky and self discharges rapidly when recharged. Thus the battery then doesn't hold a charge and is considered no good. So if one sees a rechargeable battery starting to rapidly discharge compared to what it should be doing then one can assume a weak cell. At this point a full over charging equalization charge would be needed. All non-rechargeable cells and batteries are fare game to get all the energy out of them before tossing them.

During emergency use in earthquake prone environment, the following type of lighting is much safer than a candle that can tip over and start a fire. Consider saving these units in the same location as you keep your old non-rechargeable AA or AAA cells.

If you have lots of other sizes like C and D consider soldering a single cell holder in parallel to the existing ones. Don't go over 1.5 for the "Kill a cell fast", unless you change out the 120 ma 8mm LED for a 3 watt bead SMD LED.

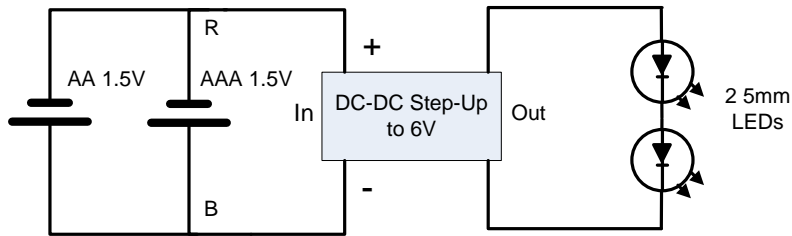
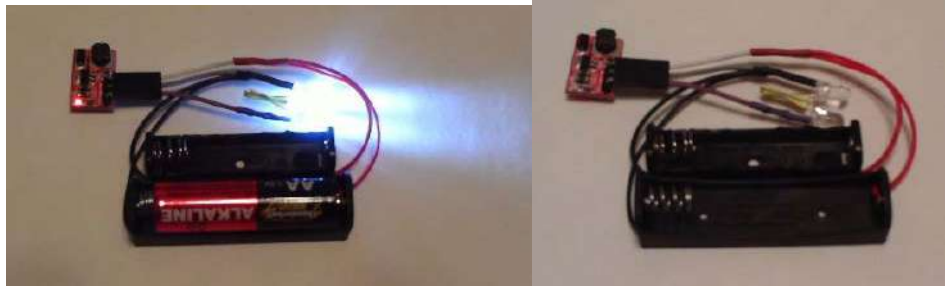
**Overview:** How does one drive a LED at a minimum of 2.7-2.9 Volts DC from a no more than 1.5 v single cell DC source? Transformers do not work with DC. The following two step-up circuits first convert the DC to AC then boost the voltage with a small transformer and then rectify and filter it back to DC. This is done at a high resonance frequency as efficiently as possible. Single cell LED flashlights use this same principle if you can find them. One type sold on eBay was tested. As an example of what can be found see:  
<http://www.ebay.com/itm/2015-Popular-Black-Mini-Led-Flashlight-Torch-Light-Lamp-Outdoor-Camping-3W-1AA-/261697024737>

With this type of use of low voltage at high current, any kind of bad or poor connection will severally lower the light output. If you suspect this just tap the flashlight on the edge of a table and the cell will move a bit in the case and the light brighten up. LED have no filament o break so don't be concerned about how hard you tap it. In the following case just take the battery out and put it back in. Note there is no switch on these units so as to decrease resistance. To turn them off and on just pull one end of the cell up until the contact is broken.

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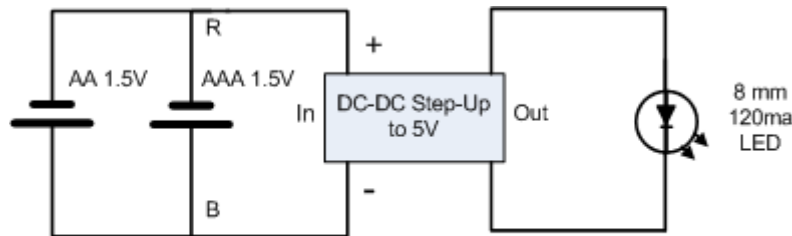
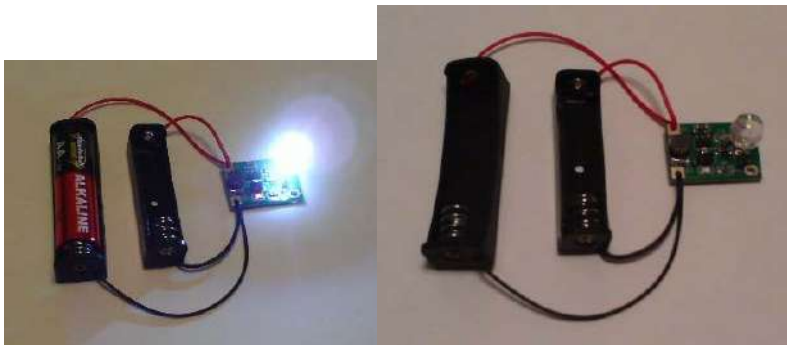
**Kill a cell slowly:** Produces narrow beam about 20-25-degrees of light more efficiently over a longer time. The wires can be bent to direct the beam to the area needed. Sold on eBay for example of what can be found see: <http://www.ebay.com/itm/171568322781>



Kill a Cell Slowly

**Kill a cell fast:** Produces maximum light in a wide angle of 135-degrees over a short time. This would be more usefully for lighting a larger area than the “Kill a cell slow”. Sold on eBay for example see:

<http://www.ebay.com/itm/DC-DC-Boost-Converter-Step-Up-Module-1-5V-to-5V-500mA-Power-Module-New-S3-/381340232628>

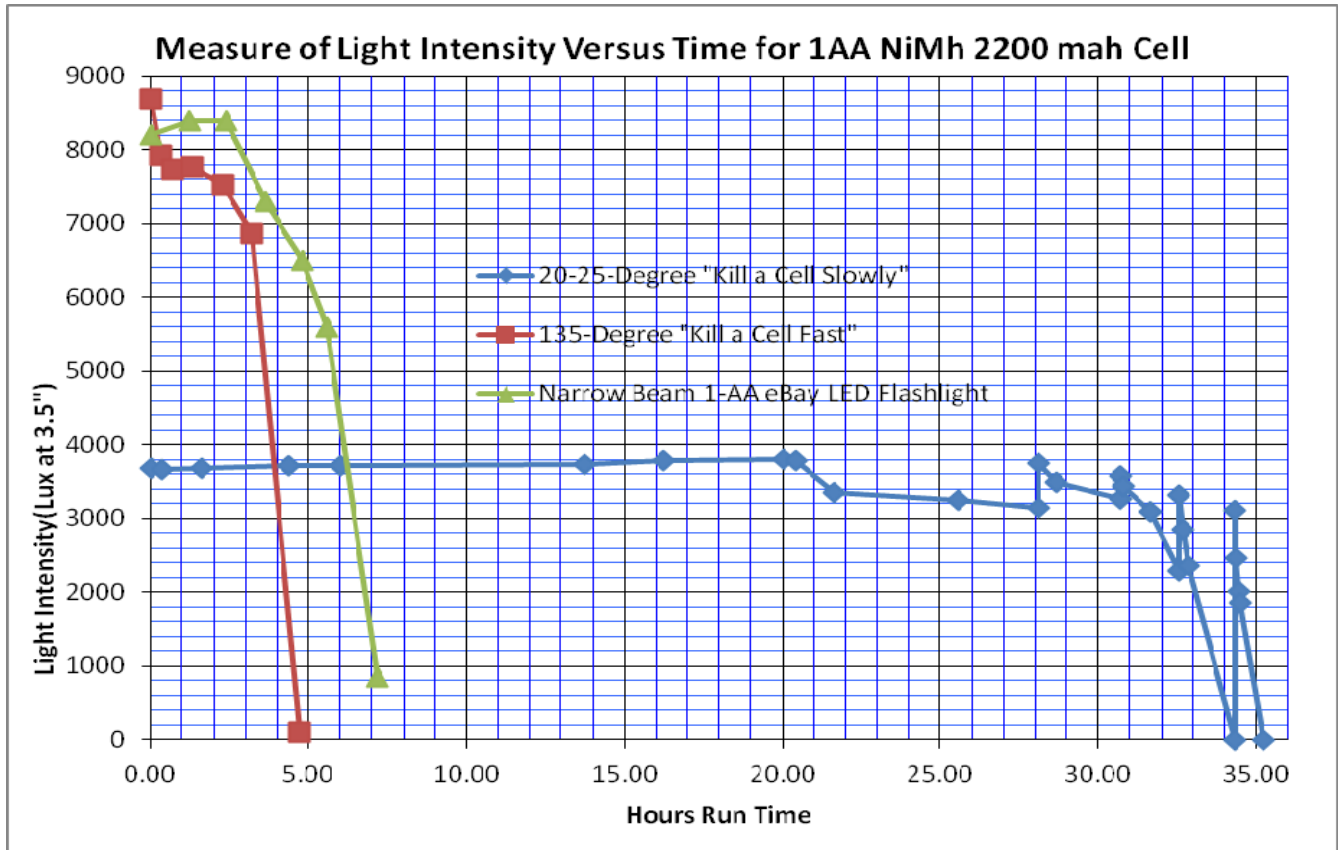


Kill a Cell Fast

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The following shows the light Intensity for the various ways of killing a cell. Both 5 and 6 volt step-up circuits are more efficient at producing light with the power given than the LED flashlight. The flashlight ends off about .9V and the step-up circuits end of at about .2V. Note that the angle of light given off by the "Kill a cell fast" is very much greater than the narrow beam flashlight. Note also the jump-up in intensity at the right end of the curve for the 20-25-Degree "Kill a Cell Slowly". The unit was turned off over night and the cell bounced back in voltage and energy to cause the jump-up-to peaks when turned back on. Most cells at the end of their discharge curve have a bounce back recharging effect when turned off for a while. This can be used to advantage in an emergency environment where one uses light only when needed.



**Description of LEDs used:** 3W High Power Cool White LED Beads 260-280Lm 20-25 degree <http://www.ebay.com/itm/231586172312> and 8mm Cool White .5 Watt Wide Angle 135-degree <http://www.ebay.com/itm/50-x-LED-8mm-Cool-White-5-Watt-Wide-Angle-Bright-High-Power-LEDs-0-5w-half-1-2-/151026675504>

Output for a narrow beam 1AA flashlight from ebay was shown in the graph above can be purchased at many different sites. The following is one example. I can be used off the shelf to kill cells down to about .9v without building the above if this is so desired. <http://www.ebay.com/itm/black-3W-Police-mini-LED-Flashlight-Torch-1AA-for-Outdoor-hunting-camping-P03-/221245946991>