

Re: LED's on a vehicle

Source: <http://sci.tech-archive.net/Archive/sci.electronics.basics/2006-01/msg00988.html>

- *From:* "kell" <kellrobinson@xxxxxxxxxxxxx>
 - *Date:* 20 Jan 2006 11:30:10 -0800
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Ken C wrote:

- > I am trying to determine the optimum arrangement for multiple LED's
- > powered by a 12V battery/alternator system on a motor vehicle.
- >
- > I could mate each LED with a 500 ohm resistor, which is how they came
- > from the HK eBay vendor. This will waste 2/3 of the energy consumed
- > and might create a heat problem if I pot the electronics in epoxy.
- >
- > I could put three LED's in series with a 150 ohm resistor, but they
- > would significantly brighten and dim as the vehicle's voltage ranged
- > between 12.5 volts (engine off) and 15 volts (alternator charging).
- >
- > I am leaning toward using one 7808 regulator feeding multiple
- > clusters, with each cluster containing two LED's in series and a 50
- > ohm resistor. This would put most of the energy loss in the
- > regulator, which I can put in a protected spot with a heat sink. The
- > constant 8V would solve the variable brightness. The regulator, rated
- > at 2.2 amps, could in this fashion illuminate over 200 LED's, which is
- > more than enough.
- >
- > Any suggestions?
- >
- > Ken C

Right now I am stuck using Google Groups, which doesn't have a nonproportional font for posting ASCII diagrams, so bear with me while I describe a simple constant current circuit. This uses a npn transistor at the low end of your led string. If you want the transistor at the top of the string, just use pnp and flip everything.

Draw a npn transistor. Draw a common red led from transistor base to ground. Draw a resistor from transistor base to battery positive. Draw a resistor from emitter to ground. Draw your diode string between battery positive and the collector.

The emitter resistor will have a fixed voltage impressed on it, which is the difference between the led voltage and the base-emitter voltage of the transistor. That will be about one volt, which makes calcs easy. Tempcos of the "base" led and b/e junction will cancel, or nearly so. Collector current, which is the led string current, will be

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equal to one volt divided by the value of the emitter resistor. Put enough leds in the string to minimize the voltage drop across the transistor. This is the most efficient way I can think of to run led's, if you are willing to wire one transistor for about every six or seven led's you run.

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- *Follow-Ups:*

- ◆ *Re: LED's on a vehicle*
◇ *From: Rich Grise*

- *References:*

- ◆ *LED's on a vehicle*
◇ *From: Ken C*

- Prev by Date: *Re: "manual closed loop control" is there such a thing?*
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