

Re: Another Novice Q. – recharging – Volts and Amps

Source: <http://sci.tech–archive.net/Archive/sci.electronics.basics/2008–06/msg00581.html>

- *From:* ehsjr <e.h.s.j.r.removethespampunctuation@xxxxxxxxxxxxxxxxxxxx>
 - *Date:* Thu, 26 Jun 2008 22:12:20 GMT
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Kris Krieger wrote:

ehsjr <e.h.s.j.r.removethespampunctuation@xxxxxxxxxxxxxxxxxxxx> wrote in [u3E8k.54\\$WJ.12@trnddc04](mailto:u3E8k.54$WJ.12@trnddc04):">[news:u3E8k.54\\$WJ.12@trnddc04](mailto:u3E8k.54$WJ.12@trnddc04):

Kris Krieger wrote:

Peter Bennett <peterbb@xxxxxxxxxxxxxxxxxxxx> wrote in news:kea3641d48c8bkakmddm6t3s8ghlljgg4n@xxxxxxxxxxxxxxxxxxxx:

On Mon, 23 Jun 2008 22:46:24 –0500, Kris Krieger <me@xxxxxxxxxxxx> wrote:

"Tom Biasi"
<tombiasi***@optonline.net>
wrote in
news:SN6dnboY57y6pf3VnZ2dnUVZ_gCdnZ2d@xxxxxxxxxxxxxxxx:

May I
suggest
deep cycle
sealed lead
acid.

Tom

My main question is, are they easily replaceable? They do seem to be easier to deal with, but these units are going into things that I'll (hopefully!) be selling, so I need to make it all as easy as possible, and I know that people can buy the NiMH batteries pretty easily. That's the only reason I've sort-of "fixated" on them. That, and it's easy to get the mA ratings that will drive the LEDs I want to use (found one that uses 20 mA, and 3.4V average, but gives out an amazing (to me) average of 18,000micro-candela, which is 226 lumens, which is a bit more than is given off by a 20-watt incandescent bulb (220 lumens). With the LED driver (I think it was you who'd recommended those), that should work out well and I could, I think, use two such LEDs, which should be about the lumens produced by a 40 watt incandescent bulb – which would be super!

Anyway, I haven't seen any drivers that I can recall reference running off of anything other than NiCad, NiMH, or Lithium-Ion batteries, so my impression was that those are the only

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two that have
both enough voltage, and
generate enough current, to
run the
drivers. I've also used store-
bought solar lights, which
had
either NiCad or NiMH
(depending upon the type),
so I know those will
work when left outdoors.

So, it might very well be
that rechargeable lead-acid
batteries can
perform similarly, it's just
that I don't know anything
about
them...

– Kris

Lead-acid batteries are normally large and
heavy. Your car battery
is lead-acid, for example (although there are
smaller sizes, and some
variations that don't have a liquid electrolyte,
available). If you
are considering AA, C or D cells for your
project, lead-acid
batteries are almost certainly not a
consideration. I'm not aware of
any lead-acid batteries in a "dry cell"
format.

AA only.

The background, in brief:

These will be fairly small-scale units that I can put inside
of stained-glass things ("lanterns", so to speak) that I design
and
hand-craft, my intent being to sell them. So the batteries
will be just the normal NiMH things that pop into regular
old solar garden/accent lights. Since the batteries will
eventually need to be replaced, I'd like them to be things

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that people can find very easily and that don't cost an arm and a leg. Someone (Tom B.?) had recommended an LED driver,

and I've been looking around at others as well (mainly to read the application notes and datasheets and whatnot so as to gain a better understanding), and Maxim posted a nifty diagram for a combination current and voltage amplifier plus an LED driver (in case it'd be helpful to anyone else, the URL is:

http://www.maxim-ic.com/appnotes.cfm/appnote_number/3871

) and I *think* that, for the input, I can use the output from a combination battery+solar-cell charging+battery management circuit.

I know that I can build a super-simple unit that will drive one normal-brightness LED; I found a few different schematics for

simple low-brightness units, and the simplest are little more than a solar cell, diode, battery, resistor, and LED, with no sort of overcharge protection or any other accommodation for any special needs that one or another sort of battery might have. They're robust, but they won't work for me because these things will be lighting stained glass, and even clear textured glass doesn't transmit as much light as does a smooth clear enclosure (I think the commercial ones are acrylic). Also, the potential customers and sales venues I've polled all have the same complaint: commercial solar lights are too dim. Ultra-cheap is not part of my equation here – I am most definitely not going seeking to try to compete with the "\$5-\$9 light" market; Wal-Mart has that very well-covered. Rather, the units, being handcrafted stained glass, will each be a minimum of around \$60, and prob. a lot more than that, depending upon the

time and skill it takes to construct a particular design. I do want to squeeze as many Lumens as possible out of a *maximum* of 4 NiMH batteries, to be charged during the daytime by solar cells, plus I want to charge the batteries in about 5-6 hours in good sunlight – and that last part is why I'm looking into overcharge protection, since it's likely that some lights will receive 8 (or even more) hours of good sunlight.

So that is why I'd asked about whether there is any significance to the relationship between the solar cell(s) V/mA rating, and the battery V/mA rating – I don't want to "cook" the batteries.

TIA!

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– Kris

I think you've gone down a path that may be counter productive. First: The amount of power you will get from the solar panel will depend predominantly on how much surface area you can get exposed to the sun. You can include instructions to the consumer concerning installation for maximum exposure, but the only factor you can control is the surface area.

What does that mean at this point? You know the size of what you are building, so you need to find solar cells that will fit that area. **That** selection will dictate how much power the design will have available, and it will be a range from minimum (0 on a cloudy day) to maximum. The amount of power available from the panel will vary throughout the day.

Only when you know how much power will be available in a typical **week** can you properly design the electronics.

So, post again once you have found a solar panel (or combination of panels) that will fit the device you are making. How much power will be available to work with under the "typical" conditions of your intended market?

You want something simple and better than a typical solar powered garden light. So do I – and I also want cheap oil. Neither is generally available these days. You can maximize what a typical solar powered garden light (like cat# SPL-09 at <http://www.allelectronics.com/> see also cat# SPL-05) produces with increased complexity and construction cost. If you can live with the performance level of either of those, your job is done – just incorporate their panels & circuitry in your product. Otherwise, you have to put in the work to search for the best panels you can get to fit your product, and obtain the best performance possible from that power source.

Without knowing how much power is available, it is impossible to say how long it will take to charge a cell, nor can the charging circuit be designed for best performance.

IIRC, no one has told you to do that work – identifying the panels – in the various threads, posts and replies since you started looking for an answer. Of course, I may have missed it, so if you have identified the panels, how much

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charging power is available to work with?

Ed

Actually, the initial consideration was finding how much brightness would be enough, and which LEDs (and/or combination thereof) will provide it. From there, it goes backwards to find out how to run them off of a *maximum* of four 1.2V NiMH batteries. From there, working backwards again, is the charge controller IC – finding the one that will charge, and keep from overcharging, 3 to 4 of the batteries. The solar cells (not panels, just cells) is actually the last thing. What I'm trying to figure out is whether I should have the solar cells producing the same total voltage as that which the batteries will have (3.6V for three of them, 4.8V for 4); since I've learned that NiMH are supposed to be fast-charged rather than trickle-charged, I'm trying to figure whether solar cell amperage is more important for doing that, with voltage being insignificant, or what.

Only *after* I know all that, can I select the specific cells, and configuration thereof...

– Kris

As you said, you are working backwards. You don't yet understand that doing it that way can result in a specification for cells that are "unobtainium".

Ed

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