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

Source: http://sci.tech−archive.net/Archive/sci.electronics.basics/2008−06/msg00552.html

- *From*: Kris Krieger <me@xxxxxxxxxx>
- *Date*: Thu, 26 Jun 2008 00:08:03 −0500

ehsjr <e.h.s.j.r.removethespampunctuation@xxxxxxxxxxxxxxxx> wrote in
u3E8k.54$WJ.12@trnddc04:">news:u3E8k.54$WJ.12@trnddc04:

> Kris Krieger wrote:
>
> > Peter Bennett <peterbb@xxxxxxxxxxxxxxxxx> wrote in
> > news:kea3641d48c8bkakmddm6t3s8ghlljgg4n@xxxxxxxxxxxxxxxxxx:
> >
> > > On Mon, 23 Jun 2008 22:46:24 −0500, Kris Krieger
> > > <me@xxxxxxxxxx>
> > > wrote:
> > >
> > > > "Tom Biasi" <tombiasi***@optonline.net>
> > > > wrote in
> > > > news:SN6dnboY57y6pf3VnZ2dnUVZ_gCdnZ2d@xxxxxxxxxxxx:
> > > >
> > > > > 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 bya 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 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 th etype), so I know those will
> work when left outdoors.
>
> So, it might very well be that rechargeable lead−acid bnatteries 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
ol' solar garden/accent lights. Since the betteries will
eventually need to be replaced, I'd like them to be things
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 otehrs as well (mainly to
read teh 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 form
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 tahn a solar cell, diode, battery, resistor, and LED,
with no sort of overcharge protection or any other
accomidation 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 mroe)
> hours of good sunlight.
>
> So that is why I'd asked about whether thre 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!
>
> − 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, you job is done − just incorporate

> their panels & circuitry in your prroduct. Oterwise, 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
> 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 tryign 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 therof...

− Kris
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