3 Dollar Battery Charger

By: gogetumnow

29 July 2004

This is a very simple circuit that can be used to charge lead acid or gel-cell type batteries from your typical 120v AC wall circuit. It is very simple and inexpensive to make.

First some warnings:

1. This circuit is a "dumb" charger. You need to be constantly vigilant as to the charge state of your batteries. This circuit, if left unchecked, does have the ability to overcharge and degrade the capacity of your batteries. (But for 3 bucks, what do you expect?)

2. This circuit uses household 120v AC. Obviously you have potential to shock yourself, or burn your house down if you don't do something right. I have used this circuit successfully many times and it works for well for ME. If you screw up and burn your house down or something, don't come running to me. Also there are potentially high voltages here. You can zap yourself with the 120v if you're not careful.

3. If you hook the circuit up backwards, instead of charging your batteries you will discharge them and ruin them.

The advantages of this circuit are:

1. Did I mention it's cheap?

2. It's very easy to build.

3. It can charge about any voltage of battery, it doesn't care.

4. It helps prevent sulfation in the battery.

5. Charge current is adjustable.

6. As a side effect, it provides good light

Materials Required:

1. Light Bulb Base

2. Light Bulb

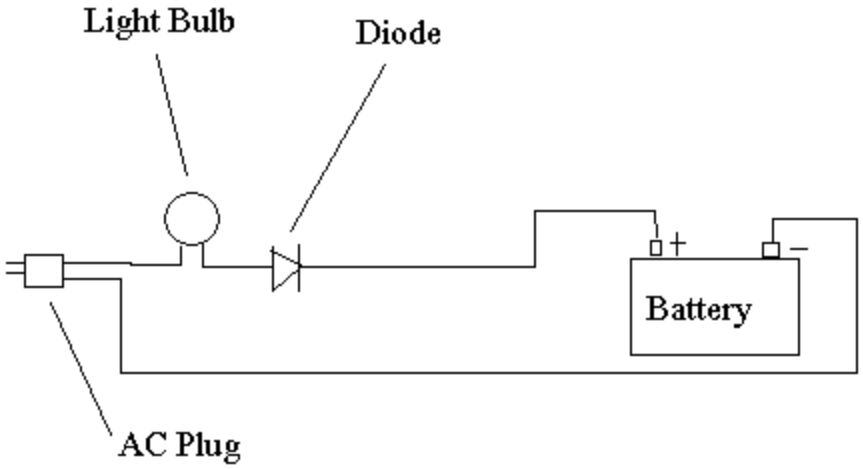
3. Silicon Diode, something rated for 1amp or greater

4. Wire, 16ga works well.

5. Hardware to attach wires to your battery

6. 2 Prong AC Plug

Here is what the circuit will look like:



Circuit description:

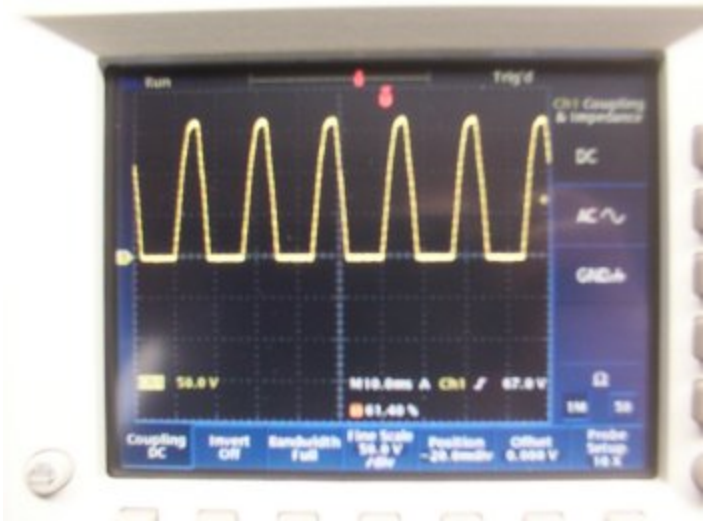
The light bulb in series with the circuit acts as a current limiter. This prevents too much current from traveling to the battery. As an added advantage it acts as a safety net. If the battery is bad and is totally shorted out, all the current is used up through the light bulb.

The diode rectifies the voltage giving a pulsed DC to the battery. This pulsed DC is good for the battery in that it helps break up sulfation.

To obtain different charge currents, simply use a different wattage light bulb.

I use a 60 watt light bulb for a good all around trickle charge.

As you can see here, using a 60 watt light bulb, with the two charging terminals shorted together (NOT HOOKED UP TO THE BATTERY) the most current I will draw is 324mA or 1/3 of an amp. If you want less, use a smaller bulb. If you want more, go for a larger bulb. The bulb is the current limiter.



This is what the waveform will look like with no battery attached. It’s a nice pulsed DC waveform. When a 12v battery is attached to the charger this spikes will go down to around 13-14 volts. This is a current limited charge, not a voltage limited charge. This means that the voltage will drop down to half a volt or so above battery terminal voltage. As stated above, the advantage to using a current limited charge is that you can charge about any voltage battery.

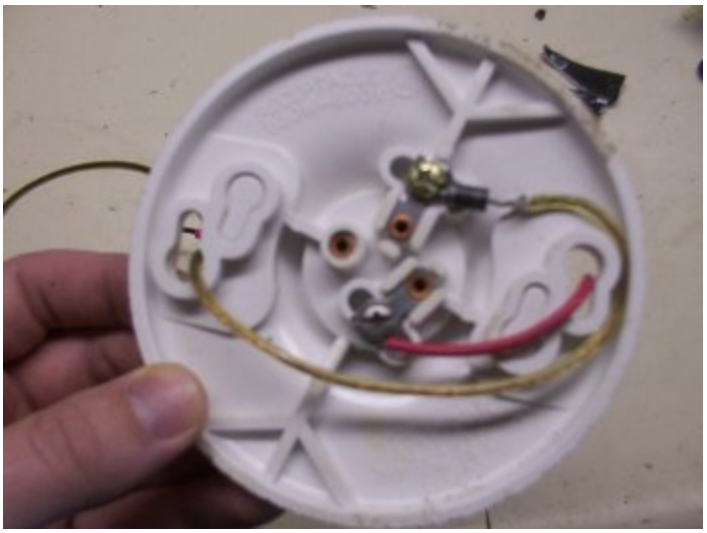
How to build:

First get all the listed materials together. I got my light bulb base at Home Depot for like $1. I used some left over 16ga lamp cord that I had. I got the diode out of an old dead computer monitor that died due to a gunshot would from a 44 Magnum. (another story) I'm sure that you can get a diode like this at Radio Shack or any electronics store. Just get an everyday garden variety Silicon Diode rated for an Amp or more. You don't want a zener, shottkey, tunnel, pin, or germanium diode. Just a regular silicon diode. It should be cheap and easy to get. The bigger the diode the better, if you can get something for 5-6 amps, that's even better. Also make sure that it's rated for at least 200v or so in reverse bias. Most are in this range, but double check.

In fact, go to www.jameco.com and look there. Product #177818, is a diode, it's rated for 1000v and 6 amps. It costs a whopping 65 cents!

Here's what mine looks like, nothing spectacular but functional nonetheless.

As you can see it's charging my little 8v gel-cell.



Here's what it looks like underneath. As you can see the diode is hooked right on one of the terminals. You don't want to set this on anything conductive as it has exposed wires underneath, for that extra safety margin you could enclose it in an electrical box or tape up the bottom. In this particular circuit I have the diode placed before the light bulb. It doesn't really matter if the light bulb or the diode gets placed in the circuit first, just so long as they are in series. If you want an even added measure of safety, you can go ahead and add an in-line fuse. Perhaps something on the order of 2-3 amps.

A note on the diode: Be sure to hook it up right. Most diodes will have a band on one end. This band indicates current flow. You want the band side of the diode to be facing the positive terminal of your battery. If you do this backwards you will discharge your battery and quite possibly ruin it.

Think of the diode as a one-way street for electrical current. Current can flow from the non-band side to the band side, but current cannot flow from the band side to the non-band side.

Testing your charger: To test your newly built charger, first make sure that it is NOT hooked up to any batteries. Then simply attach the positive lead to the negative lead and plug in your charger. The light should come on. You will note that the light is dimmer than normal. This is because the diode is cutting out the negative half of the AC current flow that the light bulb was designed for. Essentially it's running on half current.

Now that your charger passes, you are ready to start charging batteries. Just hook up your negative lead to the negative terminal of you battery, and your positive lead to the positive terminal of the battery. Away you go. Be sure to monitor your charging because as I said it is possible to overcharge your batteries. Occasionally you will have a battery that is really discharged or has a high internal resistance. You will hook up your charger and turn it on to

discover what appears to be no current flow (ie light bulb doesn't turn on). When this happens just monitor it for a few minutes. Slowly you will see the light bulb start to illuminate. This is where this circuit shines because it's good at bringing back batteries from the dead. When there is little to no current flow it means that there is much more voltage at the battery terminals. This high voltage is good for a dead battery because it helps re-establish current paths. As the current paths are re-established and the current flow increases, the voltage will go down and the current flow will go up. But the current flow will max out at the light bulb's max current.

If you want to get fancy and make the 3 dollar battery charger into a high dollar 10-12 dollar battery charger you cold add the following:

- A switch to turn it on and off

- A household timer to charge your batteries for only a certain amount of time.

- A nice project box to house everything

- An inline fuse or breaker for extra safety

- You could add a resistive load and a timer to charge and discharge your batteries unattended.

Anyway, that's the 3 dollar battery charger. It's worked well for me over the years. I have charged many batteries with it. I have brought many batteries back from the dead with it as well. It's a good all around basic charger. Good luck!

gogetumnow
