# Lost Your Charger? How to Charge any Battery Survival-Style

by **TimAnderson** on October 16, 2007

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**Author:** PRO **TimAnderson** author's website

Tim Anderson is the author of the "Heirloom Technology" column in Make Magazine. He is co-founder of www.zcorp.com, manufacturers of "3D Printer" output devices. His detailed drawings of traditional Pacific Island sailing canoes are at http://www.mit.edu/people/robot.

Tim's philosophy involves building minimum-consumption personal infrastructure from recycled scavenged materials.
Redirecting the waste stream. Doing much with little. A reverse peace-corps to learn from poor people all over the world.



## Intro: Lost Your Charger? How to Charge any Battery Survival-Style

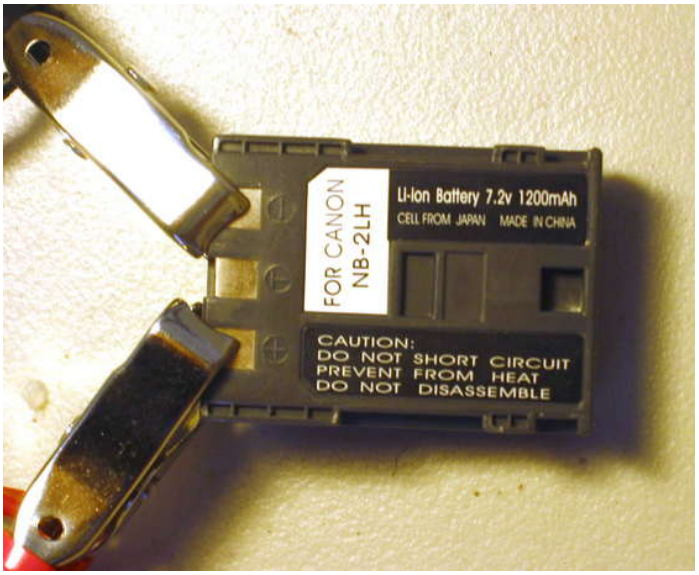
My camera shut down from low battery just when I needed to take some pictures.
The light was perfect. I suddenly remembered where I'd left the charger - 3000 miles away.
Everyone's had this experience, or the similar experience of spending one's vacation searching for a cellphone charger.

Here's how to charge any battery enough to keep doing the important stuff.

Fact 1: All past and future rechargeable batteries can be safely trickle charged if you don't overcharge them. Trickle means low current, like half an amp for an average camera or phone battery.
Fact 2: Small incandescent bulbs such as flashlight bulbs and christmast tree mini lights make great current regulators.

This is the battery to my Canon S30. It's got three terminals, labeled "+", "-", and "T".
I've clipped alligator-clips onto the two obvious ones.
You don't need clips, you can just hold wires on it for as long as it takes to charge, that's probably better anyway, so you can tell if anything is going wrong.

Warning! Wear eye protection and if anything weird happens don't breathe the fumes!

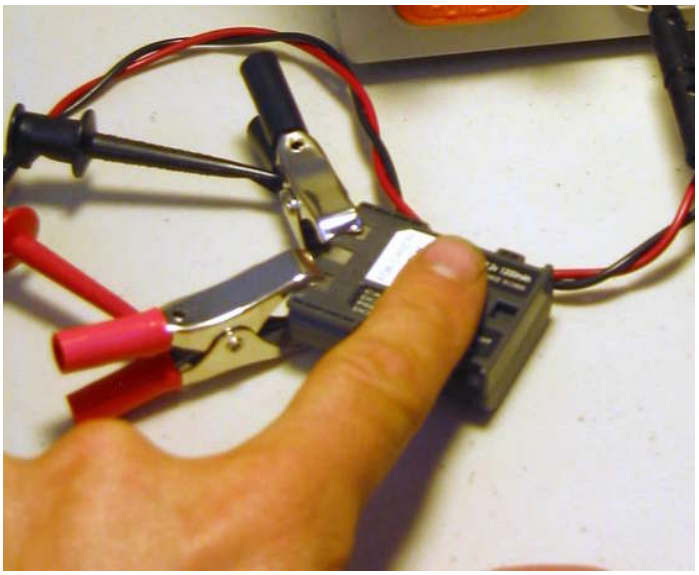



## step 1: Hands on Charging

What was that other terminal marked "T" for? TIMMY of course, just like in the nursery rhyme!
It's for Timmy to to hold his finger on the battery. If it gets hot you're doing something wrong.
Actually it's "Thermistor" or similar names. Temperature sensor. Some batteries use that to regulate charging current, some just for a safety feature.

"Digital sensor, huh?" would be a running joke back when Americans knew Greek and knew that digits are fingers. But then numbers got so much use we forgot about counting on fingers, and now people barely know how to do anything with their hands.

Anyway, here's a finger used as a digital thermometer. Which reminds me of the joke about the doctor...



## step 2: Charge from Car Battery with Lightbulb Regulators

SAFETY WARNING: scroll to the bottom if you want to read safety warnings.

Here I am charging my camera's battery from my car battery. I'm using three christmas lightbulbs at once as a current regulator to get half an amp to flow into the camera battery.
Here's how it works:
As the current through a lightbulb increases, the filament gets hot. That increases the resistance, which limits the current.

For example, here's my test of one of these mini christmas lightbulbs hooked up to a bench DC supply:

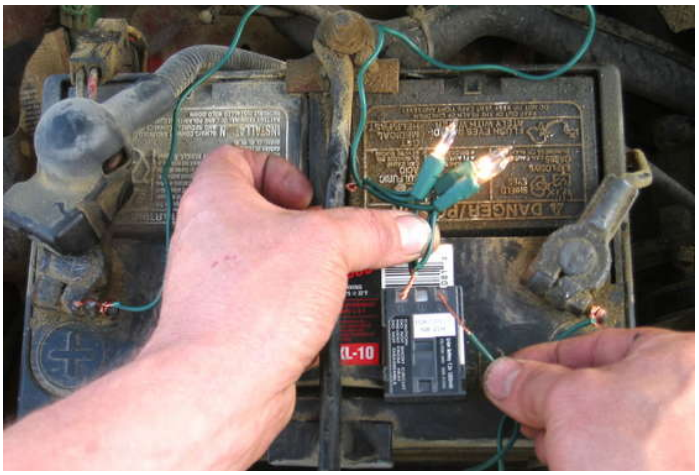
Volts Amperes
.5 .05
1 .07
1.5 .08
2 .09
3 .11
4 .13
5 .15
6 .16
7 .17
8 .18
9 .18
10 dead. The filament burned out.

I tested two bulbs and the data was the same.

Since my car battery is at ~13 volts and the camera battery is at ~7 volts, there will be 6 volts across the bulb. So I put three bulbs in parallel to get about 0.5 amperes to flow into the battery.
I'm guaranteed that less than 0.6 amps will flow, because that would burn out the bulbs.
That's some protection against reverse-charging, but do make sure you connect the plus terminals and minus terminals correctly.

Now just stand there for fifteen minutes or so until your battery is charged enough to take pictures again, you can make calls on your phone or whatever.

SAFETY WARNINGS:
Do not leave this unattended, and don't attempt to fully charge the battery.
If you charge too long and your camera battery gets over 8 volts, bad things could happen.
"Bad things" include possibly catching on fire.
Repeat: you can safely trickle charge any rechargeable battery part way.
But it is NOT SAFE to fully charge a battery without fully understanding the rules for that specific type of battery.
Car Batteries can produce a mixture of oxygen and hydrogen which can be ignited by a spark.
The resulting explosion sprays sulfuric acid everywhere. Don't let that happen to you. For simplicity's sake this photo shows me working right on the battery, but you could just as easily get your battery voltage from the cigarette lighter inside the car, far from the explosion hazard.
Also, don't electrocute yourself. I haven't heard of anyone being electrocuted by a car battery. I have heard of the other accidents described here actually happening.

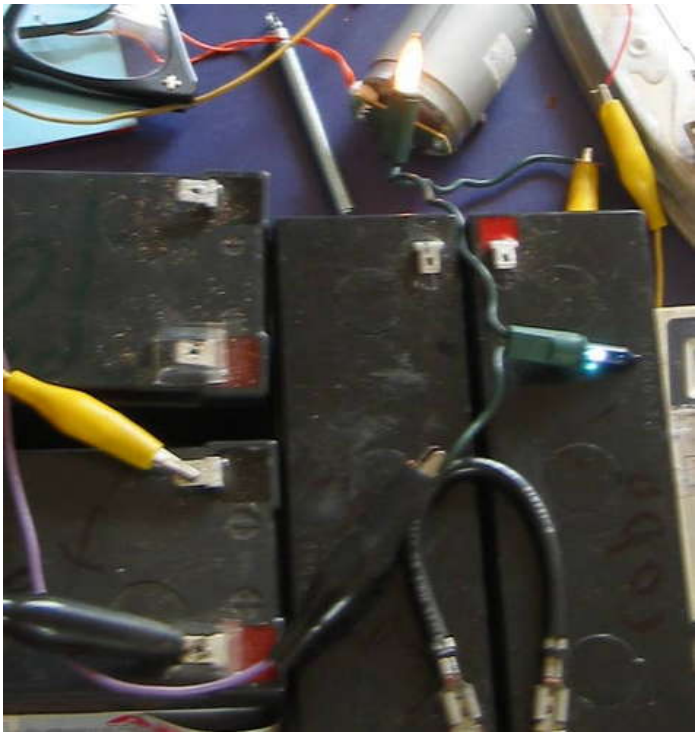

## step 3: Charging From Any DC Source and Resistor

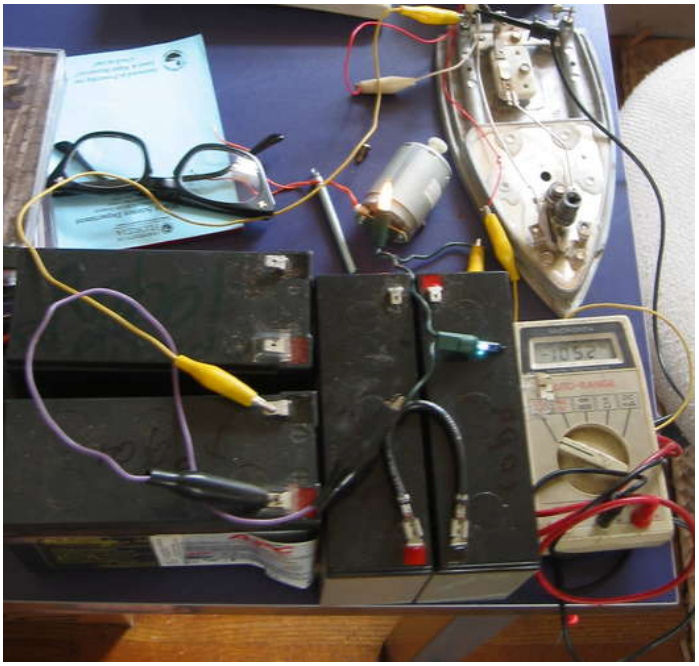
Hopefully you own an electrical meter.
Find a source of DC electricity. Look at the voltage of your source, the voltage of your battery, and use Ohm's law to figure out what kind of resistor you need to put between the two to get the right current to flow. Then go find that resistor. A piece of a heating element from a toaster or hair dryer can work. That clothes iron in the photo worked for a certain battery and a certain DC source.

As seen in the previous step, the best improvised current regulator is usually a small lightbulb. The bulb is great because the resistance goes way up when the filament gets hot and limits the current. And you can only put an amp or so through one without burning it out, so it acts as its own fuse. And they're free gifts from garbage Santa.

Here I'm using two bulbs in series to limit the current going into a gelcell. Use your multimeter to measure what current goes through your bulb at different voltages. Or you can just cowboy it and use one tiny bulb for a few minutes, while feeling to see if the battery gets hot or not.

Wear eye protection and don't breathe the fumes!





## step 4: Current and Voltage from a Bench Supply

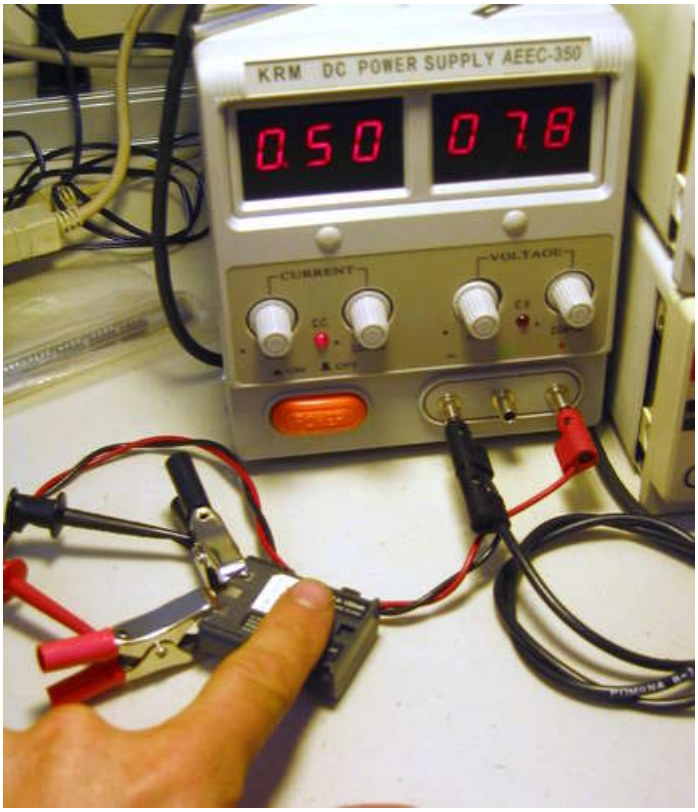
This step uses a bench power supply to charge a battery. A lot of us have those sitting around even if we can't find our cell charger. Or we know where to find an electronics guy who has one. Now what?

Want to be totally mystified? Look up "lithium battery charge control".
All that stuff is important if you want to fully charge your battery, make it survive many charge cycles, or avoid lawsuits.

But we just want to take pictures or talk on the phone. So here's what we do:
Turn the current and voltage knobs all the way to the left. Turn on the powersupply and
hook it up to your battery, bearing in mind that red and black wires can possibly be plugged into the wrong sockets. Read the labels and unplug it if it seems to be arcwelding on your battery.

Turn up the voltage and current limit knobs until 500 milliamps (0.5 amps) is flowing into your battery. If you feel like being careful look up how much current the experts use.
But half an amp for a few minutes won't damage any battery that's big enough for a modern camera or phone.

My electronics guy told me to set my voltage limit to 8 volts for my 7.2v li-ion battery. Usually facts like that are luxuries. The point of this method is to trickle charge anything without being able to know much about the properties of the battery.




## step 5: Time Limit

If you really have to do something else while charging your battery, you better hook up something to disconnect it after a few minutes.

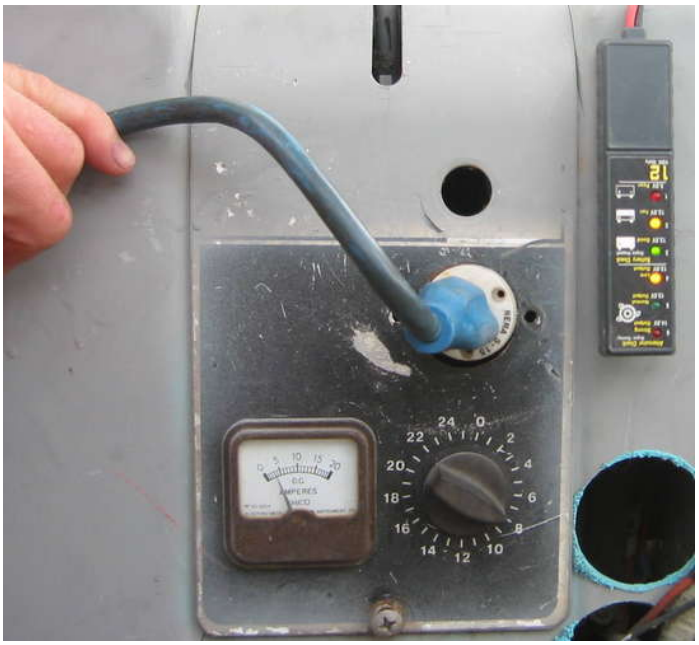
The whole point of this instructable is that we're not going to fully charge the battery because we don't know how, and we're in a hurry.
We're just going to charge it enough to go back to our regular jobs. The phone or camera will tell us roughly how charged the battery is after we start using it.

So we're only going to charge it for ten minutes or so.

My camera battery has 1200 milliamp/hours of capacity. So if it's fully discharged and we charge it at 500 milliamps, it would take more than two hours to fully charge it.

Some types of batteries can be badly damaged by overcharging. Some are just damaged a little.
This picture shows how my golf cart avoids overcharging. There's a built in appliance timer that turns off the charger automatically. It won't let you charge for more than 24 hours.

That's it! Enjoy cautiously!
To make your own external battery pack, check out AT's splefty booster pack.



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**Run a laptop of some old batteries** by ll.13

**Cordless Drill Crank Charge Batteries** (video) by babblin5

**How to make your own battery backup** by newtylerjh

**Charge AAA NiMH Batteries in an AA Charger** by Phil B

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## Comments

**50 comments** **Add Comment** **view all 61 comments**

**seabeepirate** says: Jun 27, 2009. 11:29 PM **REPLY**

Wouldn't it be better to keep the current low?(as in, just one bulb) It would take longer to charge, but it would reduce the risk of fire or damaging the battery too wouldn't it?

**lilpepsikraker** says: Sep 7, 2009. 11:46 AM **REPLY**

actually to make the current lower, you add more bulbs.

**mike1421** says: Jun 27, 2009. 9:03 PM **REPLY**

This works... I used an 18 volt drill battery, with 22 ohm resistor, I also put a christmas light in to make sure i was completing the circuit. I would not suggest anyone ever do this!!! It is dangerous. Heres a pic:

**mikeeg555** says: Jun 25, 2009. 2:17 PM **REPLY**

Thanks Tim!
I had to do this today...my charger was left 1000 miles away. I used a 5 volt AC/DC wall adapter and some wires with my multimeter in between to watch the current. I was giving it 1.7 amps, which was the maximum the adapter could pump out, and maybe a bit high, so I charged for one minute, rested for a few minutes then charged another couple minutes. This was enough to take another hundred photos!
DO ATTEMPT THIS (if you're without recourse)

---

**totos** says: Mar 11, 2009. 1:12 PM **REPLY**

I' ve lost the charger for my camera and couldn't find it for more than a year.
Can i make a charger that would work as good as the original charger?

---

**acidtrip** says: Jan 21, 2009. 6:41 PM **REPLY**

What are the wires connected to?

---


**ReCreate** says: Jan 18, 2009. 3:47 PM **REPLY**

i have two lithium ion(i think) 3.5-3.7v cellphone battery cells and i want to slowly -safely charge it(like in 24 hours or so)becouse i dont want it to catch on fire

---


**ReCreate** says: Jan 18, 2009. 3:48 PM **REPLY**

so how do i do it?
Are there any ibles that show me how?

---

**Lithium Rain** says: Dec 11, 2008. 8:00 AM **REPLY**

I love you, Tim!

I was just trying to figure out a way to charge a cell phone battery with no charger! i have found out how! Yay!

---

**matt.mccambridge** says: Dec 11, 2008. 6:13 AM **REPLY**

This page helped me out, thanks everyone. I was able to charge a pentax K10D (SLR) battery using grocery store alkalines while on vacation in Mozambique. My setup: 5 "C" cell alkalines in series(Energizers not local brand), measured @ 1.6 volts each when brand new, 1.5 volts when partially discharged, connected to my 7.4 v lithium ion battery (1620 mA-h) with wires and rubber bands. I did not need a light bulb or other current regulator, the "internal resistance" (I know that term is an approximation of the complex stuff going on inside) limited current to 300mA at first, then less than 100mA when I'd used it a few times. I was able to get another 150 or so (amazing, irreplacable) photos. Many thanks to Instructables, beachside interweb, and MIT grads who travel east africa with fuse-protected Fluke multimeters in their Land Rovers...

PS--C cell alkalines are allegedly good for about 8000 mA-h, ie many times my camera battery, so I possibly could have charged the battery many more times if I'd had the patience or if I'd been willing to let it charge unattended.

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**legless** says: Oct 21, 2007. 9:10 AM **REPLY**

I'm pretty sure that if I am away from where my chargers are located, I probably won't have access to a bench supply or a multimeter. If it's that important to be able charge stuff, one should have a home charger, a work charger and a car charger.

---

**bikerbob2005** says: Dec 2, 2008. 5:14 AM **REPLY**

never leave home with out your dig multimeter.or pocket protector ,multi-tool.
yes the TSA people realy like me we have long conversations and i get free coffee

---

**bikerbob2005** says: Dec 2, 2008. 5:03 AM **REPLY**

good job.in a pinch i have charged watch batterys by place them +side on the pos post of a car battery and touching a wire from the ground post ,just a touch then let it cool.a good chance of the button battery going boom but if its dead and have no replacement then no big loss.this is not recommended by the manufacturer .really dont try this .its scarier than teaching your cat to swim

---

**panstar1** says: Sep 12, 2008. 10:47 PM **REPLY**

all li-ion battery's have a safety systems built in if the battery gets to hot it will shut off or at least it dose in my laptop it has only happen 3 times since I have had it as for cell phones and most others they all have similar systems built in to prevent injury so the company that made the battery dose not get sued. If you have taking apart a cell phone battery you will find a little board that stops the dumb ass's from hurting them selves in this case proper safety warnings were told. it is not as if this guy is holding a gun to your head and telling you to take a li-ion battery and do this if you think it is risky then so be it. I am sorry If I am sorry if I sound mean but sometimes I get a little pissed when a well though out instructable has 15 comment's all saying don't do this with no reason why not to do it ,b/c there might be others like me who might be interested in the reason !

---

**technogumbo** says: Jul 12, 2008. 2:54 PM **REPLY**

I think Tim does a decent job of explaining the risks involved. I think I would give it a shot if I were in a jam. I would only use a very low amp source to do this though. Doing it with a car battery is too shaky for me.

---

**bGatti** says: Oct 26, 2007. 12:53 PM **REPLY**

I actually tried this to power a US Printer (110vac) on Lake Balaton Power (220vac). I used a standard light bulb in series to drop the power - pfft.

Fact 3. Two lightbulbs in series make an excellent voltage divider, one lightbulb doesn't lower the voltage any.

Fact 4. Its easier to find voltage adapters for European power at Radio Shack than in Prague, Slovenia, Austria, or Balaton Boglar. Don't leave home without it.

;-)

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**Derin** says: Jul 12, 2008. 5:00 AM **REPLY**

for that chop out a large xformer and wrap 1 turns,that is your 110 side then wrap two turns with another wire,that is your 220 side.Hey,you just made a voltage converter for free!

---

**Tracy** says: Nov 17, 2007. 8:42 PM **REPLY**

Actually, two light bulbs in series is not a voltage divider; it is simply twice the resistance of one. And yes, there is a voltage drop across one bulb; otherwise the bulb would not consume any power. That'd be great! Not only could you get light and heat for free, but that would also make it a room-temperature superconductor!
You can test this, BTW. Just connect two bulbs in series, and apply power. If what you say is true, both bulbs would be equally as bright as one, and current would double. This is exactly what would happen if you connected them in parallel, but in series both bulbs will be noticeably dimmer, the circuit will draw less current (and hence consume less power) than one, and the bulbs will never burn out!

---

**bGatti** says: Nov 18, 2007. 5:48 AM **REPLY**

Tracy,
Two resistors are the definitive voltage divider. Lightbulbs being resisters, the voltage available on the connecting pin is half of the rail voltage. You're right about the last half, and if you do this experiment (which I have done BTW with many bulbs in series), you will notice that the voltage across each of them = rail / number of bulbs AKA a voltage divider.
Ben

---

**Tracy** says: Nov 18, 2007. 8:27 AM **REPLY**

A "voltage divider" (the proper term is resistive divider) is one resistance in parallel with the load, and another resistance is series with the load. It is NOT two resistances in series; that is electrically a single resistance that is equal to the sum of the two resistances.

---

**bGatti** says: Nov 18, 2007. 12:23 PM **REPLY**

two resistors in series (connected to the rail) form a voltage divider. the way to tap a voltage divider is to connect to the point between them, as you , and almost everyone on this thread would know. I suggest it is splitting split hairs to suggest that voltage dividers should have a "proper name" and that one gets to decide what that is (be nicer). I've divided enough voltage I dare say to know a voltage divider when I see one. - and two light bulbs will do the trick within the built-in tolerances for small electronics. Do not try this if you a. don't know how to tap a voltage divider, or b. if you cannot afford to let out the magic black smoke (properly called "poof" ;-)
Ben

---

**Derin** says: Jun 21, 2008. 3:31 AM **REPLY**

ppl with a 2006 transporter:
use the lighter socket.the car battery is covered by thick plastic

and never use metal covers the wrong way,we did that with a truck battery and it welded the plate till there was a hole on it!

---

**konablue** says: May 27, 2008. 2:37 PM **REPLY**

I am amazed at how many people are knocking this guy for a freakin power supply. It was a REENACTMENT! He originally did it with a car battery as I understood it. He obviously did not have a benchtop supply with him you geniuses....

---

**triggernum5** says: Mar 22, 2008. 8:50 AM **REPLY**

Depending on battery type, this will either work, slowly degrade the battery, quickly degrade the battery, or internally build up heat/gasses that will stick to your face when the battery blows up..
Badly titled 'any battery', not the best instructable on the site..

---

**BC-45** says: Mar 18, 2008. 11:14 AM **REPLY**

um yah aboute these idea i treid it and the battery blew up on me good thing i was away left it there for 1 min the i hear a boom im like WTF and i see the battery in have like as if i burn or something and half of it i was not able to find but it was cool lol

---

**sk8erdude** says: Feb 7, 2008. 5:47 PM **REPLY**

Question:
would it work to hook a couple of AA's to the object using the correct voltage on the device (cellphone)?

---

**AT** says: Oct 17, 2007. 8:20 PM **REPLY**

You know, I often have a DC power supply with me on vacation for just such an emergency..... NOT! But if I did, I would now know how to use it to recharge my batteries.

My solution was to make an external battery pack for my DV camera. I use 7 AA rechargables, 2500 mAh batteries.

This provides me with 8.4 volts. That is what the external power supply that came with the camera provides. I stopped by Radio Shack and picked up:
- an 8 AA battery holder
- the proper plug for my camera (also just happens to be the same plug for my hand held ham radio.)

I scavenged the cord from a car adapter to an old mobile phone and replace one end with the new plug and the other end to a 9v battery plug (that is what they have on the AA battery holder. Go figure?)

I made a neoprene case from an old mouse pad and contact cement. Charged up the 7 batteries, put an jumper across the spot for the 8th battery and I have a power supply that runs my DV camera for 5 hours!!!

It is small and has some good legs and it was way cheaper than buying a battery for the camera that would maybe last and hour or so. It is also easier to find a charger for AA batteries at your friends house or the local ESSO station.

**maker12** says: Dec 14, 2007. 12:39 PM **REPLY**

how do you disable the low voltage alarm (very annoying)on a nikon coolpix 885?

**TimAnderson** says: Oct 19, 2007. 9:35 AM **REPLY**

Swank! Make that into an instructable!

How are the rodents? We've been catching lots of mice and releasing them.
It's good exercise:
http://www.instructables.com/id/Trap-a-Mouse-with-a-Jar-and-a-Coin.-Then-Chase-it-/

**AT** says: Oct 19, 2007. 7:53 PM **REPLY**

Done! Check it out..... External Battery for DV Camera

**AT** says: Oct 19, 2007. 9:49 AM **REPLY**

I really should make that into an Instructable. I thought about it when I was making it but got caught in the proof of concept mode and before I knew it, I was done! No pictures. I could take pictures of the finished product and go from there. I think I will! Thank you for the encouragement.

I'm up to 20 confirmed gophers, 1 wood chuck, and 1 ground squirrel. Just last night I came across a missing trap! Half the chain was there but the trap was gone. I think a neighbor's domesticated animal made off with one of my captured wild gophers and the trap!

Nice mouse trap! I would try that if we had mice in our house. But I would have to send them somewhere else for the chase as my motorcycle just hasn't been the same since it was hit by a Buick.

**PKM** says: Oct 20, 2007. 6:04 AM **REPLY**

Nice Instructable- informative, and I love the whole "digital thermometer" bit. But... "we are charging the battery at 500 milliamps per hour"? That's a rate of change of current, you aren't doing anything of the sort. You are charging the battery at 500 milliamps, which happens to be 500 milliamp-hours per hour, so then you can divide the battery capacity by that to get charge time. Sorry to be a pedant but this is one of my pet peeves, misuse of electrical units. It just engenders confusion.

**Tracy** says: Nov 17, 2007. 8:32 PM **REPLY**

Wow, it's been light-years since I heard anything like this!

**TimAnderson** says: Oct 20, 2007. 6:42 AM **REPLY**

Thank you! fixed it!

**Derin** says: Oct 31, 2007. 10:53 AM **REPLY**

wow huge battery since u used huge clips!

**Johnsons on fire** says: Oct 30, 2007. 5:12 PM **REPLY**

Looks cool.... I don't understand it at all! (Don't worry, i'm slow)

**icebox** says: Oct 23, 2007. 2:58 AM **REPLY**

Li-Ion batteries require a complicated charging curve - the temperature sensor also controls the charging curve. Direct charging like this will probably terminate its life, or at least seriously reduce it. Only do this kind of charging if you are really desperate, watch your fingers, incorrect charging on li-ion tend to make them catch fire, and be prepared to buy a new battery in a short time. In other words DON'T.

**invisiblelight386** says: Oct 19, 2007. 6:12 PM **REPLY**

if i dont have a charger y would i have a DC powersupliy


**wierd idiot** says: Oct 22, 2007. 7:02 PM **REPLY**

Well you have a dc power supply for running ya projecs.

**Ward_Nox** says: Oct 18, 2007. 11:52 PM **REPLY**

this qualify's for the Halloween contest HOW?

i ask cause its entered

**TimAnderson** says: Oct 19, 2007. 9:26 AM **REPLY**

I've never entered a contest before. You should enter.

**Ward_Nox** says: Oct 21, 2007. 9:20 PM **REPLY**

this IS entered in the Halloween 2007 group thats how i found this

**gmoon** says: Oct 22, 2007. 11:45 AM **REPLY**

Any member here can enter *any* instructable to a group (even if it's not your own.)

Someone liked it, so they added it to the contest group!

**flare765** says: Oct 20, 2007. 11:33 PM **REPLY**

lol the warning is funny.

**davegriff** says: Oct 20, 2007. 10:18 AM **REPLY**

Thats a pretty dangerous way to charge a lithium battery. Ever seen one burst (explode!!) into flames.

Any way, if it doesn't self destruct it certainly won't have a very long life using this method of charging.

DONT ATTEMPT THIS

**pyroelectro** says: Oct 19, 2007. 10:41 AM **REPLY**

hey, this is pretty cool to use to show off to ur mates, but im not sure whether you'd remember to pack all these extra things in case you forget your charger, but then forget your charger! lol

**kawouter** says: Oct 17, 2007. 7:40 AM **REPLY**

hmm lets go survivalling:

Bottles of water: check
Food: check
Sleeping bag: Check
A voltage and current regulator the size of a backpack which weighs over 10 kilograms: check

But nice Instructable anyway

**TimAnderson** says: Oct 19, 2007. 9:37 AM **REPLY**

I guess I better re-arrange the steps or make step 4 clearer.
All you need is any dc source and a christmas light bulb to use for a current regulator.

**xenobiologista** says: Oct 18, 2007. 8:05 PM **REPLY**

An electronics lab power supply isn't exactly "survival" is it? *runs away*

**TimAnderson** says:
Look at step 4. Use any dc source and a tiny christmas lightbulb as a current regulator.

Oct 19, 2007. 9:24 AM **REPLY**

**view all 61 comments**