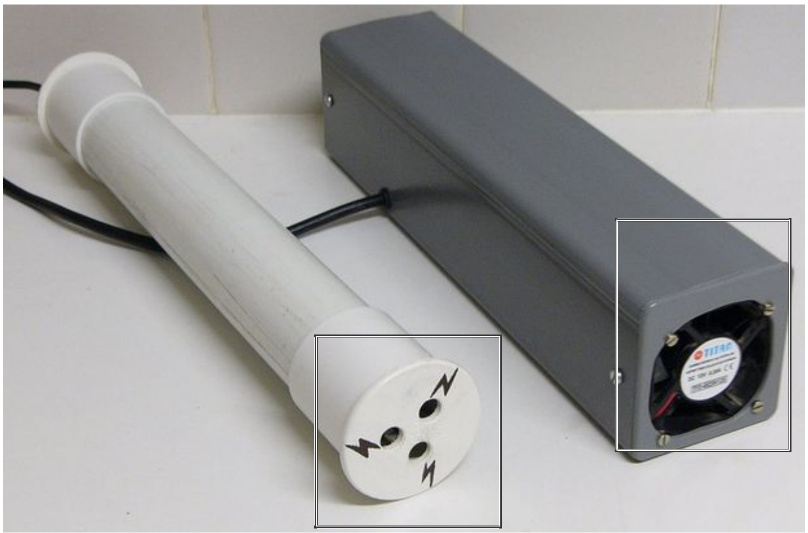
How to Make a Negative Ion air ionizer
by peterсd (/member/peterсd/)


(http://cdn.instructables.com/FQB/NGWH/GCPZMF84/FQBNGWHGCPZMF84.LARGE.jpg)

Two models will be shown, one **full-wave** rectified and the other a **half-wave** rectified negative ion ionizer. Featuring an optional fan on the full-wave model.

Benefits of negative ions supposedly include
• freshen and purify the air
• help lift mood
• alleviate depression including winter depression(SAD)
• eliminate most tiny particles suspended in the air (indoors)

CAUTION

- **HIGH VOLTAGES** present in both devices is high enough to induce a bad case of temporary Tourettes (http://en.wikipedia.org/wiki/Tourettes). ie twitching/profanity.
- Be aware of the hazards when working with loose **CARBON FIBRE filaments** if using this option for high voltage grid instead of pins.

Step 1: Components and Design


peterсd (/member/peterсd/)
Follow 416
(/member/peterсd/)
Bio: general bloke type of tinkering

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(/id/Helical-Vawt-blades-only)

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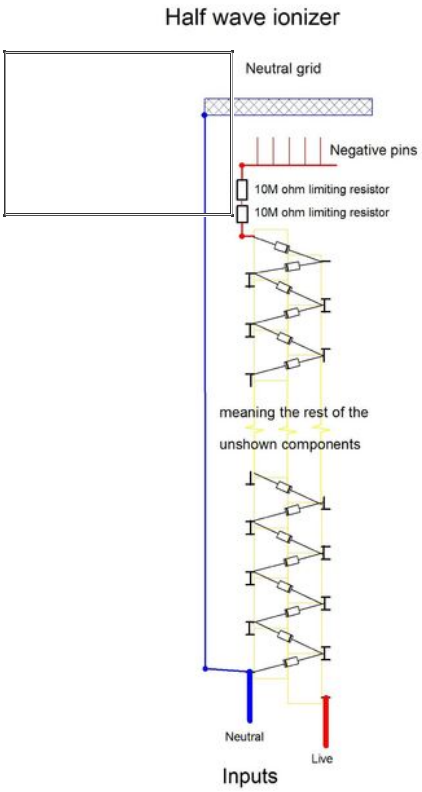


(http://cdn.instructables.com/FOT/WIM1/GCPZMDEY/FOTWIM1GCPZMDEY.LARGE.jpg)

Tools required:

- soldering iron and solder.
- screwdrivers, flat and star
- cordless drill.
- hot melt glue gun.

Optional tool:

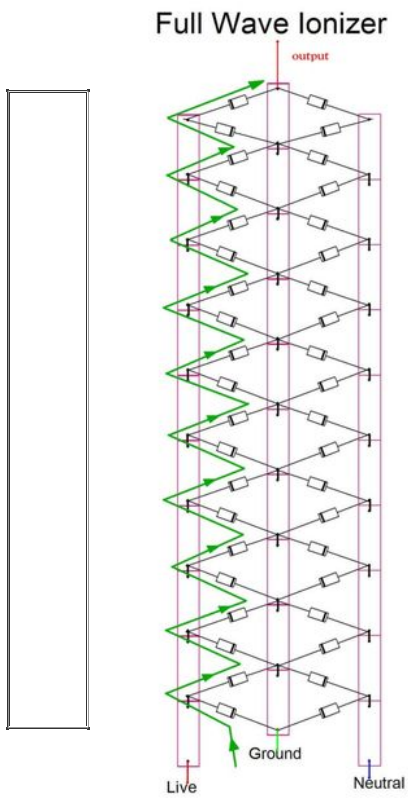
- wire wrapper.

The full wave rectified version has better performance but is a bit noisier if using the optional fan. The fan is a 60mm x 60mm CPU 12 brushless fan which I'm driving at
5v to reduce current consumption and noise.

The half wave version uses fewer components and less current, the smaller size is also trickier to build.

In both versions the negative band on the diode must point towards the ac voltage input.
If you follow the green arrows on the component diagrams, you will first encounter the negative side on the diode first, indicated by the white band.

Step 2: Full-Wave Ionizer Materials and Component Layout



(http://cdn.instructables.com/F00/9E7T/GCI8KXV2/F009E7TGCI8KXV2.LARGE.jpg)

Materials required for full-wave version:

- 2 x 10meg ohm resistors. (limit output current for safety)
- 40 x diode 1N4007.
- 30 x capacitor 100nF 275V class x2 suppression.
- 1 length 350mm ega tube trunking.
- 2 ega tube end caps for trunking.
- 4 x self tappers for end caps.
- low amperage hookup wire, ATX power supply type wire is fine.
- 1metre 3 core 220v ac lead.
- standard pins (or carbonfibre) for high voltage grid.

Optional components

- 60mm x 60mm 12V dc fan, old cpu fan works well.
- finger guard for above fan.
- old cellphone charger +/- 5V dc to power fan.
- small switch for fan, necessary for silent operation.

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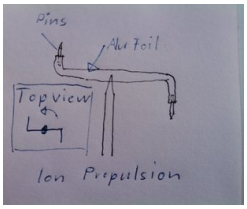
View All Steps (/id/How-to-Make-a-Negative-Ion-air-ionizer/?ALLSTEPS)


(/member/t.rohner/)

t.rohner (/member/t.rohner/) 4 years ago Reply

Nice instructable. I made one of these some 30 years ago. My mum wasn't that happy about it, because the high voltage charges fine dust particles and they are attracted by more or less grounded surfaces like walls and even windows ;-) If you direct the ion flow trough a grounded tube, you have a electrostatic air cleaner. (you can have a thin wire insulated in the center of the tube and connect the high voltage there. As it's done in laser printers.) You can also make a ion propulsion propeller...



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(/member/shomas/)

shomas (/member/shomas/) 7 months ago Reply

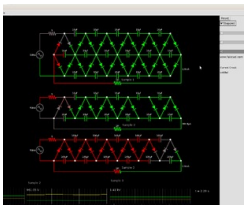
At some point, with a voltage multiplier, you start going backwards. I presume this is because of resistances and voltage drops in the diodes. Using the same Capacitor values I ran a simulation with 30 "diodes and caps" and compared it against another simulation using 18 "diodes and caps". Interestingly the shorter one gave a higher voltage output. Using fewer diodes and caps will also cost less. Maybe you could take those savings and buy larger capacitors, that will also bring up the maximum voltage.


(http://cdn.instructables.com/FR2/4R39/HXLMFO3F/FR24R39HXLMFO3F.LARGE.jpg)


(/member/shomas/)

shomas (/member/shomas/) 7 months ago Reply

While a full wave voltage multiplier can sustain higher voltages under a load versus a half wave voltage multiplier, a half wave voltage multiplier, if constructed with larger capacitors can sustain even higher voltages. Below is just an example of 3 different circuits in a circuit simulator.


(http://cdn.instructables.com/FD0/QF5U/HXLMEO50/FD0QF5UHXLMEO50.LARGE.jpg)


(/member/enderwigin/)

enderwigin (/member/enderwigin/) 8 months ago Reply

Hey Peterrc

I have bought a commerce negative ion generator that is rated for 7.5kv. I was wondering if i could use this to make a ait ionizer. When i run it it can ionizns the air but i dont know how i would set it up to capture dust.


(/member/petercd/)

petercd (/member/petercd/) (author) enderwigin 8 months ago Reply

I would use a fan on the end to cycle the air through the device, a ground plate is needed to attract the dust which would otherwise be attracted to the walls, ceiling etc.

The ground plate doesnt have to be inside the device, it can be a stack of several strips all grounded, just in front of the device output.

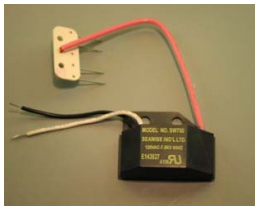
enderwigin (/member/enderwigin/) petercd 8 months ago Reply

(/member/enderwigin/)

To clarify the negative ion generator (http://www.imagesco.com/kits/negative-ion-generator.html) (last one down 7.5kv) Is only the generator. The generator has a ground terminal. Could I connect the ground to the fan metal grid and then put the pins facing it just like you did but with out a ton of capacitors. Also would it be a high voltage or low voltage systems. I would like to do the same set up but with out the electronics and just replace it with this. Would that be possible. I am trying to better understand how this works so that i can try and implement this other method.

Thank you very much.

Ender



(http://cdn.instructables.com/FEM/YRGT/HVV0ORJF/FEMYRGTHVV0ORJF.LARGE.jpg)

petercd (/member/petercd/) (author) enderwigin 8 months ago Reply

(/member/petercd/)

Yes, its exactly how you've imagined it and 7.5kv is very high voltage so be careful that your fingers dont get too close when its on.

Those 2 wires would be live and neutral and I'd suggest that you use the earth/green wire to the grid. My little fan grid isn't very effective at removing dust particles which is why I suggested the plate stack, more surface area will attract more dust. If you google electrostatic cleaner, you can get an idea of a starting point.

pvelazco (/member/pvelazco/) 9 months ago Reply

(/member/pvelazco/)

A simple question before start.
Do ionizers need to be wired to the ground to work properly? Is that correct?

Thanks in advance!

petercd (/member/petercd/) (author) pvelazco 9 months ago Reply

(/member/petercd/)

They dont really need to be grounded to work, basically the HV builds up the electron pressure in the circuit causing the negative ions to be released from any sharp points, but a ground grid in front of the neg electrode causes the neg ions to be sort of sucked off the neg electrodes, kind of boosts the working.

hygy (/member/hygy/) 9 months ago Reply

(/member/hygy/)

I build this full wave ionezer first in a paper shoebox, withouth the fan. I used it several days. On the metal fan protector start to collect the dust. So I decided to move it a final plastic box, and I put the ventillator inside (now it is not working I just put it in to be able, to connect it later).

But now in the plastic box it is not working as good as before in the paper box. The metal fan protector is started to get a brownish tint layer (as you can see in the attached pic), and very little dust can be seen on the fan protector. What I made wrong?

(http://cdn.instructables.com/F4E/I5O3/HV4DDCEW/F4EI5O3HV4DDCEW.LARGE.jpg)

(http://cdn.instructables.com/F92/GU57/HV4DDCF2/F92GU57HV4DDCF2.LARGE.jpg)

(/member/petercd/)

petercd (/member/petercd/) (author) hygy 9 months ago Reply

Be very carefull not to get too close when checking things out, in a very dark room, see if there is a faint pinkish glow on the end of the electrode pins which would indicate that the circuit is working.

With it unplugged and given time for the caps to discharge, check the earth connection to the fan guard.

Finally paper is a fairly good insulator so maybe that type of plastic is bleeding off a lot of the static charge.

(/member/itsMeaMario/)

itsMeaMario (/member/itsMeaMario/) made it! 10 months ago Reply

Thanks a lot for this nice inscrutable. I made a hack to an old one air ionizer which gave life. This way I was able to keep the old case and precious steel metal HV grid.

I used the half-wave method. It works like a charm. Only flaw is safety which will be worked on later on.

Now some pic's. There you see the 2 row caps with diodes on the back of the device. Next one is steel neutral plate which is pushed in from side so it is possible to clean those plates. front view w/o covers. Those sharp triangles is the HV tip. Next picture is neutral plates pushed in the device. Last one are old guts.

(http://cdn.instructables.com/FPB/C8DN/HT2U11ZJ/FPBC8DNHT2U11ZJ.LARGE.jpg)

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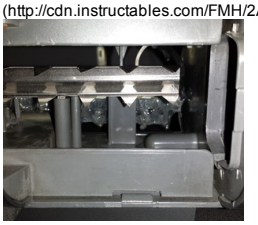

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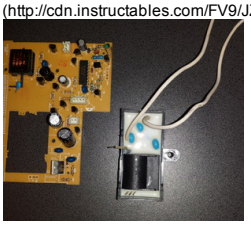

(http://cdn.instructables.com/F1M/ZKNM/HT2U121M/F1MZKNMHT2U121M.LARGE.jpg)

(/member/petercd/)

petercd (/member/petercd/) (author) itsMeaMario 10 months ago Reply

Nicely done.
It seems to have been the trend to pot the HV components in resin back in the day.
I think they relied on the resin for insulation and thats usually where something burnt out. :(

(/member/white+settler/)

white settler (/member/white+settler/) 1 year ago Reply

Hey Peter CD, still on this? I want to make an electrostatic precipitator for a wood burning stove, will one end of your ioniser stick in the air intake of the stove, with a positive charge sent by co-ax to the collector about 15 feet away? Can the charges pos and neg be collected from the same unit?

(/member/petercd/)

petercd (/member/petercd/) (author) white settler 1 year ago Reply

nope, neg only, you'd need to build another unit with all the diudes reversed to make a positive charge.

(/member/mmo6/)

mmo6 (/member/mmo6/) 1 year ago Reply

question... how about? :

- help lift mood
- alleviate depression including winter depression(SAD)

(/member/petercd/)

petercd (/member/petercd/) (author) mmo6 1 year ago Reply

mmmm, dont think so, however I live in Cape Town and have never seen snow here, hailed hard once or twice in the last 50 yrs, basically my point being that I dont get SAD in the first place so Im unable to tell you what would lift it.

I did notice that on the odd occasion Ive left it on all nite, that come morning left hand sinus is blocked.
So it lends some weight to a theory that the nostrils polarize the air positively or negatively depending on the bodys need.

(/member/bengtang/)

bengtang (/member/bengtang/) 1 year ago Reply

Hi, if after unplugging it, you short the HV output (via the safety resistors) to the AC neutral wire input (or neutral grid), does that discharge all the capacitors (so you don't get a shock from touching the output or the caps)? What is the difference between doing this and shorting the live and neutral of the 220V AC input after unplugging? I am thinking of incorporating a discharge circuit into a switch for the thing so when i switch it off it disconnects the mains power and also discharges the capacitors, but i am not sure which points to short to accomplish this.

(/member/petercd/)

petercd (/member/petercd/) (author) bengtang 1 year ago Reply

"short the HV output (via the safety resistors) to the AC neutral wire input (or neutral grid), does that discharge all the capacitors (so you don't get a shock from touching the output or the caps)"

Yes

What is the difference between doing this and shorting the live and neutral of the 220V AC input after unplugging?

This doesnt short out the caps because the rectifier bridge blocks the rest of the circuit and if you short out after the rectifier you will only discharge one cap the others being blocked by the diodes

There is a strong discharge when shorting the circuit so its best to use a resistor to do it gently to avoid damaging other components

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(/member/bengtang/)

bengtang (/member/bengtang/) petercd 1 year ago Reply

Thanks, so to discharge all the caps i have to both short the HV output to the neutral terminal, and also short the live input terminal to the neutral terminal?

Anyway my plan of having a 2 way switch which shorts the HV output to the neutral end of the cockcroft-walton multiplier when the device is switched off won't work because it would cause arcing inside the switch while the device was on (unless i fill the switch with oil, then it leaks out and is messy). So i am just going to have the switch short out the live and neutral input ends of the multiplier through a resistor when it is switched off.

On another note, here are some ideas for other electrodes / ion emitters: A round wire brush of the kind used in drills for brushing rust off metal - the wires are thick and not very sharp, but there are a lot of them, and the places where they touch each other inside the brush also act like needle points.

A wire pipe cleaner / rifle barrel cleaner type brush, these have thinner wires so might work better. An ioniser using one of these had the highest ion output count among competing models analysed by the Elrana ioniser company, see this page, it has images of ioniser PCBs: http://www.elanra.co.uk/otherionisers.htm

I have also seen razor blades recommended in one scientific paper - the super sharp edge is a brilliant at generating corona at low voltages, and the performance does not degrade as much with wear, compared to needle electrodes.

And the edge of thin gold or aluminium foil is also good, especially if it is cut at an angle, or you tear it using the serrated foil cutter on the kitchen foil box. This produces a serrated and thin edge. Get the thinnest (which is usually also cheapest) foil you can find.

Also, if you want to maximise corona production (which may also make a lot of ozone though), put a grounded or opposite charged electrode made of fine wire mesh near the emitter tips. The finer the mesh the stronger the effect, due to something about how electric fields behave when going to conductors shaped like a plane with slots.


(/member/petercd/)

petercd (/member/petercd/) (author) bengtang 1 year ago Reply

Eventually I upgraded both to the carbon fiber tips as in step 4, burnt the end of cf pieces with a lighter and then frayed out all the strands and shrink wrapped them to the ends of the HV pins.

Should probably upgrade the original doc.

(/member/bengtang/)

bengtang (/member/bengtang/) 1 year ago Reply

Another option for the discharge electrode is to use a piece of recycled old bicycle brake cable. Trim it or sharpen it so the wire ends are sharper, then fray the end by untwisting the strands. Multi strand copper wire where the strands are very thin, like hair-like, may also work.

(/member/lucek/)

lucek (/member/lucek/) 4 years ago Reply

WARNING! Devices like this have produced O3 aka Ozone. This has shown to aggravate breathing conditions like asthma. DO NOT repeat DO NOT use ionic cleaners if you or someone in the residence has breathing conditions. Further there is some risk of developing breathing conditions including but not limited to lung cancer. http://www.epa.gov/iaq/pubs/ozonegen.html

bengtang (/member/bengtang/) lucek 1 year ago Reply

(/member/bengtang/)

To reduce ozone production use less stages for lower output voltage, commercial air ionisers use 11 stages (= 22 caps half wave or 33 caps full wave), partly for this reason (and also to cut cost).

Thoth (/member/Thoth/) lucek 4 years ago Reply

(/member/Thoth/)

A way too avoid or minimize the the dangers associated with breathing ozone, is simply to run the device while no one is in the room and turn it off before the room is to be occupied, it has a short half-life.

Wesley666 (/member/Wesley666/) Thoth 3 years ago Reply

Isn't Ozone's half life like 3 days?

(/member/Wesley666/)

Whitedude0728 (/member/Whitedude0728/) Wesley666 2 years ago Reply

half life 3 you say? ;)

(/member/Whitedude0728/)

Wesley666 (/member/Wesley666/) Whitedude0728 2 years ago Reply

Don't they keep extending the date of release for that? I heard it was supposed to come out like 3 years ago and its still not here yet...

(/member/Wesley666/)

Whitedude0728 (/member/Whitedude0728/) Wesley666 2 years ago Reply

Yea the joke that people have been expecting it for like 7 years but valve will neither deny or confirm whether it is being worked on :/

(/member/Whitedude0728/)

Wesley666 (/member/Wesley666/) Whitedude0728 2 years ago Reply

If they make it, they should release it quietly in the dead of night with no warning, no advertising. I have always wanted to see what would happen if someone did that. I think it would cause quite a stir.

(/member/Wesley666/)

lucek (/member/lucek/) Wesley666 2 years ago Reply

DNF came out so HL3 can't be far off. Or our fiery death.

(/member/lucek/)

lucek (/member/lucek/) Thoth 4 years ago Reply

or just not to use them at all.

(/member/lucek/)

Skyriam (/member/Skyriam/) lucek 4 years ago Reply

Don't get in a car, you may die. Don't go out while raining, you can get struck by lightning... twice. Come on man, the benefits are greater than the risks, besides ozone is very easy to detect, its smell is very strong and if you don't smell it then its far too small to cause any harm. Chill.

(/member/Skyriam/)

lucek (/member/lucek/) Skyriam 4 years ago Reply

There is a question of risk vs. benefit. The risk is real. The benefit is minor. you receive less dust in the air but the same results can be had with a simple filter. if you argue that the ionic air purifiers work better (witch isn't proven) I'll point that only people with severe respiratory problems need that purity of air and they are the most susceptible to Ozone. BTW the safety levels are set at 0.05 ppm by the FDA far less then is noticeable. OSHA sets the safety level at twice that over 8 hours but still to small to smell.

(/member/lucek/)

Skyriam (/member/Skyriam/) lucek 4 years ago Reply

There's more ozone/negative ions in the sea, forest and mountain environments than this little thing produces. So if you live near any of this places do you get sick from ozone? NO.

(/member/Skyriam/)

lucek (/member/lucek/) Skyriam 4 years ago Reply

(/member/lucek/)

Materialistic fallacy doesn't work sorry. Again I listed safety levels. We have no tests of this device so we can't judge it's safety or ones built on it's design. Until it is tested we should assume it can be dangerous and the same should go for every one built on the design. When it comes to O3 "good up high - bad nearby".

lucek (/member/lucek/) lucek 3 years ago Reply

Typo:Naturalistic fallacy.

(/member/lucek/)

Wesley666 (/member/Wesley666/) lucek 3 years ago Reply

I like how you correct yourself more then a year later.

(/member/Wesley666/)

lucek (/member/lucek/) Wesley666 3 years ago Reply

(/member/lucek/)

I didn't look at the post for a year. When I saw my error fixing it was important to me.

Wesley666 (/member/Wesley666/) lucek 3 years ago Reply

(/member/Wesley666/)

No worries, that's what I meant, it's nice to see someone worried about spelling. I have done that too, finding an old post and realizing something was wrong and correcting it.

1-40 of 129 Next » (http://www.instructables.com/id/How-to-Make-a-Negative-Ion-air-ionizer/?&sort=ACTIVE&limit=40&offset=40#DISCUSS)

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