

Simple Room Air Ionizer and Purifier

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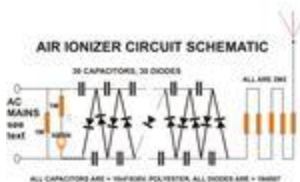
Urban modernization has resulted in a huge depletion of naturally created ions that are good for health. The simple air ionizer circuit presented here will artificially restore appropriate concentration to make the interior air clean and breathable.

The Cleansing Effect of Air Ionization

An air ionizer is a device used to purify air inside an enclosed premise through the process of air ionization. Here, a high negative voltage generator circuit is used to kick off electrons from a needle point conductor in the form of ions into the air. As these ions are negatively charged, once out in the air, they start hunting for dust particles and other pollutants. These pollutant particles being positively charged, instantly get attracted (opposites charges attract) to the ions and cling to them firmly, until they become too heavy to carry on and just fall off on the ground. Thus the air gradually becomes free from most of the dispersed pollutants. The concept is quite old but nevertheless evergreen, as it distributes free health at virtually no cost right in your house. It is surely able to create an atmosphere around you quite similar to that found in hill stations – very useful and much needed in polluted city areas.

Let's see how the proposed circuit works.

Operating Principle



The circuit is basically a standard Cockcroft-Walton Ladder Network. According to this configuration the input mains voltage is gradually stepped up to a staggering minus 10 kV, using a network of many diodes and capacitors resembling a “ladder” and hence the name.

Here, during each cycle of the input AC, the charge is shuffled back and forth across each row of capacitors, but always maintaining a forward direction in the network, due to effect of the rectifier diodes.

Once all the capacitors reach their full charge, the voltage across each of them (theoretically) becomes equal to the peak AC input mains voltage and the multiplied value of all the capacitors results to the required high voltage.

But practically it is found that the maximum voltage at the output of this circuit never reaches more than minus 4 kV due to voltage leakage through the component leads, known as corona discharge. But, coincidentally that's the exact voltage ideally suited for ionizing air. Voltages higher than this will start producing ozone rather than ions, while the lower ones won't have enough thrust to initiate the ionization process.

This voltage is ultimately fed to the pointed end terminal (needle shaped) of the circuit where the voltage (electrons) gets concentrated to a level difficult to accommodate. Also, since the electrons when too close, repel each other, tend to fly out in the surrounding air in the form of shooting ions.

Parts List

You will require the following parts for the construction of this air ionizer circuit:



10nF 630 volts, Polyester = 30 nos.

Diode 1N4007 = 30 nos.

Resistor 2M Ω , $\frac{1}{4}$ W = 5 Nos.

Resistor 1M, $\frac{1}{4}$ W = 2 no.

Neon bulb = 1 no.

General Purpose PCB = 6 by 4 inches,

FOR 120 VOLTS OPERATION JUST DOUBLE THE NUMBER OF THE DIODES AND THE CAPACITORS, REST EVERYTHING WILL REMAIN AS IT IS.

Advantages and Disadvantages

On escaping from the circuit (needle point), the ions immediately start floating in the air. Since they are negatively charged, any neutral particle like dust or smoke in the surrounding air immediately get attached to them. The pollutant particles get accumulated over these ions until it becomes too heavy for the ions to hold any more of them and they start dropping on the floor. In this way the air around the air ionizer, purifier circuit is kept clean and free from all pollution.

One small drawback would also be important to discuss here. The walls and other house hold objects are also neutral elements and may well attract the above discussed pollution laden ions, blackening your valuable carpets, walls and other objects. Perhaps, installing a small exhaust fan in your room may solve the problem, the fan will suck out these ions, heavy with pollutants and dispose them of somewhere out of the particular area.

Some ions also happen to collide with O₂ molecule and break them into two single atoms of oxygen (O). These single atoms of oxygen further go on to collide and combine with other O₂ molecules to become O₃, that's ozone, a useful gas capable of killing bacteria and viruses in the atmosphere. Thus, the circuit is also capable of producing useful ozone (in small quantities – That's Important), keeping the atmosphere free from germs and diseases.

Building the Unit



CAUTION: EACH AND EVERY POINT OF THE CIRCUIT PRESENTED HERE IS AT AC MAINS POTENTIAL, THEREFORE EXTREMELY **DANGEROUS** TO TOUCH IN **SWITCHED ON** POSITION. UTMOST CARE AND CAUTION IS ADVISED, USE OF A WOODEN PLANCK UNDER YOUR FEET IS RECOMMENDED. **NEWBIES PLEASE KEEP AWAY.**

There's nothing complicated about the design and requires just fixing the procured components over the general PCB according to the circuit diagram. Remember, a single wrong connection will stop the circuit from operating, so, do it slowly but surely.

After you finish the assembly, clean by hard brushing the board from the track side i.e. the soldered side with thinner. Repeat, until every bit of dirt or flux is removed, and the assembly looks crystal clear. Cleaning is important to avoid leakages which would seriously hamper the over all efficiency of the circuit.



Now connect the circuit to AC Mains (Read Caution Message), the neon light should come ON, indicating that the presence of the mains supply voltage.

If everything's done as explained, you should start hearing a mild hissing sound at the tip of the needle output. Take your finger near the tip (it's safe), and literally you will feel a gush of cool fresh air. A typical smell (marshy) can also be experienced near it, due to the emission of ozone.

Your air purifier is complete and ready to be used. Enclose the whole circuit inside a strong and sturdy PLASTIC box, allowing the mains cord to come of it through one end. Make sure the needle point is perfectly exposed to the air outside the box and is rigidly fixed over the box.

Fix it somewhere which will produce most beneficial results - plug it in and switch ON.

Your air ionizer, purifier unit will instantly start sanitizing your room from the word "go" and at least now you won't complain regarding the growing urban air pollution.

Keep a watch on the objects close to it; although they may require a much frequent cleaning than the regular routine, but as they say “no gain without a bit of pain.”

Source:

<http://www.brighthubengineering.com/diy-electronics-devices/78220-simple-room-air-ionizer-and-purifier/>