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Plasma Generator Kit

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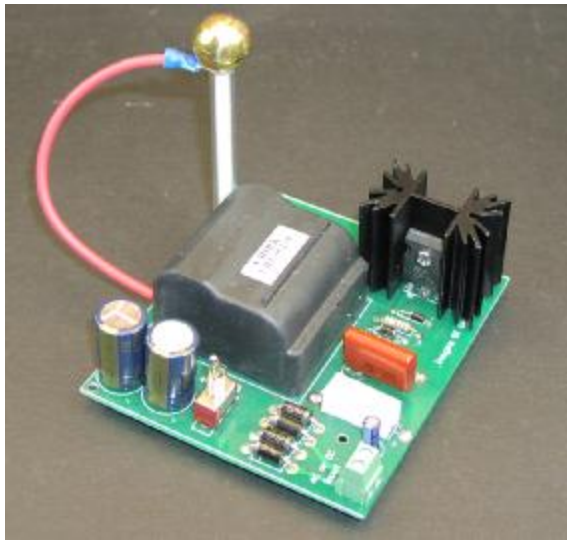

Plasma Generator Kit

This kit generates high voltage using a fly back transformer.

The Plasma generator kit can be used for many high voltage experiments.

Energizing neon gas tubes, fluorescent lamps, Geissler tubes, plasma balls, kirlian photography, etc

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See high voltage safety guide pg 3

Manual and Construction Booklet For Plasma Generator

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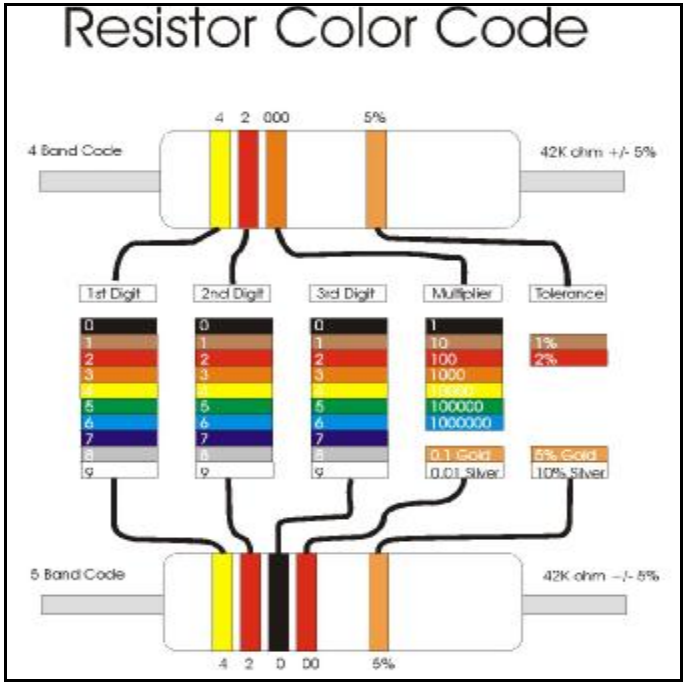
Appendix A Determining Resistor Values:

Resistor values are read using the color bands on the body of the resistor. The first band is the one nearest the end of the resistor. Start reading from this band. The first band represents the first significant number, the second band, the second significant number and the third band is the multiplier. If the third band is gold or silver this indicates a multiplier value of .1 or .01 respectively.

Color	Value	Multiplier	Tolerance (%)
Black	0	1	
Brown	1	10	
Red	2	100	
Orange	3	1000	
Yellow	4	10000	
Green	5	100000	
Blue	6	1000000	
Violet	7	10000000	
Gray	8	100000000	
White	9	1000000000	
			Gold 5%
			Silver 10%
			No Band 20%

Example: A resistor with the following color bands Red, Red, Orange, Silver
1st Number Red = 2
2nd number Red = 2
3rd Number Orange = 3 multiplier (number of zeros) that equals 1000
Silver = 10%

Putting it all together:
Red Red Orange Value Tolerance
2 2 x 1000 = 22,000 ohms +/- 10%



Parts List

1 Transistor TIP35C (Q1)
1 PC mount Toggle Switch SW1
1 2.2 uf 100V capacitor (C2)
1 2.2 uf 250 V capacitor (C3)
2 1000 uf capacitors (C1A and C1B)
1 FR204 Diode (D1)
3 FR102 Diode) (D2, D3, and D4)
4 1N5401/02 diodes (D8-D11)
1 7.5K ohm resistor (R1)
1 470 ohm power resistor (R2)
1 Two position terminal block
1 Flyback transformer (with ring terminal)
1 Printed Circuit Board

Hardware:

4 Plastic stick-on feet
1 6-32 x 7/8" machine screw
1 6-32 x 1/4" machine screw
2 6-32 nut
1 #6 lockwasher
1 plastic 10-24 threaded rod
1 8-32 plastic nut
1 clear plastic tube 5/16 OD x 3/16 ID
1 Brass ball (threaded)
1 #8 lock washer
1 Aluminum heatsink

Option Power Supply (not included with kit)

12 VDC 500 mA wall transformer power supply with 2.5 mm connector.

PN# ACA-12VDC-500 $9.95

High Voltage Safety

The plasma generator produces 15 kV (15,000 volts). While this is extremely high voltage it is not necessarily lethal. The reason this is so, is that the current our high voltage power supply can deliver is approximately 600 uAmps (0.6 mA). It is generally accepted that you need at least 1 mA of current flowing through the human body to be lethal. However a person's health has an impact on the amount of current that would be lethal to any particular person. So please follow the safety guideline provided.

And while 0.6 mA is not considered lethal, it still can still provide a good electrical shock. That electrical shock will cause you to jump, move or fall and can thereby cause a secondary injury, unrelated to the electric shock itself. I personally have been shock many times by various high voltage circuits, including this one. Take the following precautions and treat all high voltage power supplies with the respect they deserve.

Follow these simple guidelines and rules to stay safe.

1) Keep one hand in your pocket. Only use your other hand to work with the high voltage equipment. This reduces the probability of accidentally passing high voltage current across your heart from hand to hand.

2) Set up your work area away from possible grounds that you may accidentally contact. Keep your work area neat and clean to easily identify high voltage wires and grounds.

3) Be sure the floor is dry and wear preferably rubber-soled shoes.

4) Prove to yourself the high voltage power supply is off, by unplugging the device's electrical power cord. Don't trust power switches that could be hit or pressed and accidentally turned on.

5) Discharge all high voltage before working on the device. This means attaching a wire to the circuit ground and touching the high voltage output terminal with the grounded wire. This will dissipate any stored high voltage charge.

6) Do not work on high voltage apparatus when you are tired and not alert even if it means a delay.

7) Never charge a capacitor using the high voltage power supply. Even small high voltage capacitors can deliver lethal current!

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High Voltage Power Supply

The high voltage power supply may be used for a variety of high voltage experiments:

May be used to light; Geissler Tubes, Neon Tubing, Fluorescent lamps

High Voltage Ion Generator

Kirlian Photography

Plasma spheres—Or make a plasma sphere out of a small clear appliance bulb.

How it Works

Looking at the schematic on page 5.

When power is applied to the circuit, the current through resistor R1 and feedback winding (14T) coming in to the base of the transistor and puts the transistor into conduction.

This initiates current through the primary windings (16T) creating a magnetic field in the transformer and inducing a current and high voltage spike on the secondary windings (4,200T output) of the flyback transformer. At the same time the magnetic field reversed the polarity in the feedback coil (14T), turning off the transistor. With the transistor turned off the current is cut which causes the magnetic field in the core to collapses, keeping the current in (14T) feedback winding reversed.

After magnetic field in the transformer dissipates, the transistor is again pushed into conduction through the R1 resistor and circuit operation repeats.
High voltage is generated when the oscillation is adjusted to a resonance frequency of the transformer which in this circuit is approximately 22KHz.

What's an Ion?

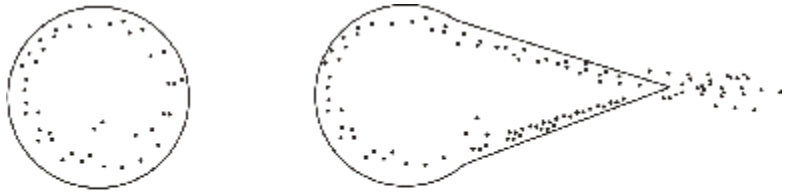
An ion is an atom or molecule that is no longer electrically neutral, it has become unbalanced electrically. The way it becomes unbalance is by the loss or gain of a positive or negative charge. When this happens the atom (or molecule) turns it into an ion that is either positively or negatively charged.

So an oxygen atom (or molecule) that acquires an free electron becomes a negatively charged ion. If however the oxygen atom loses an electron it becomes a positively charged ion.

Generating Ions

There are a few ways ions are generated; radioactivity, high temperatures, UV light or high voltages. We will focus on how high voltage can generate ions.

When dealing with high voltages, the shape of a conductor has an impact. For instance a sphere will hold a high voltage charge. While a sharp point bleeds ions into the atmosphere. This property is used to generate air ions in commercial ion and ozone generators.



Effect of Shape on Charge

To generate ions using the Plasma generator you need to connect a sharp point to the high voltage ring terminal. Be careful, a spark from the plasma generator can jump further from a sharp point that a sphere.

More fun things to try:

William Betty has a number of ion experiments to perform on his website:
http://amasci.com/freenrg/iontest.html

More experiments:

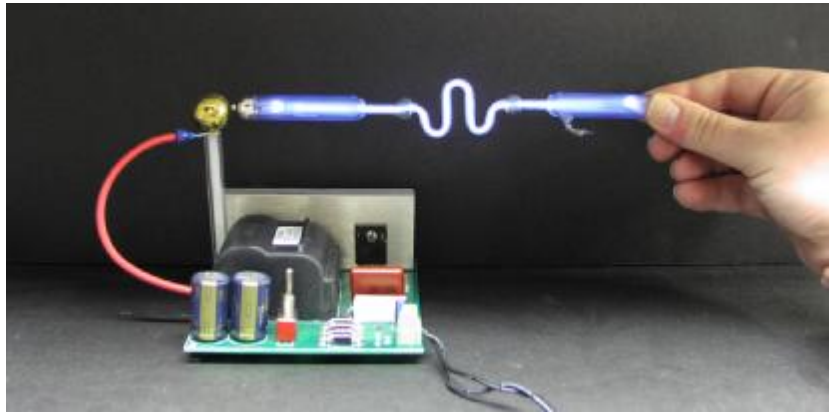
Visit
Http://www.imagesco.com

Finish the circuit be mounting and soldering the green two terminal block. Next mount the four clear plastic feet on the bottom of the pcb.

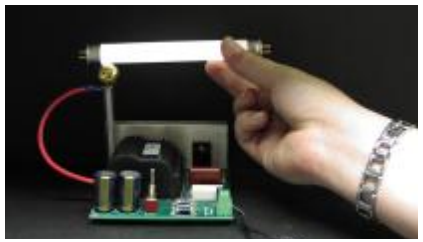
Usage:

To power the plasma generator you need to attach a power supply to the two terminal block. We recommend a 12 VAC 500 mA or 12 VDC 500 mA power supply. Attach power supply wires, any polarity to the terminal blocks and secure the wires with the top screws. Turn on the plasma generator using the on-off switch.

Lighting a small Geissler tube.

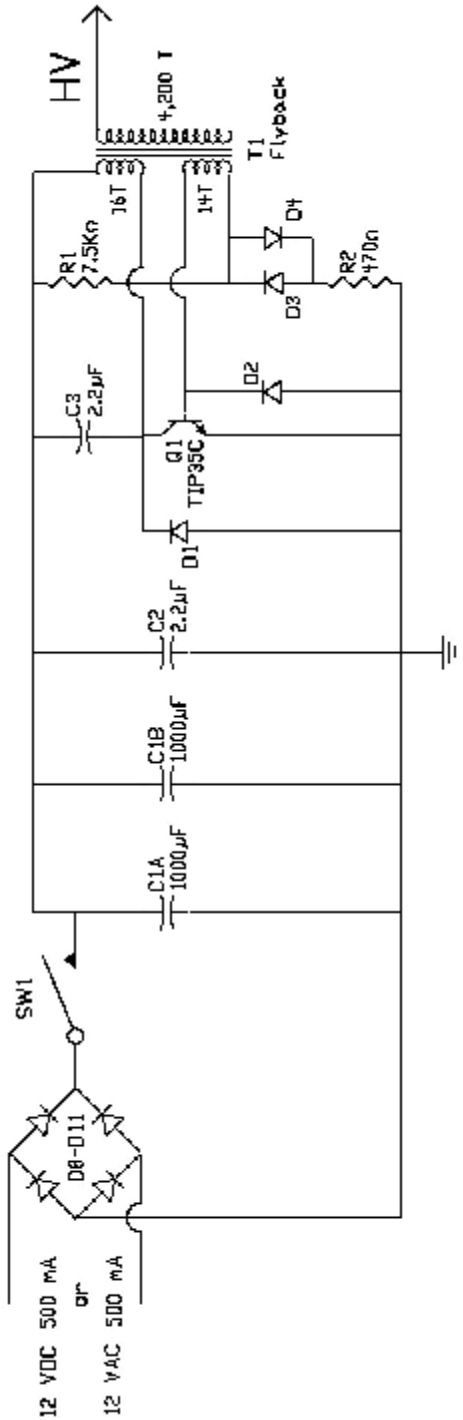


Lighting a small fluorescent tube



Turning a small appliance bulb into a Plasma Sphere.

Flyback circuit diagram



Construction

Begin construction by attaching the TIP35C transistor to the aluminum heat sink, see figure 1, using the 6-32 machine screw, nut and #6 split lock washer.

Figure 1

Next, solder the transistor to the pcb board and solder the mounting pins of the heat sink to the pcb, see figure 2.

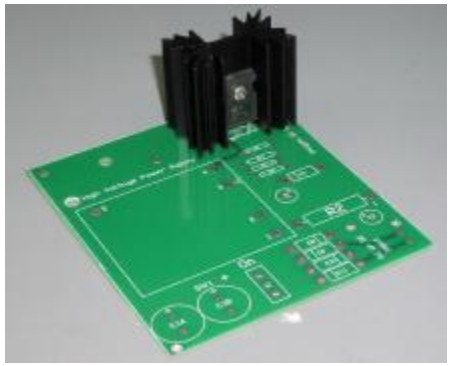
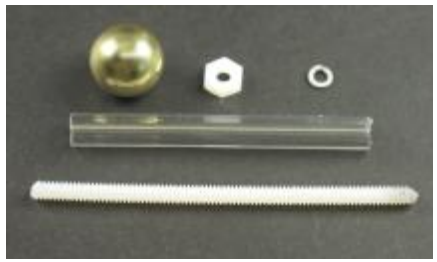


Figure 2

Next we want to assemble the HV ball terminal. This consists of the threaded brass ball, threaded rod, clear plastic tube, nut and lock washer, see figure 3.

Figure 3



The brass ball is screwed onto the threaded rod., see figure 4.

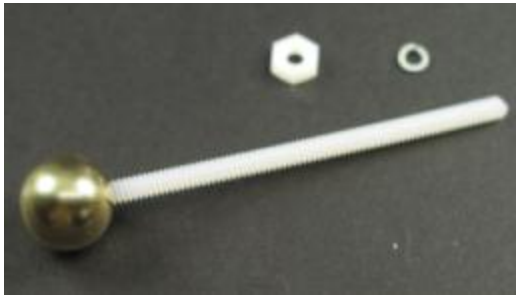
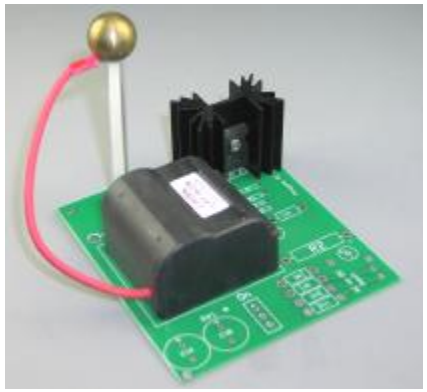


Figure 4

The fly back transformer is soldered to the PC board. The ring terminal on the HV wire output of the fly back transformer is inserted on the threaded rod underneath the brass ball. Next the clear plastic tubing is inserted on the threaded rod. Now this assembly is placed into the hole on the PC board by the flyback transformer, see figure 5, and is secured to the pc board using the 8-32 machine screw nut and #8 lock washer.

Figure 5



Next mount and solder the following components; C1A and C1B, 1000 uf 50V capacitors, SW1, on-off toggle switch, D8-D11 (diodes 1N5402/01), D2,D3 and D4 (FR102) D1 (FR204) making sure the band on the diodes are oriented properly according to the silk screen outline for the diodes, resistor R1, 7.5K ohm and power resistor R2 (470 ohms). Finish up by mounting C2 (2.2 uF 100V) and C3 (2.2 uF 250V) capacitor.

The C3 leads are bent as shown in figure 6 and mounted as shown in figure 7. C3 does not have a polarity and may be mounted with either lead in the + pcb hole.

Figure 6

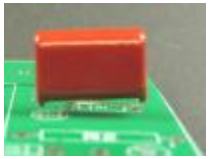


Figure 7