# HV350 / HV350R / HV350SAFE Operating Instructions

**HV350312**

## Wire explanations

1. **The heavy white wire exiting out the rear panel is the high voltage output.**
2. **The smaller wire is the high voltage return and as you note, connected to the base capacitor of the multiplier stack. Current flow from the high voltage now flows within that loop eliminating loop currents from flowing thru the circuit and causing damage. This is especially important if you anticipate spark break down in your load.**
3. **The single wire from the front panel is low voltage ground when you use battery power or ungrounded two wire power supplies. The one included is a three wire system. If you want to use this ground to be safe , simply attach it to the 115vac socket plate screw**

HV350REG

## All these series of power supplies have the following:

1. Replaceable front panel fuse. 4amp
2. 2.5mm dc jack for included 12v/4a regulated wall adapter
3. Cable included with 2.5mm plug for use with other power supply options including portable battery field operation
4. Earth grounding lead for attachment to ac socket plate screw can be green or black
5. Rubber tube control extension preventing annoying shocks as those occurring with screws in knobs
6. Front panel analog vane meter set to read output volts using basic 50 ua full scale meter movement
7. HV output is via an insulating plastic tube intended for inserting hv lead minimizing corona to open air It will be up to user and depending on the wire used the method of securing if needed. We split tube and apply a small tie wrap for tightening and mechanically securing
8. A HV return lead exits the rear panel and is either green or blk and must be connected to the return as closely as possible. This minimizes ground loop currents from retuning via the circuitry and causing damage should a fault occur in the load.
9. Units are short circuit protected but must never be allowed to continually breakdown as a spark discharge

Your **HV350** **is intended to be used for charging capacitors. THIS IS A VERY DANGEROUS FUNCTION and must be PERFORMED by a PERSON FAMILIAR WITH DANGEROUS HIGH VOLTAGE CIRCUITRY**

This circuitry is not regulated but contains a duty cycle current control chopper that controls the rate of charge. The voltmeter tells you the charged voltage any time during the cycle. The user is responsible to place a dv/dt properly designed snubbing circuit for fast and high energy discharges.
The front panel control adjusts the current by varying the duty cycle of the “on” time of the output current. Even with the control set to minimal the open circuit voltage will still be at 25kv but occurs for less time during a period limiting the current. Because of this feature the unit **can not** be operated without a load. This is why we add the resistor load consisting of the loop of twenty 2.2 meg/1watt resistor in series across the output. This load draws over 500 uamps at 25 kV and limits the open circuit voltage to this value. Unit now can be used for most any project requiring current control, short and open circuit protection.
This load may be removed if you know what your target load is and it is connected. Note that the open circuit voltage will soar to over 50kv and may damage the unit otherwise. You may operate up to 35 kV max. There is a protection spark gap that is factory set for 25 kV. It may be changed at users risk in damaging the unit. Failure is usually the IRF540 mosfet and is easily replaced.

Your **HV350R** is similar to the above but has the added feature of maintaining a constant voltage throughout its operating range. No load or load resistor is needed and voltage can be adjusted from 5000 to 25000 as in our basic model when operating at +1ma...Regulation/indicating lamp on panel indicates unit is in regulating range. If it goes out the load is too heavy and voltage control must be turned down or load reduced.
***Lower voltage higher current models are available on customer requests.***

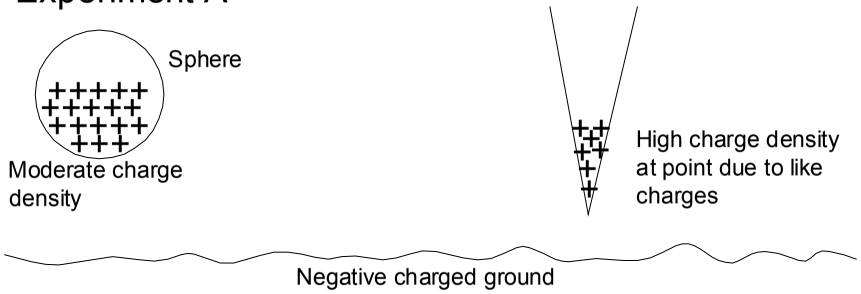
Your **HV350SAFE** is similar to the **HV350R** but has the added feature of a high resistance output without any capacitance. This feature while limiting peak capacitive shocking currents allow many experiments as shown on below page. A “brave” soul can have the output jump to his bare finger. These two resistors can be temporarily shorted creating the above HV350R however YOU WILL NOW be subject to annoying and painful shocks.

Simple **SETUP**

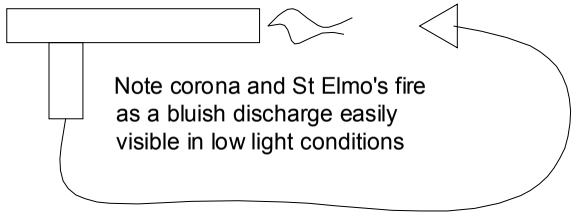
1. Connect output leads to intended load. Note that the small green or black lead exiting the rear of the unit must be used for the high voltage return as damage may result.
2. Connect a high voltage lead to the output stack. It is suggested to cut the protruding lead and make the connection well into the plastic tube. This may be difficult but will reduce leakage corona from the connection junction.
3. Verify control is full ccw and turned off and there is a 3 amp fuse in holder.
4. Connect to a 12 volt source as described above. Plus connects to red lead and minus to black lead. The green lead is an earth grounding point and is not for the high voltage return. ***It is not the same as the green lead from the rear when a high current discharge occurs!***.
5. Turn on and adjust output level as needed. Note the green LED on the HV350R indicates system is regulating.
6. Do not allow a spark to continually discharge to earth ground or continually break down as damage may occur

# Fig -10 Experiments

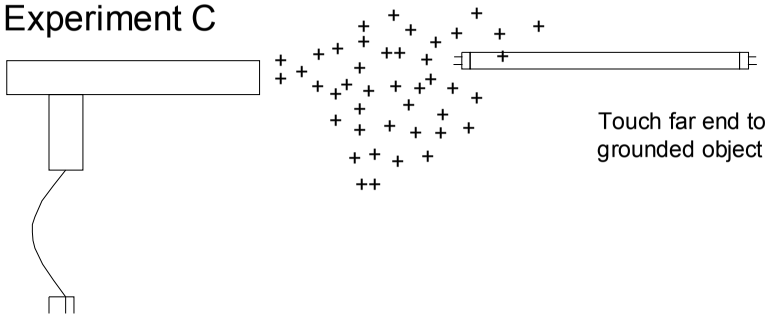
## Experiment A



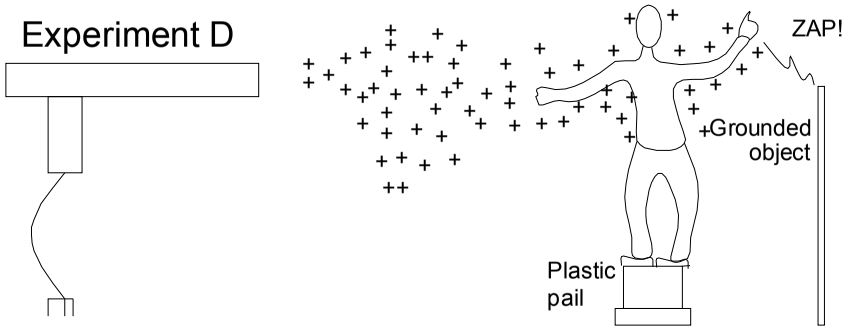

## Experiment B



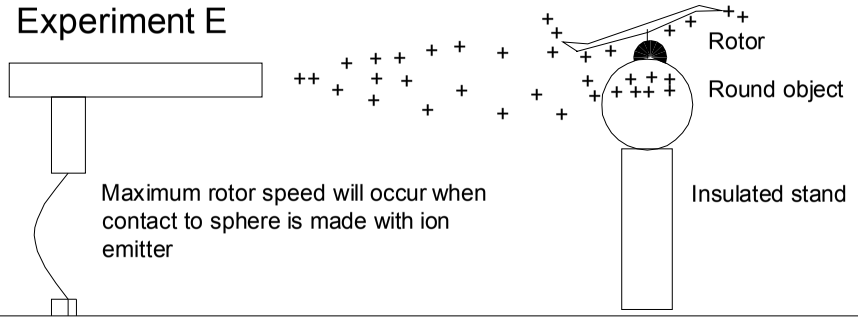

## Experiment C




## Experiment D

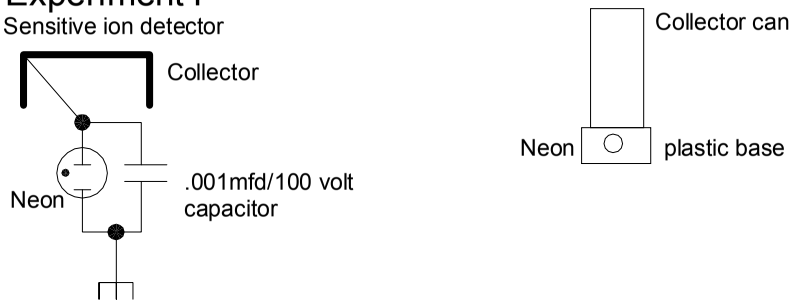


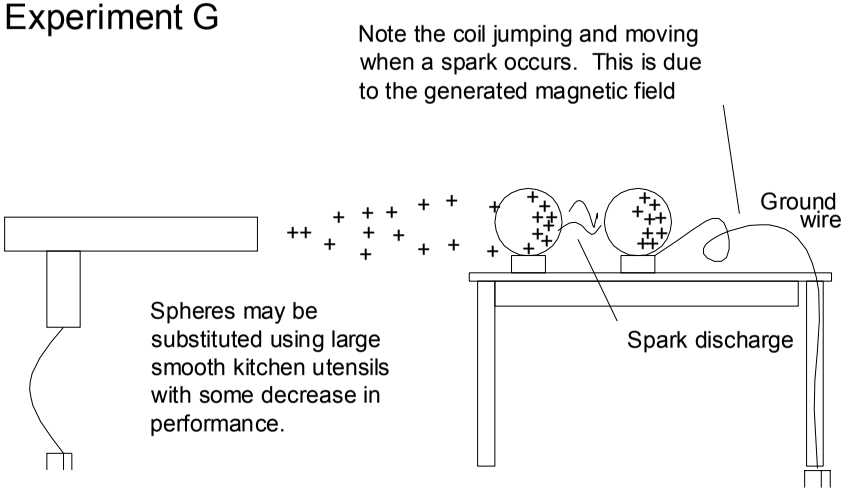

## Experiment E




## Experiment F

Sensitive ion detector




A small round metal bowl or similar object (ion collector) s attached to a glass jar or plastic cap. A neon lamp and capacitor are connected as shown. When the ion ray gun is pointed to the device the ion collector builds up a charge across the capacitor. Once the voltage reaches the ignition level of the neon lamp it flashes now discharging and repeating this action. The flashing rate is can indication of the ion field and can be used for relative measurements.

## Experiment G