

## 8. Trouble shooting

### (1) Common Problems

- a. There are surface pollutants on the electrode balls, the rubber belt, or upper and lower rollers.
- b. There are current leakages caused by pollutants on the inside or outside surfaces of the organic glass tube.
- c. The rubber belt is extended so that it is too loose.
- d. The upper and lower combs are not parallel and the friction surface is too small.
- e. The distance between the collecting comb and the rubber belt is too large, or their positions are not correct.
- f. Point discharges are produced because of the break of connecting wires.
- g. Humidity is too high.

### (2) Advanced Trouble shooting

- a. Remove the upper dome half of the electrode and the upper roller. Open the base / main console cover (underneath) and remove the rubber belt.
- b. Clean the upper and lower rollers, the rubber belt, and the Plexiglas tube with a piece of clean, damp silk fabric.
- c. Replace the base cover after proper dry time, keeping the upper roller parallel to the lower. Insure the rubber belt is snug, and position the collecting comb in very close proximity (not touching) to the rubber belt.
- d. Let the instrument run for a few minutes leaving the upper dome off, so that the bulb located in the base has a chance to exhaust as much moisture as possible.
- e. Assemble the upper dome half, and proceed to use.

## 9. Miscellaneous

- (1) When the instrument is not in use for a long time, you should reduce the height of the upper roller to reduce tension on the rubber belt.
- (2) This instrument is designed for intermittent use, and leaving the device running for long periods of time is not recommended.



## VAN DE GRAAF GENERATOR MODEL LC2910-HC

### 1. Purpose

The LC2910-HC model Van De Graaf machine is an electrostatic high-voltage generator that can generate very high voltages. It can be used independently to demonstrate electrostatic principles, or can be used to provide a high-voltage electrostatic source for physical electrostatic experimentation.

### 2. Specifications

Power supply: AC 110 V 60 Hz

Power consumption: 80 W

Motor R.P.M.: 3,500

Fuse: Bussman GMA-5A

Diameter of electrode ball: 250mm

Diameter of discharge ball: 60mm

Output Voltage: 325,000V Max @7 $\mu$ A

### 3. Operation principle and construction

The electrode is supported by a round Plexiglas tube. The instrument is provided with dielectric upper and lower rollers. The lower roller is connected with an electric motor and the upper roller is run by a rubber belt. The negative charges produced by the friction between the upper roller and the rubber belt are collected to the electrode ball by the upper collecting comb beside the upper roller. At the same time, the positive charges produced by the friction between the rubber belt and the upper roller are transported to the lower roller by the rubber belt and collected to the positive electrode terminal by the lower collecting comb beside the lower roller. Conversely, the negative charges produced by the lower roller are transported to the upper roller by the rubber belt and collected to the main electrode ball by the upper collecting comb. Because the electric motor is running continuously and the above-mentioned process is repeated constantly, very high potentials will be produced.

#### 4. Warnings

- (1) **Children should not use or operate this device.** If used for demonstration purposes around children, close adult supervision is required, and children should be kept at a safe viewing distance away from the device (> 5 feet).
- (2) **Proper care should be taken to avoid static electric shock.** This device produces high voltage, and the operator should use proper care to insure safe operation.
- (3) **Persons with pacemakers or heart conditions should not come within 15' (15 Feet of this device when in operation.** This device can disrupt proper operation of pacemakers and cause injury to those with heart conditions.

#### 5. Initial Setup

- (1) Remove main console (including Plexiglas column and bottom half of main dome) from the Styrofoam storage case.
- (2) Place main console on a clean level surface in close proximity to a grounded 110V outlet. **Do not connect the upper dome segment to the lower one yet.**
- (3) Attach one end of the enclosed ground wire to the main console / base using the supplied opening, and the other end to the handle of the discharge electrode wand.
- (4) Insert plug into a properly grounded 110V outlet.
- (5) Turn on the device using the switch located on the main console / base.
- (6) While touching the discharge wand to the lower half of the dome, observe the drive belt to ensure that it is properly adjusted and running in the center of the top pulley. This generator is adjusted for proper belt travel and tension at the factory, but these adjustments can be thrown out by rough handling. If necessary, use the tensioners located inside the bottom dome half to correct belt travel.
- (7) Turn the device off and touch the discharge wand to the lower half of the dome.
- (8) Carefully connect the upper dome segment to the lower one.

#### 6. Adjustment and Cleaning

- (1) Remove the upper dome of the electrode, and clean the electrode ball, the discharge ball, the upper and lower rollers, the rubber belt and the Plexiglas tube with a piece of clean cloth.
- (2) Adjust the distance between the upper and lower rollers so that the rubber belt is

suitably snug, making sure to keep the upper and lower rollers parallel. This is accomplished by adjusting the tensioners inside the lower half of the dome.

- (3) Adjust the upper and lower collecting combs so that they are very close to the rubber belt, but not in contact.
- (4) If using the unit in higher humidity, connect the power supply and let the instrument run for a full minute prior to use. The bulb located in the unit base will help to dissipate moisture, which adversely affects operation.

#### 7. Method of experiment

- (1) The demonstration of charge nature  
Place some tiny pieces of paper near the electrode ball, and they will be subject to induced electrification, and will fly to electrode ball. After they have contacted the electrode ball, they will receive the same charges as the electrode ball and will be repelled and will fly away from the electrode ball.
- (2) The demonstration of lines of electric force  
Attach a parallel plate capacitor to the generator making a circuit from base to dome top (with the capacitor in between). Keep the two plates parallel, keeping them an inch apart. When the generator is turned on, you can clearly observe the distribution of lines of electric force.
- (3) The demonstration of point discharge  
Place metal pointed bodies between the upper and lower dome halves, exposed to the dome exterior. When the generator is in operation, you can see the spark discharge at the metal points in a darkened room.
- (4) Hair Raising  
Place the device on an insulated surface and remove the discharge electrode. Have an adult volunteer stand on an insulating surface such as a plastic stool, rubber mat, etc. Have the volunteer place one hand on the dome, while you switch the device on. Hair should begin to rise after 1 minute. If not, check for current leakage caused by worn accessories, nearby objects, etc. Hair type (thin hair is best) and length (longer hair is better) are important factors, and should be considered when selecting a volunteer. When finished, have the volunteer quickly remove their hand from the dome and step away. Make sure to use an insulating object to switch the device off, else you become the ground (OUCH!).