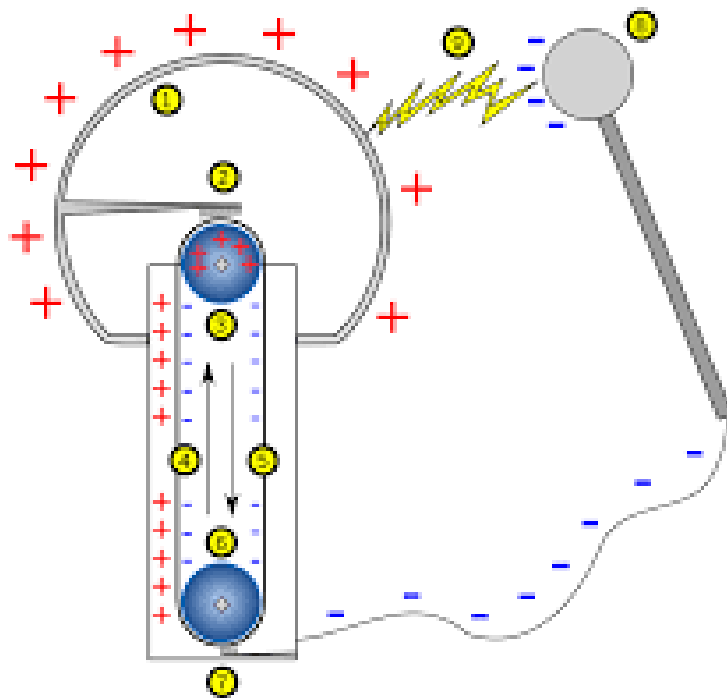


VAN DE GRAAF GENERATOR

Van de Graaf generator uses a long rubber belt, an electric motor, pulleys and an aluminum sphere that is insulated by a Plexiglas tube.



At the top pulley the rubber belt picks up electrons and then drops them off at the bottom pulley. The lack of electrons at the top pulley creates a positive charge. Since the aluminum sphere is a conductor, the positive charge will spread out evenly over the sphere. Objects in contact with the sphere become positively charged. When the positive charge becomes large enough, a sudden static discharge or spark occurs to neutralize the Van de Graaf generator.

LIGHTENING AND LIGHTENING RODS

Inside a large thunder head cloud strong up drafts and down drafts create a situation similar to a Van de Graaf generator. Particles of ice and supercooled water droplets are cycled up and down in the cloud at speeds of up to 100 km/h. For reasons related to changes in temperature (the top of the thunder head is much cooler) positive charge accumulates at the top of the cloud and negative charge spreads out along the bottom of the cloud. When the negative charge at the bottom

of the cloud is large enough, a large static discharge occurs (i.e. a lightning bolt). The high voltage and current on electrons in the lightning bolt heats up the air to temperatures as great as 33 000 °C. This high temperature causes the air to expand as rapidly as in an explosion, creating the familiar noise of thunder.

You can determine how far away a thunder storm is by timing the delay from when you see the lightning bolt to when you actually hear the thunder. Every three second of delay works out to 1 km of distance.

A lightning rod is simply a grounding rod. Since lightning will seek the easiest way to discharge, lightning usually strikes the highest objects which then help to carry the discharge to the ground. A lightning rod, connected to a highly conductive grounding cable offers a better route for the discharge (see diagram pg 315). The electrons in the lightning bolt find it easier to travel through the grounding cable than to travel through other non-conducting objects. The lightning will strike the lightning rod and spare the barn or house to which it is attached.