

615-4670 (10-335) Jacob's Ladder

Theory:

The Jacob's Ladder is best known for its role in Frankenstein films, but it does have a valid scientific purpose. It is one of the few electrical devices that is driven by convection. This odd pairing is the result of several different phenomena at work.

The Jacob's Ladder consists of a 15,000 volt power supply and two conductive antennas. You will notice that the antennas slope away from each other, but come almost within touching distance towards the bottom. When the device is activated, the high voltage potential across the antennas is sufficient to ionize the air between them, turning it into a plasma.

Air is a very good insulator, but plasma, with its free moving electrons, is a good conductor. When the plasma state is achieved, it completes the circuit between the antennas, allowing an electric arc to form. This arc is very hot, and quickly heats up the air inside the tube. Hot air rises due to convection currents.

As the air inside the tube rises, it draws the arc sustaining plasma along with it. This forces the arc up the antennas. As the antennas slope outwards, the voltage potential between them becomes weaker and weaker. Eventually, it is insufficient to maintain the arc, and it will extinguish. It will reform at the bottom and continue the cycle.

Operation:

Operating your Jacob's Ladder is simple. Simply plug it in and activate the power switch. However, there are some safety concerns which should be carefully read **before** using the unit:

- Even though the device operates at only 10 microamperes, it still generates 15 kV potential. This is enough to cause minor injury. When the antennas are fully enclosed, the device is safe. The unit should **never** be used if there is reason to doubt the integrity of the enclosure!
- The cap on the device is chemically bonded into place. Do not use the unit if the cap is loose or missing. You can use the holes on the cap to control the airflow inside the tube, which will adjust the speed that the arc climbs the antennas. Lower airflow will make the arc move slower.
- Do not use the device if the main tube is cracked or otherwise broken.
- Do not operate the Jacob's ladder for more than 20 continuous minutes, as this may cause damage to the antennas.

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.