

Tesla Coil



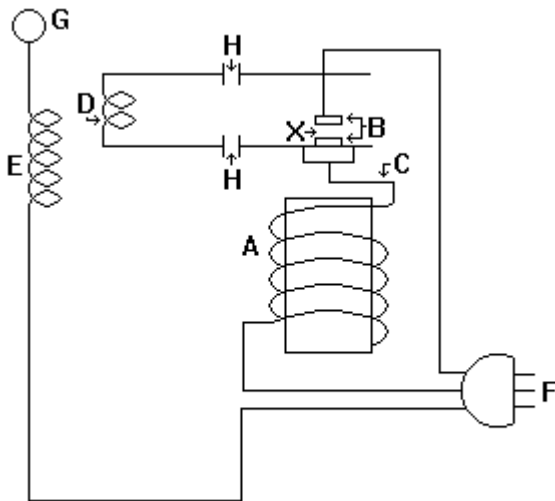
What is a Tesla Coil?

The Tesla Coil is an air-core transformer with primary and secondary coils tuned to resonate. The primary and secondary coils function as a step-up transformer which converts relatively low current at high frequencies.

The Tesla Coil demonstrates the fundamental principles of high frequency electrical phenomena. It illustrates the principles of the ionization of gases and the behavior of insulators and conductors when in contact with high frequency electrical fields.

As conceived by the inventor Nikola Tesla, the Tesla Coil was developed to transmit electrical power without wires. An antenna would be constructed to pull the transmitted electrical energy into the electrical system. The Tesla Coil can be considered a simple radio transmitter, operating within a broad range of high frequencies, which transmits power rather than information.

Components of the Tesla Coil



The Tesla Coil consists of a vibrator or transformer (parts A and B in the Diagram), two (2) high-voltage capacitors (H), a primary (D), and a secondary (E) connected to a ball terminal or antenna (G).

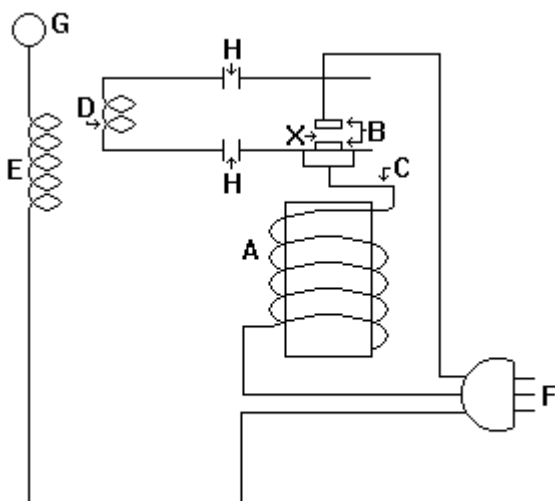
The vibrator is composed of an air slot iron core (A) around which coils of copper are wound, and a buzzer which consists of 2 tungsten points or contacts (B), which open and close when by means of a spring (C), as alternating current electricity passes through the iron core and discharges in the spark gap (X).

The capacitors are 2 large cylinders located on either side of the spark gap formed by the open contacts of the buzzer. These are high-voltage capacitors of a predetermined size and value.

The primary (or primary coil) is a coil of 2 thick insulated copper wires located next to but not touching the secondary. It is connected in series with the capacitors and spark gap. The secondary (or secondary coil) is a cone-shaped coil. It consists of about 400 turns of thin enameled copper wire and functions as a transformer by stepping up the voltage to very high levels.

The high voltage thus produced is given off by the ball terminal (G).

How a Tesla Coil Works



The following explanation of Tesla Coil operation refers to this diagram.

When the plug (F) is inserted into 110 alternating cycle current, the electricity flows through the vibrator (A), an iron core with a hollow center around which is wound many coils of copper wire. The iron core becomes an electromagnet. The buzzer (B), which consists of 2 tungsten contacts located opposite each other and almost but not quite touching, pull apart when the electromagnet is activated and close when the magnetic field decays. This occurs at the rate of 120 times a second, to coincide with each time the AC current changes the polarity of the electromagnet.

The capacitors (H) charge up when the buzzer contacts are open, since the current then passes into them to complete the electrical circuit. When the contacts are closed, the capacitors are shorted together and current does not

pass into them. The open contacts allow the air in the spark gap (X, the small space between the open contacts) to ionize, which permits a discharge that short circuits the transformer and capacitors. But the capacitors retain their electric charge, since the function of a capacitor is to store an electrical charge, and thus provide the energy to create an electromagnetic field.

The spark which takes place in this spark gap (X), does not consist simply of a single spark passing in one direction, as would appear to the eye, but actually is a number of separate sparks passing back and forth in opposite directions. They take place so rapidly the direction change cannot be seen. The time during which the spark appears to pass may only be a fraction of a second, but during that time the current may have osculated back and forth several thousand times.

The electromagnetic field is formed by the primary (D), which converts the charge stored in the capacitors to magnetic energy. The electrical charge is transferred to the primary by the capacitors when the magnetic field in the iron core decays. When the magnetic field in the iron core is reactivated, the field generated in the primary is the one to decay, and the electrical charge is transferred back to the capacitors with every half cycle, a charge of increasingly higher voltage as each activation of the magnetic field adds to the charges previously generated.

Thus the vibrator also acts as an air core transformer, boosting the voltage to medium high levels with every half-cycle pulse of AC current. The high frequencies that are produced are rich in harmonics since each pulse of electricity across the spark gap of the buzzer are composed of many surges of electrical energy.

The capacitors in Tesla Coils supplied by 'Dr' Dee's' have been chosen for a particular size and value. They serve the dual function of storing an electric charge and filtering through the high frequency 60 cycle current. This is a safety feature, since by isolating the primary from the 60 cycle component of the current, the electrical circuit will not be complete in regard to the 60 cycle component, and you will not receive a shock if you touch the coil directly. An additional safeguard is the air-core transformer, that by its nature, does not pass 60 cycle current very well.

The frequency in the primary often reaches many million cycles per second. When the high frequency becomes great enough to attain the voltage pre-determined by the size and value of the capacitor, the primary will include a magnetic field in the secondary (E). Inducing means that a moving magnetic field causes a magnetic field to form in another wire coil located close enough, or inside, the first coil.

Condition of Resonance

The primary of this Tesla Coil consists of two thick insulated copper wires which are resonated by the capacitors to equal the natural resonant frequency of the secondary. In other words, when the resonance of the capacitors equals that of the secondary, a magnetic field is formed in the secondary. One way of looking at the nature of resonance is to compare it to a cymbal. When a cymbal selected for a certain size and weight is struck it rings at a specific frequency. In the case of the Tesla Coil, the right capacitors and right secondary coil "ring" at the chosen high frequency.

Parts in the Tesla Coil

- High-Frequency High-Voltage Generator (the Tesla Coil)
- Special Lamp Socket
- Large Radiating Antenna Plate
- Small Radiating Antenna Plate
- Neon Lamp
- Instruction and Experiment Booklet
- Discharge Electrode
- Plastic Stranded Wire, 20 Gauge
- Uninsulated Copper Wire, about 24", 18 Gauge

Magickal Uses

1. Will energize a psycotronics box or any metal object used in magick.
2. Will function as a potamaton. Receives and sends impressions.
3. An important tool for experiment and therefore, gnosis.



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