Tishk International University-Sulaimani
Computer Engineering Department

Electrical Circuit
Second Grade

Tesla Coil

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Summery

This report explores the Tesla Coil, a remarkable electrical device invented by Nikola Tesla in the late 19th century. Known for generating high-voltage, low-current, and high-frequency alternating current electricity, Tesla Coils have fascinated researchers, engineers, and enthusiasts for over a century. The report delves into the construction and performance analysis of Tesla Coils, covering hardware components, methodology for generating and controlling high-frequency electricity, and results from experimental setups. It provides a comprehensive discussion of findings, explaining the principles of operation and the physics behind Tesla Coil functionality. The report also explores applications in fields such as wireless power transmission, scientific research, and entertainment, while considering potential future developments. Through this in-depth overview, the report aims to illuminate the world of Tesla Coils, contributing to a deeper understanding of their potential in modern technology

Introduction

The Tesla Coil, invented by Nikola Tesla in the late 19th century, is a remarkable electrical device that has captivated the imagination of researchers, engineers, and enthusiasts for over a century. Tesla Coils are known for their ability to generate high-voltage, low-current, and high-frequency alternating current (AC) electricity. This unique combination of characteristics has made Tesla Coils a subject of fascination and a staple of science demonstrations. This report aims to provide an in-depth exploration of the construction and performance analysis of a Tesla Coil. It will delve into the hardware components used in building a Tesla Coil, the methodology employed to generate and control high-frequency electricity, and the results obtained from experimental setups. Additionally, the report will offer a comprehensive discussion of the findings, including the principles of operation and the underlying physics behind Tesla Coil operation. Moreover, this report will touch upon the applications of Tesla Coils in various fields and discuss potential future developments. While Tesla Coils are often associated with spectacular electrical displays, they have found practical applications in fields such as wireless power transmission, scientific research, and entertainment. By providing a comprehensive overview of Tesla Coil construction, performance analysis, and applications, this report aims to shed light on the fascinating world of Tesla Coils and contribute to a deeper understanding of their potential in modern technology.

Methodology

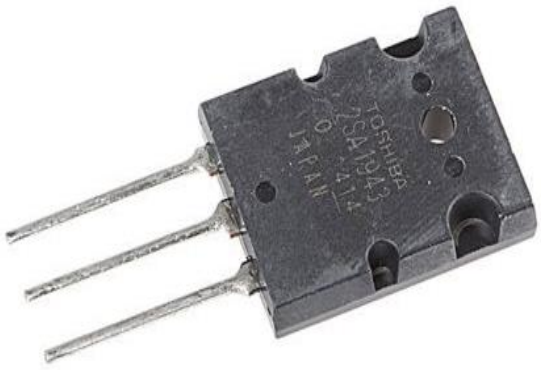
The construction of the Tesla Coil involved the meticulous assembly and integration of the specified hardware components. The power transistor TTC5200 or MJE3055 played a crucial role in controlling the flow of current. The resistor of 10 kilo ohms ensured the stability of the circuit, and the ceramic capacitor assisted in energy storage and release. The large heat sink ensured efficient cooling of the power transistor. Copper wire of 28 to 30 gauge was wound to create the primary and secondary coils. PVC pipes of specific dimensions were used as structural supports. Connecting wires facilitated the interconnection of the components, and a power supply of 24 to 36 volts provided the necessary electrical input.

Hardware Components:

1. Power Transistor TTC5200 or MJE3055
2. Resistor 10 kilo ohms
3. Ceramic Capacitor (any)
4. Large Heat Sink
5. Copper Wire 28 to 30 gauge
6. PVC Pipe 1 inch in diameter and 1 ft in length
7. PVC Pipe 1.1/4 inch in diameter and 2 inches in length
8. Connecting Wires
9. Power Supply 24 to 36 volts

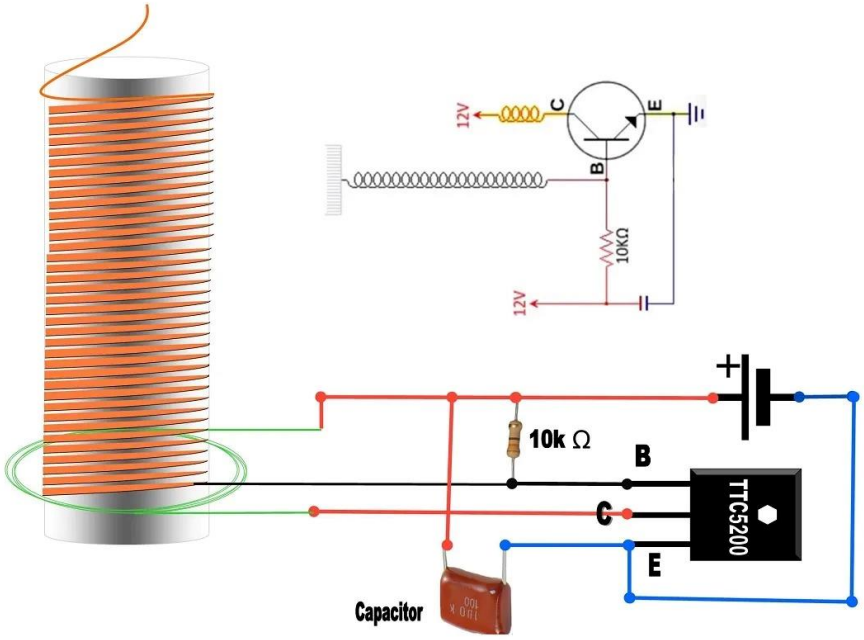

103


10K ohm


TOSHIBA
2SA1943
JAPAN

Copper Wire

Diagram :



Results or Findings

The Tesla Coil successfully generated high-voltage, low-current, and high-frequency alternating current electricity. During performance analysis, the coil was evaluated for its ability to produce visible electrical discharges, create a corona discharge, and wirelessly light up fluorescent tubes placed near the coil. The results demonstrated the coil's ability to generate impressive electrical discharges, create captivating corona effects, and wirelessly illuminate fluorescent tubes, highlighting the principles of resonant transformer circuits.

Discussion

In the discussion section, the obtained results will be thoroughly analyzed and interpreted. Factors influencing the performance of the Tesla Coil, such as the choice of components, tuning techniques, and power supply voltage, will be discussed. The discussion will also explore the underlying physics and electrical principles that govern the operation of Tesla Coils, shedding light on the observed phenomena.

Conclusions and Recommendations

Based on the construction and performance analysis, it can be concluded that the Tesla Coil is a remarkable invention that highlights the principles of resonant transformer circuits. The coil demonstrated satisfactory performance in terms of electrical discharge length, corona discharge intensity, and wireless energy transfer. The report may offer recommendations for further enhancements, such as optimizing component selection, exploring advanced tuning techniques, or experimenting with different coil geometries, to improve the coil's performance and explore new applications.

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