

**SMALL SCALE MODEL OF DELTATRON BASED
TECHNIQUE FOR HIGH DC VOLTAGE GENERATION**

**This is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Honours)
UNIVERSITI TEKNOLOGI MARA**



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NOVEMBER 1999

ACKNOWLEDGEMENT

With the name of Allah, and with the help of Allah. All good ascription's, devotions, good expressions, prayers are for Allah. I bear witness that there is no god save Allah alone, no partner unto Him, and I bear witness that Muhammad is as his servant and His Messenger, sent him along with the truth, as giver of glad tidings and as a Warner, and to tell that the hour is fast-approaching, no doubt in it. Peace be on you, O the Prophet, and Allah's mercy and His blessings. Peace be on us and on Allah's upright servants. Allah, forgive me and straighten me.

Firstly and foremost, I would like to take this occasion to express my sincere gratitude and appreciation to my project supervisor, Mr. Ismail Musirin whose patience, inspiration, contribution of precious ideas, proposals, counsel, support, encouragement and constant guidance to help me to successfully complete the project and this thesis. My appreciation also goes to all my lecturers, laboratory technician and friends for their willingness to cooperate and assist throughout the completion of this project.

Finally, I would like to thank to all of you.

MAY ALLAH BLESS YOU ALL.

ABSTRACT

High Voltage Engineering and related fields have become an integral part of our society and consequently its uses are widespread. This field still requires and even rigorous researches and investigations to be explored. One of related field in High Voltage Engineering is the High dc Voltage Generation. Generations of high dc voltages are mainly required in research work and have numerous other applications.

This report concern on the discussion of high dc voltage generation by modeling cascade transformers incorporated with high dc voltage multiplier circuit popularly known as Deltatron. The complete system comprises a high frequency oscillator, low scale rectifier circuit, conventional step-up transformers, filter circuits and Cockcroft-Walton circuit acts as the voltage multiplier.

The hardware set-up is also discussed especially the components involved. This technique has experimentally tested in the laboratory and its characteristic; include circuit stability and responses are emphasised in this report.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

High voltage technology developed originally because of the need to transfer large quantities of electrical energy economically at high levels of voltage [1]. In the field of Electrical Engineering and Applied Physics, high voltage are required for several applications. For example, dc high voltages are required in electron microscopes and x-ray units. It is also used in electron precipitators, particle accelerators and so on [1,2]. In fact, one main concern of High Voltage Engineering is for insulation testing of various power system components [1].

There are two methods of producing high dc voltages such as rectification high alternating voltages and electrostatic generation [1,2,3]. In this report, the generation method of high dc voltage through basic rectification technique is employed. The development of Deltatron model is used in order to analyze circuit output characteristics. A characterization for Deltatron model is very useful as the rigorous discussion is not fully established. An experimentation through modeling technique is implemented prior to the actual configuration for safety precautions.

The developed technique being introduced for this is an application of full-wave rectifier circuit. Solid state diodes are introduced in the circuit configuration as dealing with high voltage requires this type of device rather than ordinary diode. Other rectifier that could be used in high dc voltage generation is an electron tube.

For higher voltages, several rectifier units are to be connected in series. When a number of units are connected in series, transient voltage distribution along each unit becomes non-uniform and special care should be taken to make the distribution uniform [3].