

THREE-PHASE CONTROLLED RECTIFIER USING THYRISTOR

Project report is presented in partial fulfillment for the award of Bachelor of
Engineering (Hons) Electrical
UNIVERSITI TEKNOLOGI MARA



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ACKNOWLEDGEMENTS

I am particularly grateful to my Supervisor, Prof. Madya Muhammad Yahya, whom without his assistance it would have been difficult to prepare this report.

I would also like to express my gratitude to the Dr. Chan Sei and Prof. Madya Ir. Zulkifli, the panel for their vision and criticism, which inspired me to complete this project.

Special thanks to my friends for their ready help when I needed it.

Finally, I would thank my family for their love, support, inspiration, patience and understanding.

ABSTRACT

Today, the application of power electronics for the control and conversion of electric power is well accepted. Power electronic is based on the switching of power semiconductor devices whose power handling capabilities and switching speeds have improved tremendously over the years.

This thesis presents the effects of changing the firing angles of the converter using the power semiconductor switches, i.e thyristors with the DC machine as load. The effects of the firing angles considered are 30° , 60° , 90° , 120° and 150° . In the thesis presented, the converter output is processed by MATLAB software with simulink blocks that can completely show the results. The simulation results which done, the current and voltage waveforms are shown on the scope blocks.

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CHAPTER 1

THYRISTORS AND THEIR CHARACTERISTICS

1.1 Introduction

A thyristor is one of the most important types of power semiconductor devices. Thyristors are used extensively in power electronic circuits. They are operated as bistable switches, operating from nonconducting state to conducting state. Thyristors can be assumed as ideal switches for many applications, but the practical thyristors exhibit certain characteristics and limitations. A large number of devices are included in the family of thyristors.

1.2 Thyristor Family

Thyristor is a bistable semiconductor device, comprising three or more junction, which can be switched from the 'off state' to the 'on state' or vice versa. However the term thyristor is commonly used for the reverse blocking triode thyristor or SCR. Thyristors form a large family and they have 2, 3 or 4 terminal and 4 or 5 p and n layers.

In essence a thyristor is a pnpn sandwich. If an ohmic connection is made to the first p-region and last n-region the device is a diode thyristor. If an ohmic connection is made to an intermediate p or n region, it is p or n gate type triode thyristor. When ohmic connection is made to both p and n regions, it is tetrode thyristor. In addition, there are thyristors which can be activated by light and are called LAS (Light Activated Switch), LASCR (Light Activated Semiconductor Controlled Rectifier), and LASCS (Light Activated Silicon Controlled Switch).