HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

POWER ELECTRONIC CIRCUIT: APPLICATION OF THE THYRISTOR AND ITS DRIVING CIRCUIT

E. 1244

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This project is submitted in partial fulfillment
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INTRODUCTION

In the following pages an attempt to an understandable approach of the semiconductor device called thyristor will be made. Some details about the physics of semiconductor materials or the design of thyristor internal structure may be considered unnecessary but might proved important in the manner of understanding the operation of the device.

Thyristor is the internationally recognized name for the particular semiconductor also known as SCR. The name (thyristor) is derived from the greek with the first part 'thyri' meaning switch and the second part an association with the transistor family.

Its trade name SCR (silicon controlled rectifier) is derived from the fact that is a silicon made device and it is used as a rectifier which can be controlled. As a controlled switch it forms a group with other devices used in power electronics which are the power transistor, the IGBT, and the MOSFET.

However the general interest, development and use of the thyristor indicates that for many cases its many advantages make it superior to the other devices.

As it will be obvious in the pages to follow one text can not cover all aspects referring to thyristor as an electronic switch in detail. The important aspects of operation, protection and control are described carefully and any additional information or specification of the device are provided in the manufacturers data sheets in the appendices.

Chapter one attempts to give an overall picture of the thyristor as a switch in power electronics circuits by description of its static and dynamic characteristics and by reference to the protection measures which are necessary for safe operation.

In chapter two the driving requirements of thyristor are described and a brief description of CA3059 IC used in the driving circuit is provided.

In chapter three some thyristor applications are presented and finally in chapter four the construction procedure of the firing circuit and the heat sink base of the thyristor and triac is described.