SINGLE-PHASE MATRIX CONVERTER FOR RECTIFIER OPERATION CONTROLLED USING PIC

This thesis is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Honors)

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ACKNOWLEDGEMENT

In the name of Allah, Lord of universe, the Merciful and Beneficent with also bless and regard to Nabi Muhammad S.A.W, his Companion and the people who follow his path.

To my truly beloved parents Abd Latib B Hashim and [illegible] supports and understanding towards me. I would like to thank to Allah for giving me a health and strength to conduct the project.

A lot of thank you for my supervisor Puan Siti Zaliha Mohammad Noor because your patience and determination to help me complete this project.

Also goes to everyone that involved directly and indirectly in completing this project, thanks for your love and kindness.

May ALLAH bless all of us, Amin.

Wassalam.

ABSTRACT

Single-phase matrix converter (SPMC) is a device that contains eight stage of switching. For AC to DC converter, only certain stage is use for the process. Each switching stage has IGBT, IGBT driver and other electronic component. Pair of IGBT is called bi-directional switch. 5V DC supply is needed to generate to the SPMC. An AC to DC converter is construct and supplied of 20V(rms) input voltage, 50 Hz, supplying a passive R and RL load operated with modulation index of 30% and 50% and PWM frequency 3kHz and 6kHz. MATLAB 2008 software is use as medium to design and simulate the model of Single Phase Matrix Converter (SPMC). Digital switching and PWM are generate using Peripheral Interface Controller (PIC). The result is demonstrated at the hardware and the result is display at oscilloscope and multimeter. The MATLAB show the behaviour of the matrix converter operations and to program into the PIC is using MPLAB IDE software in C Languange.

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CHAPTER 1

INTRODUCTION

1.1 POWER ELECTRONIC CONVERTER

More than 52 year Malaysia is independent, demand on electricity on the rise. The electrical power supplied to the consumer in constant 50 Hertz frequency and voltage either in single phase or three phases according to consumer demand. They come in AC type. But most of electrical equipment nowadays is supplied in DC. Sensitive equipments are less tolerable to nuisances caused by harmonics penetration into the supply system.

So, something device are needed to change from AC to DC. There is many ways to convert from AC to DC. From the late nineteenth century through the middle of the twentieth century, invention of semiconductor diode has been found. Since then, the simple of bridge rectifier have design.

The old designs of the rectifier have a problem in efficiency and power conversion depend on material in the system. These requirements can be solved by power electronics technology. Power electronic has applications that span the whole field of electrical power systems, with the range of applications extending from a few Watts to MW. The main task of power electronics is to control and change electrical energy from one form to another as power electronic converter.

Converter in power electronic system is a device for conversion of energy. The energy here is refers to the type of waveform in input source that has been used. Power