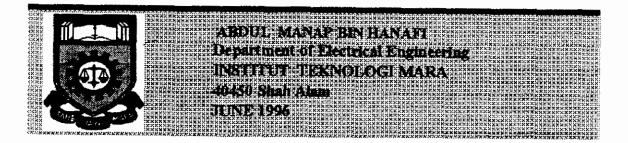
ACTIVE FILTER FOR HARMONIC AND REACTIVE POWER COMPENSATOR

THESIS

Thesis is presented in partial fulfilment for the award of the Advanced Diploma in Electrical Engineering of INSTITUT TEKNOLOGI MARA

> Bahagian Rujuban & Perkhidmatan Pembaca Perpustakaan Tun Abdul Razak Institut Teknologi MARA 40450 Shah Alam Selangor Darul Ehsan.





ABSTRACT

In recent years there has been an increasing concern over the introduction of current harmonics in power supply system owing to the use of non linear loads. Conventional filtering techniques which use passive filters are inflexible because they cannot cope with variation in the filtering requirements as the load and system conditions vary. The development of an active filter that can be connected across a non-linear load, is capable of self-tuning and overcomes the disadvantages of the conventional passive filters, is presented .In this technique, the utility is required to supply only the fundamental component of current required by the load; leading to a harmonic - free system. This current injected active filter was successfully implemented and tested.

ACKNOWLEDGEMENTS

In the name of ALLAH, the Beneficent and the Merciful. It is the deepest sense of gratitude of the Al-Mighty ALLAH who gives strength and ability to complete this project.

I would like to take this opportunity to express my most gratitude and appreciation to my project supervisor Mr.Mohamad Fadzil Saidon and also Mr. Mohd. Zaki Abdullah for their guidance, advise and effort in making the completion of this project possible. Also wish to express my heartiest thanks to lectures, technicians and the laboratory.

Lastly, not least, thanks to all my friends and many other who somehow or other had helped me directly or indirectly in successful of my project.

ACTIVE FILTER FOR HARMONIC AND REACTIVE POWER COMPENSATOR

<u>CONTENTS</u> Abstract		<u>PAGE NO:</u> i
Contents		in
1.0	Introduction	1
	1.1 Effect Of Harmonics	3
	1.1.1 Effect On Transmission Lines	3
	1.1.2 Effect On Metering Devices	4
	1.1.4 Effect On Consumer Equipment	4
	1.2 Posibble Solutions	5
2.0	Proposed System	6
	2.1 Scope Of Work	7
	2.1.1 H-Bridge Circuit	8
	2.1.2 Current Control Loop	8
	2.1.3 Notch Filter	8
	2.2 Theoritical Development	9
3.0	Basic Theory	11
	3.1 H-Bridge	11
	3.2 Current Control Circuit	13
	3.3 Notch Filter	14
	3.3.1 Practical Design Technique	17
	3.3.2 Select The Op- Amp	19
	3.3.3 Slew Rate	20
4.0	Hardware Development	21
	4.1 Power Supply Circuit	21
	4.2 Current Transducer	22
	4.3 H-Bridge Circuit	23
5.0	Circuit Testing	25
	5.1 H-Bridge Circuit Testing	25
	5.2 Current Control Circuit Testing	28
	5.3 Notch Filter Circuit Testing	31
	5.4 The Complete Set Testing	36
6.0	Discussion And Conclusion	39
	References	40
	Appendixes	

CHAPTER 1

1.0 INTRODUCTION:

A d.c load usually fed from a rectifier, will in its voltage have a harmonics contents, the lowest order of which is the pulse number of the rectifier. Harmonics at multiples of the pulse number will also exist. The rectifier will have a higher harmonic content in the load current than when the rectifier is uncontrolled [6],[4].

The harmonic voltage present in the voltage waveforms will inevitably give rise to harmonic current of the same frequency in the load. Although many of the waveforms were drawn with the assumption of level d.c load current, in the practice this assumption of infinite load inductance is not always justified, and harmonics current do exist in the load waveform. The effect of harmonics have on the load must be judged in respect of individual application, but often they merely contribute to increased losses.

The switching action of the rectifier device inevitably results in non sinusoidal current being drawn from the a.c. supply system. In essence, the a.c. supply delivers a sinusoidal voltage with power flow relating only to the fundamental frequency. The load then converts some of this power to higher frequencies, and transmits harmonics power back into the supply system. Hence a rectifier load acts part as a harmonic generator.