

**DEVELOPMENT OF A PC BASED INTERFACE TO  
EXISTING POWER QUALITY MEASUREMENT  
EQUIPMENT**

This report is presented in partial fulfillment for the award of the Bachelor of

Electrical Engineering (Hons)

**UNIVERSITI TEKNOLOGI MARA**



AINOL ADHAN BIN OSMAN  
Faculty of Electrical Engineering  
UNIVERSITI TEKNOLOGI MARA  
40450 Shah Alam  
Selangor Darul Ehsan

## ACKNOWLEDGEMENT

I would like to express my appreciation for the contribution, both knowingly and unknowingly to the development of this project. Special thank to my supervisor Pn. Zuhaina Zakaria and also En. Mustafa Kamal Hamzah who has provided a living laboratory within I could test many sections of this project. Their comment and criticisms have been valuable and are greatly appreciated.

A debt of gratitude is owned to those my family, especially my father and mother for their understanding, support and encouragement in completing this course and project report.

Last, but certainly not least, my special thank to all my friends, lecturers, staff of Power Quality Research Laboratory, Faculty of Electrical Engineering, Universiti Teknologi MARA for their support and providing access requirement materials for the completion of this project report. They have by known become well accustomed to my endless writing report.

Ainol Adhan Bin Osman  
Faculty of Electrical Engineering  
Universiti Teknologi MARA (UiTM)  
Shah Alam.  
April 28, 2001

## **ABSTRACT**

Power quality issues have become more important due to increased use of electronics and non-linear loads from equipment in the home to control of huge and costly industrial processes. Power quality measurement equipment is used to enable the power engineers have a better understanding on the power quality events and their effect on consumers. One of such equipment in use is the Series 901 Dranetz Power Harmonic Analyzer.

However, this equipment could only display the measured data in the printed form. This report describes the development of PC based software used to interface with the existing equipment. A graphical user interface was also developed that allows better logging and visualization. However, the thorough analysis of power quality will not be covered in this project but another student member will perform them in a different project. The harmonic related project is proposed in view of the frequent power supply disturbance occurring Faculty of Electrical Engineering, UiTM. This project classified under the category of measurement using software development.

# TABLE OF CONTENTS

<b>CHAPTER</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
<b>1</b>	<b>INTRODUCTION</b>	
	1.0 Electrical Power Quality	1
	1.1 Project Overview	3
<b>2</b>	<b>HARMONICS</b>	
	2.0 Harmonics	5
	2.1 Source of Harmonics	8
	2.2 Effect of Harmonics	9
	2.2.1 Communication Interference	9
	2.2.2 Heating	10
	2.2.3 Effect of Protection Relay	11
	2.2.4 Effect on Consumer Equipment	11
<b>3</b>	<b>DRANETZ 901 POWER SERIES ANALYZER</b>	
	3.0 Harmonic Measurement Using Dranetz 901 Power Series Analyzer.	12

# **CHAPTER 1**

## **INTRODUCTION**

### **1.0 ELECTRICAL POWER QUALITY.**

Electric power quality is an aspect of power engineering that has been with us since the inception of power system. The trend in modern power engineering have been to extract the most from the existing installed system, and this too has placed stress on issues of sinusoidal waveform fidelity, absence of high and low voltage conditions, and other AC waveform distortion.

Electric power quality stand for the response involves the waveform of current and voltage in ac system, the presence of harmonic signals in bus voltages and load currents, the presence of spikes and momentary low voltages, and other issues of distortion. Perhaps the best definition of power quality is the provision of voltage and system design so that the use of electric power can utilize electric energy from the distribution system successfully, without interference or interruption. A broad definition of power quality borders on system reliability, dielectric selection in equipment and conductors, long-term outage, voltage unbalance in three phase systems, power electronic and their interface with the electric power supply, and many other areas.