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HARMONIC INVESTIGATION OF ELECTRONIC BALLAST AND OTHER COMMONLY USED ELECTRICAL EQUIPMENT

This thesis is presented in partial fulfillment for the award of the
Bachelor in Electrical Engineering (Hons) of
INSTITUT TEKNOLOGI MARA



ZULKIFLE BIN OMAR
Faculty of Electrical Engineering
Institut Teknologi MARA
40450 Shah Alam, Malaysia
APRIL 1998

ACKNOWLEDGEMENT

In the name of Allah SWT, The Most gracious who has given me the strength and ability to complete this project and report.

My deepest gratitude and appreciation to my supervisor, Tuan Haji Mohd Khayat Idris. His continuous guidance and invaluable advice has helped me tremendously in completing this project. Apart from being actively involved in the project he was also a continuous source of constant inspiration throughout the completion of this project. My gratitude also goes to En. Zaki Abdullah, En. Ishak Ismail and En. Ngah Ramzi Hamzah for their guidance and willingness in sharing knowledge towards the accomplishment of this project.

Also thanks to my family for their support and my classmates, friends and technicians for their suggestions and contribution to this project. May Allah guide your every step.

Zulkifle Bin Omar

MARA Institute of Technology

Shah Alam

SELANGOR DARUL EHSAN

ABSTRACT

A harmonic can be defined as a sinusoidal of a periodic wave or quantity having a frequency that is an integral of the fundamental frequency.

Harmonics generation can lead to serious power quality problem if it is not reduced to acceptable level. Electronic components content of modern electrical loads contribute to serious harmonics injection to the main supply line. Recent energy audit suggested using electronic ballast in fluorescent light fitting.

The objective of this project is to make comparison how serious is the harmonics due to electronic ballast with other commonly used equipments. The test was done using five different brand of electronic ballast and five different type of electrical equipment such as printer, computer brand A, computer brand B, video player and television. The result obtained indicated most equipment's generating high harmonic contents.

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CHAPTER 1

1.0 INTRODUCTION

Any device with nonlinear characteristics, which derive their input power from a sinusoidal electrical system, may be responsible for injecting harmonic currents and voltages into the electrical system [1].

In ideal power system, the voltage supplied to customer equipment and the resulting load current are perfect sine wave. In practice, however, conditions are never ideal, so these waveforms are often quite distorted [1,7].

The term harmonics originated from the field of acoustics. Where it refers to the vibration of a string or column of air at a frequency that is the multiple of the basic frequency. Similarly for electric signal it is defined as a sinusoidal component of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency [2].

Thus on a 50 Hz power system a harmonic wave is a sinusoidal having a frequency expressed by:

$$F_{\text{harmonic}} = n \times 50 \text{ Hz.}$$

Where n is integer.