CHAPTER 1

INTRODUCTION

1.1 Project Background

The term ‘power quality’ has become more and more popular in the power industry since the late 1980s, and now both electric utilities and end users of electrical power are beginning to take power quality into account. This is due to the fact that equipment used nowadays is more sensitive to voltage variations and failure to operate can cause massive losses, financially and time. There have been many debates between both utilities and customers on whether which party is the source of the problem but in reality, both sides have a fair share of blame. Nevertheless, power quality disturbances affect the customer side more and this has spurred massive concern thought out the world.

1.2 Objective

The objectives for this project are stated below:

i. To obtain power quality indices and check against International Standard.

ii. To study general causes and effect of power quality problems.

iii. To discuss measurement issues.
iv. To develop GUI using Visual Basic software.

1.3 Scope of the Project

Data has been collected at Substation Board in FKEE lab by using power quality analyzer. The harmonic data that we get will be transferred to the computer by using Flukeview software. After that, harmonic voltage and current has been compared against International Standard which focused on AS 61000.3.6 and IEEE Std 519-1992. Finally, all the comparison data will be display in Visual Basic 2005, (Microsoft Web Developer).

1.4 Literature Review

Another power quality analysis was done by Lee K.J Gordon in Western Power Network which all the data is provided by Western Powers. It’s done in some residential, commercial and industrial areas within the Western Power network were monitored. Disturbances like transients, short duration voltage variations (sags and swells), voltage unbalance and harmonics were monitored. The normal rms voltage and current trends were also investigated. It consisted of data from residential, commercial and industrial areas in between 1999 to 2004. These data was recorded through a data logger placed in these particular sites in order to record the normal trend and also variations in power within that particular area. From the equipment, the data was exported into particular demo software whereby the normal trend and disturbances can be viewed in the form of waveforms. From there, measurements were conducted through the cursors and importance readings were obtained. [1]

Most sites were monitored for about a week although there were some which exceeded to a month. It must be noted that not all sites were being monitored for all
types of disturbances. Some sites were monitored for normal voltage and current trends only, whereas others may be monitored for all types of disturbances. The measuring equipment can be configured to monitor the particular trend or disturbances as required. The parameters being monitored depends on the objectives of monitoring the particular area. Most analytical works were conducted through the help of the software. Some of the plots that could be obtained from the software were the rms sag disturbance, rms swell disturbance, impulse disturbance, wave shape disturbance, snapshot waveform, rms strip chart, and harmonic trend. So, three sites were analyzed in term of the harmonic component and the total harmonic distortion. In this section, two residential areas, five commercial areas and 5 industrial areas will be looked into. It must be noted that not all the five commercial and industrial areas covered here are similar to that in the previous section. However, the residential areas remain the same. This is because not all sites are being monitored for all disturbances, and some sites from the previous section do not have harmonic readings. Therefore, additional commercial and industrial sites were monitored for harmonics. [1]

Harmonics for residential areas were checked against AS 61000.3.2 (Class A) for the harmonic currents only as there were no harmonic voltage limits present. Furthermore, this standard does not have any total harmonic distortion limit. Therefore, the IEEE 519 Std. was used to cross check all the total harmonic distortion for residential areas. As for commercial and industrial areas, the current was checked against IEEE 519.Std. as well whereas the voltage was monitored with AS 61000.3.6.Comparison was conducted on odd and even harmonic current and harmonic voltage components. [1]