DEVELOPMENT OF AN INTERFACE CARD FOR THE USE OF A PERSONAL COMPUTER AS A STORAGE OSCILOSCOPE

BY: VASOS VASSILIOU

Project report submitted to the
Department of Electrical Engineering of the
Higher Technical Institute
Nicosia - Cyprus
in partial fulfilment of the requirements
for the diploma of

TECHNICIAN ENGINEER IN ELECTRICAL ENGINEERING

Project supervisor: Mr S. Hadjioannou

External Assessor: Mr A. Falas

JUNE 1993



STORAGE OSCILLOSCOPE SYSTEM USING THE IBM - PC

by VASOS VASSILIOU

SUMMARY

This project is intended to contribute in the expansion of the manipulations of digitally sampled analog signals. The user is qoing to utilize the analog to digitall converter and the computer interface of a card developed for this project.

A great part of the documents is about hardware. There is a chapter talking about computers, another one about Analog to Digital Conversion and a chapter about interfacing with computers.

The Basic logic behind it is to develop appropriate software to use the system as storage oscilloscope.

What the objective means is that there is to be a demonstration about how an IBM - PC can process and present analog data that is sampled and converted into digital format. The presentation of the signal will be through the screen of the computer.

The processing is made by a program developed in Turbo Pascal Ver6.0 a very powerful language which provides a User Friendly environment, With Pull down menus and color choosing having also mouse support. Chapter 4 explains some important procedures of the program.

CONTENTS

ACKNOWLEDGEMENTS		
SUMMARY		
INTRODUCTION		7
CHAPTER 1:		
IBM - PC		
COMPUTERS GENERALLY		2
COMPUTER'S INTERNAL STRUCTURE		5
Central processing unit (CPU)		5
Memory		6
Input & Output Devices		7
IBM - PC Expansion Slots		8
I/O Channel Signal Description		9
CHAPTER 2:		
INTERFACING		13
INTEL 8255 PPI	13	
Block Diagram Of the 8255		13
8255 MODES OF OPERATION		15
Mode 0		15
Mode 1		15
Mode 2		15
ADRESSING 8255		17

CHAPTER 3

SAMPLING	20
THE SAMPLING THEOREM	20
ALIASING	21
ANALOG TO DIGITAL CONVERSION	22
A/D CONVERTERS	22
Dual Slope	22
Counter Type	24
Successive Approximation	25
Parallel or Flash	27
ADC's Errors	28
Conversion time	29
THE ZN439 ADC	
REFERENCE VOLTAGE	31
CLOCK FREQUENCY	31
INPUT STAGE	32
CHAPTER 4:	
THE SOFTWARE	35
THE DEMANDS FROM THE SOFTWARE	35
TURBO PASCAL LANGUAGE	35
Object oriented programming	36
Turbo Vision	36
Inline Assembler	36
PROCEDURE SAMPLE	37
PROCESSING OF THE SAMPLES 38	
Opening, Saving and deleting	•
sample files	38

CHAPTER 5:

USER'S GUIDE	42
STORAGE OSCILLOSCOPE SYSTEM	
REQUIREMENTS	42
INSTALLATION	42
GETTING STARTED	43
USING THE MENUS	43
GETTING SAMPLES	44
PLOTTING ON THE SCREEN	45
COMMENTS AND CONCLUSIONS	48
REFERENCES	
COMPONENTS DATA SHEETS	
SOUND CARD	
SOFTWARE LISTING	