Development of a Computer Based Digital Oscilloscope Interface system

Project report submitted by :

Psaroudes Pericles

In part satisfaction of the conditions for the award
of Diploma of Technical Engineer
in Electrical Engineering of the
Higher Technical Institute

NICOSIA , CYPRUS

1994

HIGHER TECHNICAL INSTITUTE
PROJECT NO
2291

SUMMARY

The purpose of this project is to demonstrate the possibility of interfacing a computer system with a digital oscilloscope and provides a reliable software for this interfacing which will be easy to handle from any person with a little experience in any professional software.

The first chapter of this project gives a small description of the interface card I.E.E.E 488.1 , it's operation and the installation of the card . The second chapter describes the facilities of the H.P 54501A oscilloscope and the way the interfacing to the computer is achieved. In chapter three a comparison between the abilities offered by this software and the abilities of the computer is given writing done also any problems that were detected and overcomed. The third chapter gives a brief description on the programming with the aid of block diagrams. Chapter four is the User's manual chapter which describes how the software can be handled from any user.

The equipment used for this interfacing are as follows :

(a) Personal Computer

(b) Interfacing Card I.E.E.E 488.1

(c) H.P 54501A Digitizing oscilloscope

(d) Printer

(e) The wires needed

CONTENTS

	Summary	
	Introduction	
	Chapter1	
1.1	**General**	1
1.2	**Bus Tutorial**	1
1.2.1	Bus Description	1
1.2.2	Bus Structure and connector pin assignment	2
1.2.3	Managment lines	3
1.2.4	Handshake lines	4
1.2.5	Other bus lines	5
1.3	**Theory of operation**	6
1.4	**Installing the interface card**	7
1.4.1	I/O Base address and wait states	7
1.4.2	Firmware adress setting	9
1.4.3	Operating mode setting	10
1.4.4	DMA level setting	10
1.4.5	Interrupt level (IRQ) setting	11
	Chapter 2	
2.1	**Introduction to HP54501A**	13
2.2	**How does it operates**	13
2.2.1	Vertical Channels	13
2.2.2	Converting to digital	13
2.2.3	Converting to digital (continue)	17
2.2.4	The processor and CRT	17
2.3	**Comparing the software with digiting scopes**	18
2.3.1	Advantages of the software	18
2.3.2	Disadvantages of the software	19
2.3.3	Differences between scope and software	20

	Chapter 3	
3	**The software**	22
3.1	The objectives	22
3.2	**Programming Language**	23
3.3	**Brif explanation of the program**	23
3.3.1	Main program	23
3.3.2	"Channel setup" subsystem	24
3.3.3	"Vertical setup" subsystem	26
3.3.4	"Timebase setup" subsystem	27
3.3.5	"Triggering mode" subsystem	29
3.3.6	"Measurements " subsystem	34
3.3.7	"Save" subsystem	36
3.3.8	"Retrieve" subsystem	36
3.3.9	"Print subsystem	37
3.3.10	The "Myutils" unit	38
3.3.11	The "TBPGPIB.INC" file	39
3.3.11.1	Routines used from "TBPGPIB.INC" file	39
	Chapter 4	
4.1	**Installing and running**	43
4.2.1	Set "Channel setup"	43
4.2.2	Set "Vertical setup"	44
4.2.3	Set "Timebase"	45
4.2.4	Set "Triggering Mode"	46
4.2.5	Using the "Measure" subsystem	47
4.2.6	Save data to file	47
4.2.7	Retrieve data from a file	48
4.2.8	Print a waveform	48
4.2.9	Exit from the program	48
	Conclusions	48
	Appendix (The software)	49