# **PROJECT REPORT**

Project Submitted by KOURMOUZOS KYRIACOS

### CONTROL OF A HOUSEHOLD PUMPING SYSTEM USING PROGRAMMABLE LOGIC CONTROLLERS

In part Satisfaction of the award of Diploma of Technician engineer in Electrical engineering of the HIGHER TECHNICAL INSTITUTE CYPRUS

**Project Supervisor: Mr E. Michael** 

Lecturer in Electrical Engineering, H.T.I.

**Type of Project: Individual** 

JUNE 1993

INSTITUTE 2.158

#### ACKNOWLEDGEMENTS

I would like to express my appreciation to my project supervisor Mr E. Michael and to Mr J. Pampouris, laboratory assistant for their valuable contribution and guidance during the preparation of this project.

I also want to thank Mr Pambos Stavrinides for his information about the costing of the practical application.

Kourmouzos Kyriakos 3rd year student in Electrical Engineering H.T.I

#### SUMMARY

**<u>TITLE:</u>** "Sequence control using Programmable Controllers" **AUTHOR:** Kourmouzos D. Kyriacos

The report investigates the programming capabilities of a "ladder language". It also examines the characteristics and capabilities of Programmable Controllers. Then an application programme using the Programmable Controller for a sequence control process is developed. Finally, the program analysis, costing and comparison with conventional methods are given.

The application program is based on the Allen-Bradley SLC 500 Programmable Controller's instruction techniques and the PLC of the H.T.I.

## CONTENTS

	PAGES
Acknowledgements	I
Summary	II
Indroduction	1
CHAPTER 1: Indroduction to PLC	3
1.0 Indroduction	4
1.1 Definition	4
1.2 Advantages of Programmable Controller	5
1.3 Disadvantages	7
1.4 Historical Development	8
CHAPTER 2: Programmable Development System descripti	lon
2.0 Indroduction	11
2.1 Major section of a Programmable Controller	11
2.2 The Central Processing Unit (CPU)	12
2.3 The processor	14
2.4 Input/Output modules	17
2.5 Power Supplies	22
2.6 PC programming Devices	26
2.7 Programm Recording Devices - Tape or Disk	27
2.8 Printers	29
CHAPTER 3: PLC Languages	
3.0 Indroduction	31
3.1 PC languages	31
3.2 Programming instructions	34
3.3 Program files	34
3.4 Data files	35
3.5 Bit Addressing	36

3.5 Bit Addressing

CHAPTER 4: Basic functions of PLC	
4.0 Introduction	38
4.1 Relay logic (Bit) instructions	38
4.2 Timer and Counter instructions	41
4.3 Comparison instructions	44
4.4 Compute and Math instructions	45
4.5 Move and Logical instructions	46
4.6 File Copy and File Fill instructions	46
4.7 Bit Shift instructions	46
4.8 Sequencer instructions	46
4.9 Control instructions	47
CHAPTER 5: Application case study	
5.0 Introduction	48
5.1 Program planning steps	48
5.2 Explanation of the PLC program	67
5.3 Convertional method to control a system	74
CHAPTER 6: Costing	
6.0 Introduction	76
6.1 Cost analysis	76
6.2 Selection of the CPU user memory	77
6.3 Costing estimation of the PLC system used	78
6.4 Comparison with the conventional methods costs	79
CONCLUSIONS	81
REFERENCES	83
APPENDICES:	
APPENDIX 1: Configuring and programing the PLC	84
APPENDIX 2: SLC 500 specifications	94