HIGHER TECHNICAL INSTITUTE ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DEVELOPMENT OF AN AERIAL POLAR DIAGRAM PLOTTER By

MARIOS IOANNIDES (E/1013) JUNE 1966

DEVELOPMENT OF AN AERIAL POLAR DIAGRAM PLOTTER

BY: MARIOS IOANNIDES

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

IN
ELECTRICAL ENGINEERING

June 1996



CONTENTS

			PAGE
ACKNOWLEDGEM	ENTS		5
SUMMARY			6
CHAPTER 1.	INTRODUCTION		
	1.1	Similar systems	7
CHAPTER 2.	THE I	DEA FOR THIS PROJECT	
		Experiments block diagram	9
		Experiments equipment	9
		Experiments theory	10
		Points for improvement	10
			10
CHAPTER 3.	GENER	AL VIEW OF THE PROJECT	
7.17		Block diagram	12
		Equipment used	13
CHAPTER 4.	AERIA	LS	
	4.1	Antennas properties	14
	4.2	Antennas types	17
		The Yagi antenna	17
CHAPTER 5.	THE ROTATING SYSTEM		
	5.1	Why is it needed	19
	5.2	Analogue motors	1.9
	5.3	Position measuring system	20
	5.3.1		20

			PAGE
	5.3.2	Transducer	20
	5.3.3	Signal conditioner	20
	5.3.4	Recorder or Display	21
	5.4	Stepper motors	21
	5.4.1	Stepper motors control	21
	5.4.2	Advantages and Disadvantages	22
		of steppers	
	5.4.3	Applications of stepper motors	24
	5.5	Selection of motor	25
	5.6.1	The system used	25
	5.6.2	Block diagram	25
	5.6.3	Stepper motor driver	25
	5.6.4	Rotating system	28
		connection & control	
			-3
			ż
CHAPTER 6.	IMPEDANC	ES MATCHING	
	6.1 Blo	ck diagram	31
	6.2 Cal	culations	31
\$ 2			
CHAPTER 7.	INTERFACING		
	7.1 Int	roduction	33
	7.2 PCL	-711 card	33
	7.3 Pro	duct specifications	34
	7.4 Sof	tware	36
CHAPTER 8.	PROGRAMMING		
	8.1	Introduction	40
	8.1.1	Pascal block diagram (A)	43
	8.1.2	Pascal block diagram (B)	43
CHAPTER 9.	CONCLUSI	ONS-SUGGESTIONS FOR IMPROVEMENT	51

APPENDICES

APPENDIX	A:	AEREAL POLAR DIAGRAM PLOTTERS	54
APPENDIX	B:	THE EXPERIMENT	64
APPENDIX	C:	ENCODERS	72
APPENDIX	D:	STEPPER MOTORS & STEPPER MOTOR CONTROLLERS	82
APPENDIX	E:	AERIALS	114
APPENDIX	F:	INTERFACING & A/D CONVERSION	118
APPENDIX	G:	THE GRAPH UNIT (PASCAL)	140
REFERENCE	S		145

ACKNOWLEDGEMENTS

I would like to thank my Supervisor Mr. D. Lambrianides for his guidance, advices and help.

I also like to thank Mr S. Spyrou and Mr. Ch. Theopemptou for their guidance.

Many thanks also to my family for their help and support.

Marios Ioannides

SUMMARY

Academic Year 1995/96 Project Number, E.1013

Title:

DEVELOPMENT OF AN AERIAL POLAR DIAGRAM PLOTTER

Objectives:

- To study the various types of (a) Aerials and (b) Aerial Polar Diagram Plotters
- To select, design, develop, construct test and calibrate an Aerial Polar Diagram Plotter
- 3. To use the Aerial Polar Diagram Plotter as a demonstration unit

Terms and Conditions:

- 1. The following items are provided
 - (a) Motor (Analogue and Stepping)
 - (b) Several types of Aerials
 - (c) Computer (PC type)

Student

Marios Ioannides, 3EL1

Supervisor

: Mr Diomides Lambrianides