# DEVELOPMENT AND SIMULATION OF SOLID STATE CONTROLLER FOR SINGLE PHASE GENERATOR

Thesis is presented to fulfil the requirement of Advance Diploma In Electrical Engineering of MARA Institute of Technology

MD. FARIL BIN ISMAIL

NOV, 1994

Department of Electrical Engineering
School of Engineering
MARA Institute of Technology
40450 Shah Alam
Selangor
MALAYSIA

#### **ACKNOWLEDGEMENT**

All praise be to Allah, the Beneficent, the Merciful. Thee do we worship and Thee do we beseech help. Our ever-lasting thank to Allah for granting us patience in completing this project.

Great effort has been put in ensuring the success of this project and as such I would like to extend my sincerest expression to my project supervisor Mr. Mohd Zaki bin Abdullah whose patience, inspiration, ideas, suggestion and constant guidance has helped me to successfully completed the project and produced report. Lastly, I would like to thank En Halim Bin Minar and his staff in the Mechanical Department, lectures and friends for their suggestion and helpful to modify the manual generator to perform as an automatic standby generator.

#### **PREFACE**

The purpose of this project is to carry out a study on developing a controller system that will improve the starting system of a Single Phase Standby Generator. The objective of designing the fully automatic control system is expected to enhance the usage and application of the Standby Generator in household and industrial application. The same controller can also be use to incoporate with other type of generator.

This report is put forward to provide information on the study that has been carried out. It includes the description on the setup and functions of the control unit, results of digital simulation and the achievement that has been developed on the mechanical part. It is hoped that the information will help in further development process.

# TABLE OF CONTENTS

			Page
DEDICATIO	N		, <b>i</b>
APPROVAL	,		ii
ACKNOWL	iii		
PREFACE			iv
CHAPTER	1		
INTRODUC	TION		
	1.1	Introduction	1
	1.2	Objective	2
CHAPTER	2	•	
CIRCUIT DI	EVELO	PMENT	
	2.1	Introduction	4
	2.2	Operating Condition	6
,*	2.3	Sequence Of Operation	13
CHAPTER	3		
CIRCUIT SII	MULA	TION	
	3.1	Introduction	19
	3.2	Introduction To Pspice	19
	3.3	Simulation 1	20
	3.4	Simulation 2	24
	3.5	Simulation 3	26
	3.6	Simulation 4	29
	3.7	Simulation 5	30
	3 8	Simulation 6	32

### CHAPTER

HARDWARI	E DESI	GN AND DEVELOPMENT	
	4.1	Introduction	35
261	4.2	Electrical System	36
•	4.3	Starting System	38
	4.4	Change Over Supply	38
	4.5	Cranking Process	39
	4.6	Mechanical Setup	42
		4.6.1 Belt Drive System	42
CHAPTER 5			
DISCUSSIO	N AND	CONCLUSION	
	5.1	Discussion	45
	5.2	Conclusion	47
BIBLIOGRA	PHY		

# **APPENDIXES**