## DEVELOPMENT OF A SCARING OFF SYSTEM FOR A CAR

Project Report Submitted by:

## **GEORGHIOS PAMBORIS**

In partial fulfilment of the requirements for the award of the diploma of Technician Engineer in Electrical Engineering of the Higher Technical Institute Cyprus.

Project Supervisor: G. KOURTELLIS

Lecturer in Electrical engineering

H.T.I.

External Assessor: Andreas Elia

Type of project: Individual \

Group

Project Number: E/874

June 1993



## INTRODUCTION

The development of a scaring off system in combination with an existing car intruder/theft alarm was expected after the completion of the project.

The project was divided into four chapters in order to obtain a spherical approach for better understanding.

In the first chapter the physiological effects of electric current passing through the human body were studied and the corresponding conclusions were obtained. It must be noted that the IEC 479 publication was consulted.

The second chapter of the project dealt with the measurement of the capacitance of a typical car. Additionally the measurement of the capacitance was examined to observe whether it was within safe limits.

In the third part the electric shock method was investigated in order to induce a safe electric current on the car body. Furthermore laboratory work was performed at a frequency of 5000  $\rm H_z$ , to select a corresponding voltage that would give a safe electric current.

Finally in the last part the most appropriate circuit was designed, constructed and tested in order to be connected on an existing alarm system of a car.

## CONTENTS

		Page
CHAPTE	R 1	
PHYSIO	LOGICAL EFFECTS OF ELECTRIC CURRENT	
1.1	Introduction	
1.2	Electrical Impedance Of The Human Body	1
1.3	Effects Of Direct Current	9
1.4	Effects Of AC In The Range Of 15Hz to 100Hz	14
1.5	Effects Of AC With Frequencies Above 100Hz	21
1.6	Effects Of Special Waveforms Of Currents	26
1.7	Electric Shock Hazard	36
CHAPTE	R 2	
MEASUR	EMENT OF THE CAPACITANCE OF A TYPICAL CAR	
2.1	General	40
2.2	Capacitance Values	40
2.3	Effect Of Capacitance To Livestock Safety	41
CHAPTE	R 3	
INVEST	GATION OF THE ELECTRIC SHOCK METHOD	
TO SCA	RE OFF A POSSIBLE INTRUDER/THIEF	
3.1	General	43
3.2	Hold On Current	44
3.3	Ventricular Fibrillation	45
3.4	Limitations Of Experimental Results	46
3.5	Body Resistance	47
3.6	Limits Of Safety	47
3.7	The Heart As A Control System	48
3.8	Effects Of Frequency	50
3.9	Respiratory Arrest	50
3.10	Experience Of Artificial Respiration	51
3.11	Importance Of Artificial Respiration	52
3.12		
	A Safe Electric Shock	53

	Page
CHAPTER 4	
TO DESIGN, CONSTRUCT AND TEST THE MOST	
APPROPRIATE CIRCUIT	
4.1 Introduction	56
4.2 High Voltage Generator	57
4.3 Driving Circuit	63
4.4 Logic Circuit	65
4.5 Testing	70
REFERENCES	72
APPENDICES	73