



**HIGHER TECHNICAL INSTITUTE**

**ELECTRICAL ENGINEERING COURSE**

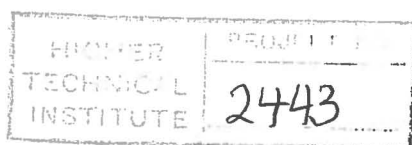
**DIPLOMA PROJECT**

**DEVELOPMENT OF ELECTRONIC  
INDICATION CIRCUITS  
FOR AUTOMOBILES**

**E/964**

**GEORGE PAPHITIS**

**JUNE 1995**



**DEVELOPMENT OF ELECTRONIC INDICATION CIRCUITS FOR CARS**

Project Number: E/964

Designed and Constructed by: GEORGE PAPHITIS

Supervised by: Mr. C. Theopemtou

Project report submitted in partial fulfillment of the requirements for the award of the Diploma of Technician Engineer in Electrical Engineering of the Higher Technical Institute.

JUNE 1995

## ACKNOWLEDGEMENTS

I feel privileged to have had Mr Charalambos Theopemptou as my project supervisor and I wish to take this opportunity to express my sincere and deep thanks for taking my project proposal and for his valuable assistance and guidance.

I would also like to thank Mr Pouroutos, my electronic components supplier, for his assistance and help in the accomplishment of my ideas. Additionally I would like to say that I feel indebted to all those people that I met at his shop, for the assistance they gave me from their background in electronic construction techniques.

I would like to thank my parents for their patience, understanding and the guidance they have shown throughout my studies.

Finally I must thank Mr Pitsillides Demetris for his assistance and advice in the typing of this project.

GEORGE PAPHITIS

JUNE 1995

## TABLE OF CONTENTS

	Page
Summary . . . . .	1
Introduction . . . . .	2

### UNIT 1: CONSTRUCTION

#### **CHAPTER 1: CAR BATTERY MONITOR**

1.0 Introduction . . . . .	5
1.1 Lead Acid Battery . . . . .	5
1.2 Design . . . . .	6
1.3 Circuit diagram description . . . . .	6
1.4 Extra facilities, Adjustment and Construction . . . . .	9

#### **CHAPTER 2: RADIATOR HIGH TEMPERATURE INDICATOR**

2.0 Introduction . . . . .	11
2.1 555 Oscillator . . . . .	12
2.2 Sensor Switch . . . . .	13
2.3 Circuit description . . . . .	13
2.4 Construction and Adjustment . . . . .	15

#### **CHAPTER 3: INTERNAL LIGHT DELAY**

3.0 Introduction . . . . .	17
3.1 555 Timer . . . . .	17
3.2 Circuit description . . . . .	18
3.3 Construction . . . . .	20

#### **CHAPTER 4: PROGRAMMABLE ANTI-THEFT DIGITAL SYSTEM**

4.0 Introduction . . . . .	22
4.1 Devices and Technics Used . . . . .	22
4.2 Design . . . . .	23
4.3 Circuit description . . . . .	24
4.4 Construction . . . . .	24
4.5 Improvements . . . . .	26

#### **CHAPTER 5: SEAT-BELT INDICATION SIGNAL**

5.0 Introduction . . . . .	28
----------------------------	----

5.1	Circuit description . . . . .	28
5.2	Improvements and Installation . . . . .	29

**CHAPTER 6: RADIATOR FAN START INDICATOR**

6.0	Introduction . . . . .	31
6.1	Circuit description . . . . .	31

**CHAPTER 7: SPARKS INDICATORS**

7.0	Introduction . . . . .	33
7.1	Design . . . . .	33
7.2	Circuit description . . . . .	33
7.3	Improvements . . . . .	35

**CHAPTER 8: POWER SUPPLY**

8.0	Introduction . . . . .	37
8.1	Circuit description . . . . .	37

**UNIT 2 RESEARCH**

Introduction . . . . .	40
------------------------	----

**CHAPTER 1 MICROCONTROLLED FUEL INJECTION AND IGNITION SYSTEMS**

1.0	Introduction . . . . .	42
1.1	Sensors . . . . .	42
1.2	Actuators . . . . .	44
1.3	Actions of the system under various operating conditions . . . . .	46
1.4	Systems use in fault-finding test and maintenance	47
1.5	Connection to the overall engine management system	48

<b>CHAPTER 2: TACHOGRAPHOS . . . . .</b>	<b>51</b>
--	-----------

<b>CHAPTER 3: ELECTRONICS USED IN CARS FOR CONVENIENCE AND SAFETY . . . . .</b>	<b>54</b>
---	-----------

<b>CHAPTER 4: ELECTRONIC CONTROL OF AUTOMOBILE SUSPENSION . . . . .</b>	<b>57</b>
---	-----------

<b>CHAPTER 5: NEWLY INTRODUCED IDEAS . . . . .</b>	<b>61</b>
Conclusions . . . . .	63
References . . . . .	64

**APPENDICES**

Appendix 1:	Printed Circuits
Appendix 2:	Values of components used
Appendix 3:	Data sheets
Appendix 4:	Modern systems data
	MERCEDES
	GOLF
	BMW
	CITROEN
	NISSAN
	TACHOGRAPH
	GENERAL

## SUMMARY

### **DEVELOPMENT OF ELECTRONIC INDICATION CIRCUITS FOR CARS BY: PAPHITIS GEORGE**

The objective of this project was to construct some electronic circuits which would provide the driver of a car with very vital information about the car status. In addition some other circuits were constructed which will help in the safe and normal operation of cars. Furthermore, an investigation was made of how electronics are incorporated in modern cars.

As a beginning some small circuits were constructed based on basic electronic principles but being very helpful in the correct operation of a car. Also a decoder circuit was constructed which acts as an anti-theft system to the car.

The second part of the project is a research in to the Cyprus market about the use of electronics in modern cars.

The results were really fascinating since it was discovered that all newly introduced models where using microprocessors to control the basic engine operations. The most interesting part is the accuracy and speed with which these microcontrollers operate and the harmony with which they are interfaced with car systems.



## INTRODUCTION

It is a primary necessity for a modern car to be microprocessor controlled or electronically controlled to guarantee an effective performance, as required by international standards.

In the first part of the present study general methods and basic electronic techniques were used to help in the correct use and operation of a car. Some simple integrated circuits, such as the 555 timer IC, were used as eye catching techniques to facilitate the driver in proper operation of his vehicle. In addition to that, basic digital IC comparators were used to construct a programmable anti-theft system which can be widely used by any vehicle. All the circuits were fed from a common power supply constructed for them so as to offer them better projection and to avoid any interference to the car electrics.

All the circuits are constructed from basic electronic principles but they can be very useful in saving the engine from vital damages and also passengers from injuries.

In the second part of the project a detailed research into the Cypriot market was made by visits to car dealers and also people who were involved in the car electronic industry. A lot of useful material was gathered concerning modern cars and how they incorporated electronic principles. The main procedure that all new models follow was to use micro-controllers to monitor their ignition and injection systems. Furthermore, some other electronic ideas were incorporated, but this was done mainly on expensive luxury models.

As a reader progresses through the pages of this project he or she can find useful information about new car technological advantages and new ideas which could be used in cars.