

6

**A STUDY OF BUILDING ENERGY  
MANAGEMENT SYSTEMS**

Project Report Submitted by:

**EVRIPIDOU CHRISTAKIS**

In part satisfaction of the award of  
Diploma of Technician Engineer  
in the field of Mechanical Engineering  
of the Higher Technical Institute  
Nicosia, Cyprus

Project Supervisor : Dr. P. Elephtheriou  
Lecturer in Mechanical  
Engineering, H.T.I

Type of Project : Individual

**JUNE 1991**

APPROVED	PROJECT NO
TECHNICAL	1875
APPROVAL	

## ABSTRACT

This project work is dealt particularly on the Building Energy Management Systems (BEMS). It consists of five chapters. Chapter 1 answers to the question "What is BEAMS?" giving a clear definition about it, and describes the types of BEMS. Chapter 2 refers to the available Energy Management Systems in the local market and in general. Chapter 3 describes the functions of these systems giving details for each function. This chapter actually describes how these systems work. Chapter 4 consists of a case study about Golden Bay Hotel which employs a Building Energy Management system. Finally chapter 5 which refers to the advantages of BEMS based on economical terms.

The conclusions drawn from this project work are that by the efficient use of BEMS by special trained personnel, considerable energy savings can be made causing a consequent reduction in country's energy bill.

# CONTENTS

Page

INTRODUCTION.....	1	
CHAPTER 1 - WHAT IS BEMS?		
1.1    Definition.....	3	
1.2    Types of BEMS.....	4	
1.2.1    Dedicated.....	4	
1.2.2    Comprehensive.....	4	
CHAPTER 2 - AVAILABLE ENERGY MANAGEMENT SYSTEMS.....		9
CHAPTER 3 - FUNCTIONS OF BEMS		
3.1    Feature Programming.....	12	
3.1.1    To Program Keyboard Access Code....	12	
3.1.2    To Lock/Unlock Keyboard.....	13	
3.1.3    To Review Input/Output Status.....	13	
3.1.4    To Program Current Date, Day of Week and Time of Day.....	14	
3.1.5    To Program Configuration.....	14	
3.1.5.1    Clock Format.....	15	
3.1.5.2    Temperature.....	15	
3.1.5.3    Relay Logic.....	15	
3.1.5.4    Maintained or Momentary Relay.....	16	
3.1.5.5    Momentary Duration.....	16	
3.1.5.6    Stagger Up.....	16	
3.1.5.7    Duty Cycle Stagger Duration.....	17	
3.1.5.8    Input Assignment.....	17	

3.1.5.9	External Override Duration.....	17
3.1.5.10	Override Input to Output Assignments.....	18
3.1.5.11	Minimum ON Time.....	18
3.1.5.12	Minimum OFF Time.....	19
3.1.5.13	Maximum ON Time.....	19
3.1.5.14	Maximum OFF Time.....	19
3.1.6	To Program Holidays.....	19
3.1.7	To Program Astro Dial Feature.....	21
3.1.8	To Program Manual Override.....	21
3.2	Set Point Programming.....	22
3.2.1	To Program ON or OFF Schedules.....	23
3.2.2	To Program Fixed Duty Cycling.....	23
3.2.3	To Program Adaptive Duty Cycling...	24
3.2.4	To Program Sensor Control.....	26
3.2.5	To Program Variable Sensor Control.....	27
3.2.6	To Program Optimized Start/Stop....	30
3.2.7	To Program Temporary Set Points....	33
3.3	Demand Programming.....	33
3.3.1	Meter Factor.....	35
3.3.2	Priority Level.....	36
3.3.3	Demand Programs.....	36
3.4	Performance Log Review and Initializing Program Parameters....	37
3.4.1	Sensor Calibration.....	37
3.4.2	Review Peak & Low Analog Values....	37
3.4.3	Optimized Start Times.....	38

3.4.4	Optimized Error Factor.....	38
3.4.5	To Alter Optimal Rate Table.....	39
CHAPTER 4 - CASE STUDY - GOLDEN BAY HOTEL.....		40
CHAPTER 5 - ADVANTAGES OF BEMS.....		45
CONCLUSIONS.....		48