

HIGHER TECHNICAL INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**PC BASED DATA ACQUISITION AND PROCESSING
FOR SOLAR SYSTEMS**

By

DEMETRIS GEORGHIADES (M/762)
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HIGHER TECHNICAL INSTITUTE

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Project Report

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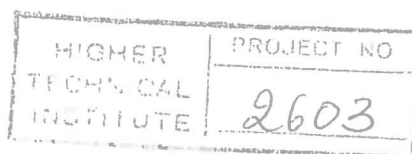
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3rd year student of the
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June, 1996

*Dedicated to my family
and Nasia*

Summary

PC BASED DATA ACQUISITION PROCESSING FOR SOLAR SYSTEMS

This project deals with the tests carried out on Solar Water Heating Systems under the ISO 9459-2 test. It is a computer program that processes the measurements taken during the testing period, as indicated by the International Organization for Standardization.

This book describes briefly the Solar System generally and the two major parts of a solar system (flat-plate collector and storage tank) individually. It defines what is ISO and describes the series of tests ISO 9459 as well as the test ISO 9459-2 in detail. It contains also the testing procedure for the collection of the measurements required.

Then, it describes the different interfacing systems on computers as well as data-acquisition systems (DAS), which are computerized systems for collecting data. There is also a brief explanation of the DAS used in the tests.

Finally, there is a description on the programming language used to develop the program (Visual Basic), a note on the structure and the construction of the developed program, and a user's manual.

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INTRODUCTION

The discovery of the oil, took over, and satisfied the needs of the Industrial Revolution, that started in the 18th century. The easy process of pumping and transferring of the new fuel, together with its many uses after the refinery, as well, as the low costs became important properties, that coal, the major source of energy till that day, couldn't compete with.

In 1973 however, the famous "energy crisis", made people think, that the multi-use, low cost fuel, could run out sometime. Many small countries were dependent exclusively upon oil. The "crisis" forced a lot of governments to take measurements in order to save as much energy as possible. The lack of this form of energy, made the price of the oil to increase dramatically.

The big industrially developed countries pointed the direction of their research towards the discovery of renewable sources of energy. Among the renewable sources of energy that were under research, was the solar energy. The sun, that every day supplies the Earth with a tremendous amount of energy, could be a solution to the problem. Heating methods were discovered, using the solar energy, saving a big amount of energy from oil. The evolution of the solar heating method was a reality. Although it is a method that costs more than the electric heating systems, it saves a lot of money and decreases the demand of energy from the non-renewable sources.

Nowadays, in Cyprus, government follows an energy plan that started in 1988, and expected to end in the year 2000. The energy plan tries to take advantage of the renewable sources of energy. For example, in 1994, the total energy consumption of Cyprus, was 1,322,586 Toe (Toe = Ton oil equivalent). The total solar energy consumption, was 86,480 Toe, that is, the 6.54% of the total energy consumption.

In 1994, the total domestic energy consumption was 202,487 Toe, from which, the 80,280 Toe was solar energy. The 40% of the total domestic energy consumption is supplied by the sun. This shows the extended use of solar heating systems in Cyprus, that has the advantage of the 300 days of sunshine per year.

The high demand in the solar heating system, created a number of industries in Cyprus and generally, all over the world, that manufacture hot water storage tanks, flat plate collectors, e.t.c. Since, every manufacturer has its own way of producing his systems, following different theories and methods, the International Organization for Standardization (ISO), created a series of standard tests, for the determination of the efficiency of every solar system. These tests are carried out for Cyprus manufacturers, by the Applied Energy Center, a department of the Ministry of Commerce and Industry. The tests ensure that a solar system is working according to the standards of the ISO, and that its efficiency is in the appropriate limits.