

HIGHER TECHNICAL INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**COMISSIONING AND TESTING OF
THE HTI CENTRAL HEATING MODEL
(M/743)**

By
COSTAS ATHANASIOU

JUNE 1996

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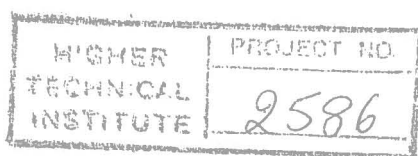
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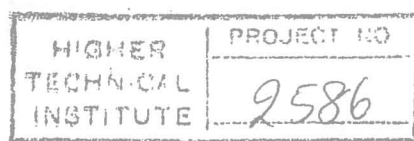


**COMMISIONING AND TESTING
OF THE HTI
CENTRAL HEATING MODEL**

by Costas Athanasiou

**submitted to
the Department of Mechanical Engineering
of Higher Technical Institute
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Finally I would like to thank all the companies that provided the necessary equipment for constructing and testing the data acquisition system of the educational model.

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ABSTRACT

The aims of this project are:

- (a) To get familiar with modern PC based data acquisition systems.
- (b) Prepare a PC based system to acquire data from the HTI Central Heating Model (temperature, flow rate...etc.)
- (c) Write a program in Basic to acquire and process the data according to specific experiment work.
- (d) Commissioning and testing the system.

In the project what is a data acquisition system is explained. Some instrument used in the system is shown and a computer program in basic language is written to acquire and process the data taken from the H.T.I. Central Heating Model.

A similar to the real PC based system to acquire data from the HTI Control Heating Model was prepare, and the program was tested to see if it was operative.

Theory about boiler and heat exchanger performances were written method of increasing the combustion and thermal efficiencies.

The test, suggested to test the system were written. These are: 1) measurement of CO_2 , stack temperature draft, and smoke, 2) Temperature gradient of Water in Water Tank, 3) Comparison of two method of heating water in water tank (a) Testing the performance of the system using the data acquisition system.

Finally the combined system description and operation were explained giving their specifications.

The most important conclusion after finishing this project is that data acquisition system is a quick and accurate method of measuring different parameters

(such temperature, flow etc) all together and through a computer program to use them for further processing. This method can be used for testing and continual controlling of plants or systems eg. Power station and central heating system.

Another important conclusion is that adjustments for higher combustion efficiency of a boiler is an important factor for fuel economy and better overall efficiency of the system.

INTRODUCTION

INTRODUCTION

Modern requirements of industry need to use quick, easy and accurate methods of measurement physical phenomenon like temperature, flow, pressure velocity etc. They are used in a way human needs are served.

The temperature at the beginning was measured just by using human sense to find out if the water or milk was heated enough. The expansion of liquids like alcohol and mercury were used then. As science was developed new method were used eg. Electrical and radiation method to estimate temperature.

Flow of liquids and gases is started measured by measuring the time needed for example to fill a known volume pot with water. Other methods developed are mechanical methods (propeller type flow meter), reference in pressure flowmeters (orifice plate, Venturimeter) and thermal flowmeters.

A data acquisition method can combine different kind of measuring methods of flow, temperature etc with the limitation that all transducers (measuring instruments) must produce emf. signals. These emf signals are used then by a computer to find the performance of a system.

Starting this project first thing to do was to understand the HTI Central Heating Model Operation. Then it was decided to divided into three different circuits and the main parts consisting each circuit, for project use purposes. Also drawing of the 3 cct of the model were decided to be drawn.

The performance of hot water domestic boiler, the heat exchanger with the water tank, the aluminium alloy radiator, the towel radiator, the steel radiator, the fancoil unit and the circulating pumps was decide to a tested.

The experiments that could be performed were the aided too. This are

(1) Measurement of CO₂ , stack temperature smoke and draft readings, 2) Temperature gradient of water in water tank, 3) comparison of two methods of heating water in water tank, 4)testing the performance of the system.

Unfortunately tests were not took place due to the weakness of the institute to provide the necessary equipments at the night time. This are a gas burner and flow meters.

The drawings of the system were made.

The next thing to do was to find out what measurements, data and formulas were necessary for the testing of the H.T.I. Central Heating Model.

The measurement need for the testing of the model are temperature and flow rates. Thermocouples and propeller and magnetic flow meters are advised to be used. The formulas data and measurement taken are listed in the basic programme and measurement are shown in "Drawing" fig. 1 - 4.

A data acquisition system is decided to used to transfer the analogue input signals to the computer using DAS - 8 and EXP - 16 A/C converters. Also a program in Basic was prepared to take the converted analogue estimate the efficiencies of the HTI Central Heating System.

Since the HTI Central Heating model was not set into operation a similar PC based system which was going to be used in reality was prepared to acquire data from T type thermocouples for testing is the basic program is working.