

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**“DESIGN AND CONSTRUCTION OF A PC
CONTROLLED INDEXING TABLE”**

M/993

DESIGN BY: PHILIPPOS PRODROMOU

JUNE 2004

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Design by: *Philippos Prodromou*

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	3537

"DESIGN AND CONSTRUCTION OF A PC CONTROLLED
INDEXING TABLE"

Design by: *Philippos Prodromou*

Project report submitted to the
Department of Mechanical Engineering
of the Higher Technical Institute
Nicosia Cyprus

In partial fulfillment of the requirements for the diploma of

TECHNICAL ENGINEER

in

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Project supervisor: Dr A. Stassis

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To reach the goal of successful completion of this project I received help from various technical fields. The project clearly exhibits the essence of many important branches of technology.

Before proceeding to the presentation of my work I would like to express my sincere thanks to all people that in any way contributed to the completion of this project, especially:

My project supervisor Dr Andreas Stassis for his guidance, advice and assistance concerning my project.

The Mechanical Engineering department of H.T.I, for its valuable cooperation during the calibration and testing procedure of my project.

The E.A.C (Dhekelia Power Station) for the provision of the workshop concerning the project construction.

“This project is **dedicated** in my familial person that was very near to me for many years and five years ago left so much fast and unfairly from this world.”

SUMMARY

The purpose of the project was to design and construct a PC control mechanism which can be positioned in 2 Axis (x-y) with possibility to use a 3rd vertical axis (motion) with the minimum cost and maximum efficiency as possible.

- General familiarization with hardware interfacing, computer programming, electronics in order to control the stepper motors and drive a mechanical device, were made as mentioned at the project objectives.
- The design and construction of the indexing table was made under all possible mechanical calculations.
- A market investigation was done for the purchase of the materials needed to construct the PC control indexing table from the local market.
- The design and development of a simple electronic controller was done.
- The development of a software program in order to control the stepper motors and move the positioning table having a specific accuracy.
- Testing and calibration of the table was done in order to improve its accuracy.
- The final design was critically examined and suggestions were made for further improvements.

Working on this project was an enlightening experience. I learned a lot; I invested and experienced a lot and also applied what I have learned so far.

PREFACE

In order to complete this project a wide range of engineering knowledge where needed to invest includes software, electronics and mechanical design.

Primarily, the following aims were placed before the design and construction procedure of the project:

- To develop and understand the design process of such a device and also calibrate it in order to provide an accuracy of approximately 0.2mm per axis.
- The design of the device that will be capable of using multiple applications and tools in the 3rd vertical axis (motion).
- To design and develop a simple electronic controller with the minimum cost and effectiveness in order to drive the motors.
- To develop the Pc Programs, able to control and interface with Parallel port through an electronic circuit the stepper motors to position the table.
- To keep the number of different parts for the device at minimum.
- And finally to perform static analysis and calculate the appropriate Torque, forces, frictions diameters and select the materials needed for such device and to use as much as possible materials and electronic equipment with local availability.

The basic idea of the design of the mechanical part of the project was carried out by industry and the basic operation from printers and plotters where positioning, in this branch of technology, is very applicable.

The construction of the product can be used for experimental purpose in the HTI laboratory or for small positioning operations with the application of the third axis of motion. Furthermore the design of such a product can be used largely in the industry for automated PCB drill or for small detail operations. The design of the product can also be done with a larger scale for a variety of applications in the industry.

The primary aim of the author is to familiarize with production and mechatronics engineering aspects which are his main ambitions and self expectation for future career. Having majored in electronic engineering in a technical school and joined (HTI) in the Mechanical engineering course constituted a great opportunity for him to combine the knowledge he acquired for the design and construction of the project.

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