Ain Shams University
Faculty of Engineering

Development of Software Package for Surveying Problems on Personal Computers

By

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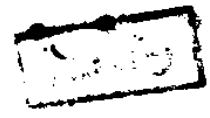
Submitted in partial fulfillment for the requirements
of the Degree of Master of Science in Civil Engineering
(Public Works - Surveying)

Supervised by



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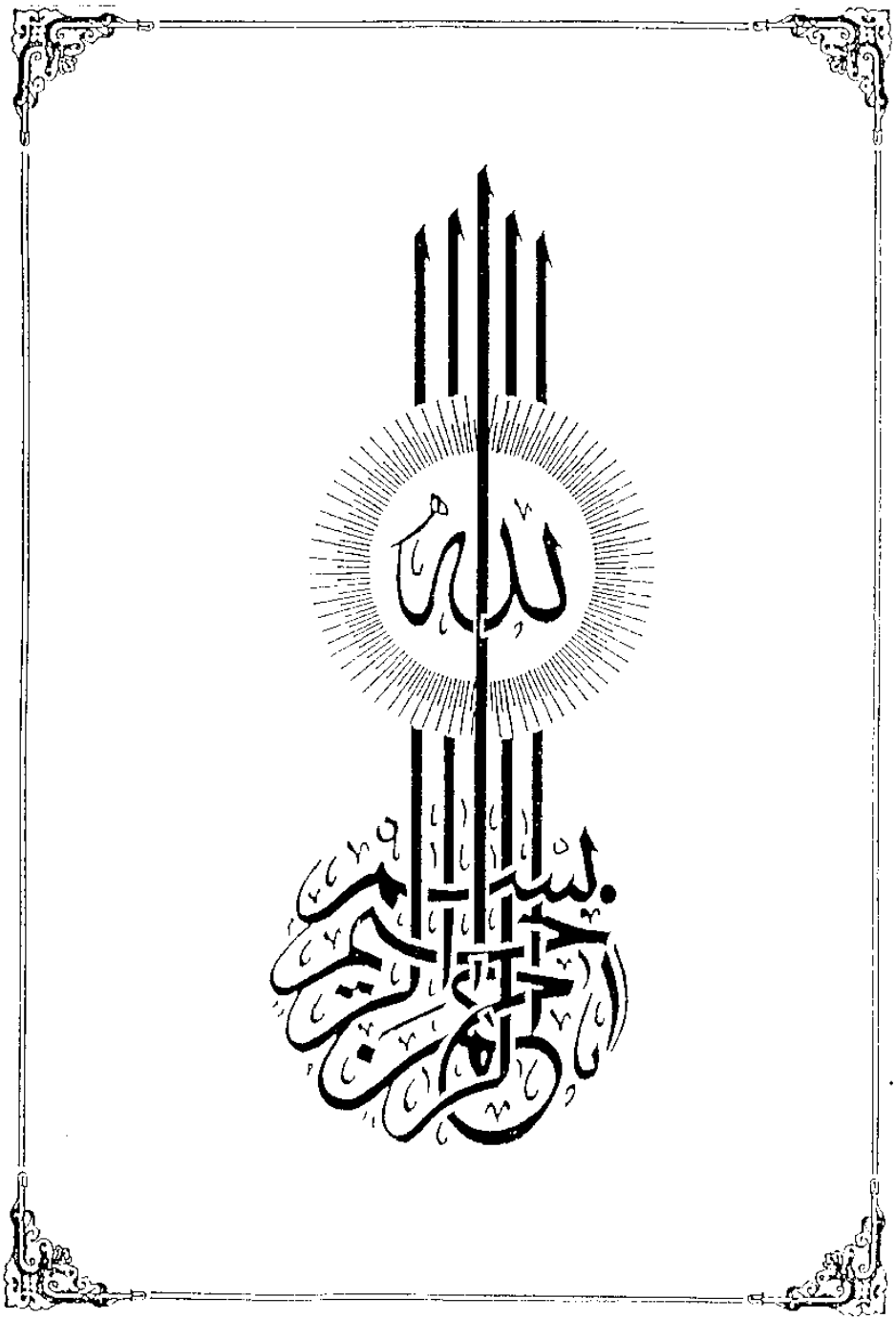

STATEMENT

This disseration is submitted to Ain Shams University for the degree of MASTER OF SCIENCE in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Civil Engineering (Public Works Division), Ain Shams University, from 1986 to 1990.

No part of this thesis has been submitted for a degree or a qualification at any other University or Institution.

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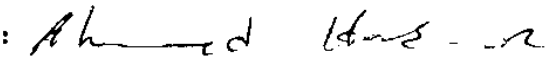
Signature : 

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ABSTRACT :

This research aims mainly at developing a computer software package for surveying problems on personal computer. In this context, a group of sotware programs has been developed in the surveying field. These programs have been arranged in three packages. The first package is intended for solving some mathematical problems related to surveying such as the solution of plane and spherical triangles, matrix algebra, techniques of least-squares adjustment, etc.. The second package treats some simple surveying problems frequently encountered in practice such as positioning by intersection, resection, traversing, etc. The third package is designed to solve some selected large surveying problems which are required to be adjusted and computed according to the method of least-squares such as horizontal control networks in plane and on ellipsoid and vertical control networks. These packages are intended to be just a step in the direction of establishing a computer library at the Faculty Of Engineering at Ain Shams University containing software programs in the surveying field. All of the developed packages have been designed to suit the IBM microcomputers and their compatibles widespread in the market which work under the DOS operating system. Finally, some practical computations were done to test some of the developed programs to study the maximum size of those problems which the computer can solve.

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CHAPTER 1
INTRODUCTION

1.1 General

Since its innovation, the computer has become a common tool in most things in the everyday life. It is the driver of the space craft, the tutor in schools and Universities and many other things. So, it is of great importance to utilize such powerful capabilities of this machine. Many software packages have been developed in many branches of science but still inadequate. More efforts in the software field are required. The actual problem of the computer use is that the development of hardware technology is much faster than that of software technology.

Many computer applications have been developed in many branches of science, but they are neither organized nor generalized in use. So, they are not yet optimally exploited. To overcome this problem, there should be a computer team in every branch of science. This team would be responsible for preparing software packages utilizing the computer hardware technology and directed towards its specialization. By this, it would be possible to computerize every science. This team would be responsible also to update its package according to everyday changes. The work of such a team would not come to an end, because of the continuous progress in computer technology.

After developing such packages in every branch of science, it would be possible to have computer based (or aided)

researches. The researcher in this case would save time and direct his effort towards the research itself rather than the preparation of his own programs, which could be a problem in itself. Computer aided researches will of course be more efficient, much faster and more trustworthy.

The great progress of the surveying instrumentations and in data capture techniques requires a similar progress in the computational techniques. The computer, as a computational machine, provides powerful capabilities, but it needs a comprehensive software based on a good mathematical approach.

It should be stated here that there are a few surveying packages already available in the market. But unfortunately they all possess some or all of the following disadvantages since they are provided through surveying instrumentations manufacturers or through private companies. A common factor is their expensive prices. Each one individually lacks comprehensiveness. There is no access for users to the mathematical grounds of the packages. The format and contents of input and output data may not fit the requirements of users in Egypt. Therefore, there is a great need for a comprehensive surveying package that overcome all such restrictions. This has been actually the motivation behind carrying out the present study.

1.2 Objectives of the Thesis

This reseach aims mainly at founding a computer package