EXHIBIT 22

Computer and Data Processing

Dictionary
and
Guide

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A WORD FROM THE AUTHOR

Mechanical means of computation have existed since early civilizations. An abacus, which is still used today, is a digital computer. The ancient Stonehenge in England is reputed to have been an astronomical analog computer for determining the dates of eclipses. An ordinary slide rule is a mechanical analog computer and an analog to decimal converter.

In 1642, Blaise Pascal built a successful adding machine. Shortly after, Gottfried Leibnitz built a primitive calculator. Charles Babbage in the 19th century developed a desk calculator and envisioned a "difference engine" and an "analytical engine." Babbage never completed his work. His engines would have had lever inputs, mechanical storage and type-writer-like outputs.

The Jacquard looms of today were the invention of J. M. Jacquard (1752-1834) who conceived of the idea of programming a loom with a chain of perforated cards. In the 1880's Dr. Herman Hollerith used experimental punched card mechanisms to process data for the U.S. Census Bureau. The world's first electrically controlled card tabulation system was installed in the Department of Health in Baltimore, Md. in 1889.

The first working computer was completed in 1940 by the Bell Telephone Laboratories. Shortly afterward, the Mark I was developed at Harvard University and is still a curiosity at the Harvard Computer Center. However, the first all electrical computer was the ENIAC (Electrical Numerical Integrator and Calculator) which was completed at the Moore School of Engineering in 1945. Subsequently, UNIVAC (Universal Automatic Computer) was commercially available (1951) and an era known as the Computer age began.

The author's interest in the field began on assignment with the Army in 1946 in developing new applications for tabulating equipment. Subsequently, as an Air Force civilian, he participated in using early EDP equipment. Since then he has witnessed a mushrooming computer industry.

The development of computers has been such that no one individual can be credited with having invented any of the computers which are

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THE NEED FOR STANDARDIZED
TERMINOLOGY

Most glossaries of the electronic data processing field have tended to meet the needs of certain technical areas. Engineers wrote glossaries for engineers. Programmers for programmers. Little attempt has been made to accomodate other fields. Some glossaries were oriented to one type of equipment or another. Others, to one type of application or another. The compilers of the glossaries spoke to the reader in terms peculiar to their field.

Few of the glossaries could serve as a reference for the non-EDP oriented reader. Other management personnel, who have contact with automation, require a general reference. New entrants into the field, while having worthwhile texts and manufacturer supplied manuals, could make only limited use of other reading unless a general reference were available.

Thus, there was a need for a comprehensive dictionary that would serve the needs of most fields, include all types of equipment and provide various degrees of exposure to electronic data processing technology. It is for this purpose that this volume was written.

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DEVELOPMENT OF DEFINITIONS

The terms in this dictionary were compiled from published glossaries, trade magazines, manufacturer equipment and programming manuals, books and topical articles.

The definitions were developed from the context wherein they occured. When a term appeared in literature, the contiguous information was analyzed in order to develop a meaning. When the same term appeared in a number of places with varying context, several definitions are given for the term and ranked in order. Those definitions having the greatest usage and having the weight of authority were ranked first. Definitions of a low order of usage or of a somewhat misleading nature were eliminated from the entry.

An example is the term "multiprogramming" which generally means "simultaneous performance of more than one routine." The term had been used to cover the feature of "inter-leaving program steps of two or more programs." Inter-leaving means the accomplishment of one step of one program, and then, the accomplishment of a step from another program. Simultaneous performance requires the accomplishment of one step of one program in a portion of the equipment at the same time as another portion of the equipment is accomplishing a step of another program. Multiprogramming would require more sophisticated equipment control features and advanced programming techniques. It is therefore not desirable that both definitions apply to the same term.

HOW TO USE THIS DICTIONARY

For quick reference, each term is presented as it is likely to occur in literature or conversation. "Banner Word" can be found in the B's, not as "Word, Banner" in the W's.

Some terms appear to be similar and the reader is cautioned to re-search the exact term of interest. To a casual reader, "Inquiry Station" might seem similar to "Inquiry Unit". Even the context of the literature may mislead. An inquiry station is remotely located and permits com-munication between it and the computer. An inquiry unit is a device (not remote) which is capable of extracting requested data at random moments during processing.

Many terms have more than one definition. The alternate definitions are presented in the order of their popularity and are separated by semi-colons.

After the definitions for a term are presented, explanatory material and examples appear, to provide insight into its usage.

The reader may find a number of cross references to other terms when researching a particular term. This will provide additional information about the specific term being researched. Such references refer to other terms but do not duplicate the information being supplied elsewhere. Cross references are of three types:

1. See . . .   In most cases this refers to an accepted synonym which is fully defined elsewhere. It may also refer to an associated term which the reader may want to review. For example: after the definition of "Delivery Date" the reader will notice the reference to "See Installation Date." While these are not synonyms, the reader will be aware of the other term and avoid using the terms interchangeably. The instruction "See" may also refer the reader to one of the Appendices in Part II.
2. Compare . . . This advises the reader of another term of parallel or similar meaning. For instance: the definition of "Context" is given as "the surrounding data which adds to the interpretation and significance of a particular item of data." Subsequently, the

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d Character: the special character in some equipment which modifies the Op Code. See *Instruction Format*.

D. C. Couple: a device which transmits a steady state of pulses rather than oscillating characteristics.

D. C. Dump: the withdrawal of direct current flow from a device or system.

D. C. Erasing Head: an electromagnetic device that removes magnetic bits from magnetic tape by use of a one directional magnetic field developed from direct current.

D. C. Signalling: a data transmission system which uses direct current.

Damping: an electrical circuitry which reduces rapid or overload conditions in a main circuit.

DASD: See *Direct Access Storage Devices*.

Data: a general term for information; also used to distinguish input and output information from instructions. Also considered to be the absence or presence of a certain condition, such as a magnetic field.

Data Cell: a unit of data which cannot be divided further, such as a magnetic bit.

Data Collection: the process of gathering information from remote points and transferring such information to a central point.

Data Communication: the transmission of information from one place to another.

Data Conversion: any of a number of different types of processes that change the form of data representation. *Example:* tape to card conversion.

Data Delay: the time element of waiting for information before another process can be performed.

Data Division: the COBOL term for file and record descriptions which describe the data that is to be processed or created by the object program. See the *Computer Languages Section*.

Data Element: a basic unit of information which forms part of a set of data, as in the employee number being part of the employee data. Also refers to the smallest division of information, such as a magnetic bit.