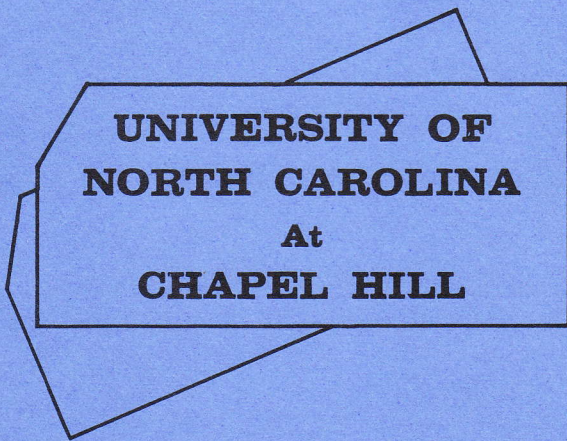


**THE  
COMPUTATION  
CENTER**



**UNIVERSITY OF  
NORTH CAROLINA  
At  
CHAPEL HILL**

## GLOSSARY OF COMPUTER TERMINOLOGY

<b>Access Time:</b>	The time interval between the instant at which information is called for from storage, and the instant at which delivery is completed.
<b>Binary:</b>	A number system which uses two digits, zero and one, in arithmetic process instead of the digits zero through nine as in the decimal system.
<b>Bit:</b>	The abbreviation for binary digit.
<b>Byte:</b>	The smallest addressable unit in the system. (8 binary digits)
<b>Compiler:</b>	A computer program which translates instructions written in a problem oriented language into an equivalent program in the machine language of a particular computer.
<b>Core:</b>	A magnetic material capable of assuming one of two magnetic states and thus representing a binary digit.
<b>Data:</b>	A collection of facts represented by numbers, letters, and symbols, which is processed or produced by the computer.
<b>Flow-Chart:</b>	A schematic representation of the logical steps necessary to solve a particular problem. Symbols are frequently used to represent the operations such as compute, substitute, compare, jump, copy, read, etc.
<b>Hardware:</b>	The physical equipment or devices forming a computer.
<b>Machine Language:</b>	The code which is used to represent program and data within the computer.
<b>Memory:</b>	The section or units within the computer or peripheral equipment where information is stored pending future use.
<b>Microsecond:</b>	One millionth of a second.
<b>Millisecond:</b>	One thousandth of a second.
<b>Nanosecond:</b>	One billionth of a second.
<b>Program:</b>	The precise sequence of operations which the computer must perform on the data in order to solve a given problem.
<b>Programmers:</b>	A person who analyses a given problem and prepares the program necessary for its solution by a computer.
<b>Software:</b>	The computer programs furnished by the computer manufacturer which aid in the use of the physical equipment (Hardware). The software includes the control programs such as the supervisor, the programs which translate our program from the language in which they were written into machine language; and common usage programs such as a program to sort data.

## THE COMPUTER AT CHAPEL HILL

The University of North Carolina Computation Center began operation in August 1959, to provide the University with the capabilities and power of a modern computing system for use in research and education. The State Government, Remington Rand (Univac), The National Science Foundation, and The Bureau of the Census purchased a Univac 1105 computer. This computer was replaced in July 1966 by an IBM System/360 model 30. The model 30 was in use for approximately 1 year and was replaced by a larger model 40 in the 360/system. This computer is now in operation at the Computation Center on a 24 hour, 7 day week basis. The model 40 is being rented from IBM at the cost of \$22,000 per month.

### The Hardware

The IBM system/360 incorporates the most advanced philosophies of the large-scale computers into a modular system economical enough for small-scale users and powerful enough for highest performance requirements. The model 40 here at the center has a 256,000 byte core storage with the access time of 0.625 microseconds. The main storage read/write cycle time is 2.5 microseconds. The central processing unit contains the facilities for addressing main storage, for retrieving or storing information, for arithmetic and logical processing of data, for sequencing instructions in the desired order, and for initiating the communications between storage and external devices. The card reader is used for input only and reads cards at the speed of 1000 cards per minute. The card punch, used for output only, punches cards at the speed of 300 cards per minute. The disk drives are used for storing information, and work similar to a record player. The disk packs has 10 surfaces that can be used for reading or writing data. 7,250,000 bytes of information can be stored on one disk with access time of 75 milliseconds, data transfer to the processor is 156,000 bytes per second. The disk rotate at 2400 rpm. The printer is used for output only and prints at the speed of 1100 lines (132 characters) per minute, this is approximately

24,000 words per minute. The tape drives are used for input and output to the computer. Reading and writing on these units is very similar to an audio tape recorder. Each tape unit has a nine track read/write head and reads and writes 800 characters per inch of tape. These magnetic tape reels hold 2400 feet of tape, which amounts to 15,000,000 bytes of information per reel.

The most unique feature about the model 40 is the teleprocessing unit. The model 40 is connected by telephone lines to the model 75 computer which is located at the Research Triangle Park. The teleprocessing unit acts as a telephone exchange between the computers. Data can be transmitted at the speed of 5100 characters per second.

### **System/360 Model 75 at TUCC**

The Triangle University Computation Center (TUCC) is a facility organized by Duke University, North Carolina University at Chapel Hill, and North Carolina State University at Raleigh. The IBM System/360 model 75 is housed in the Science and Technology Research Center Building at the Research Triangle Park. This computer is being rented from IBM by the 3 universities. Located on each campus is a model 30 or 40 IBM computer, these computers are linked to the model 75 by telephone lines. Programs can be teleprocess (sent via telephone lines) to the model 75 from the computers located on either campus. The model 75 is one of the larger and faster computers in the computing field, for example, it can add one million ten-digit figures in less than a second. It has a 2 million byte large core storage, 12 disk drives, and 7 tape drives. Perhaps the most significant feature of the Model 75 is its programming versatility. By the use of multiprogramming, TUCC runs remote batch job processing concurrently with on-line terminal facilities.

### **Organization of the Computation Center Administration**

The administrative staff of the Computation Center consists of a director, an associate director and business officer, secretarial and clerical personnel. The director reports to the provost.

### **Programming Staff**

The programming staff not only assists university members in using the computer in education and research, but also carries on programming research and development in order to make the computer a more effective tool in problem solving. In order to solve any specific problem or perform a desired function with an automatic digital computer, it is necessary to prepare a set of detailed instructions known as a computer program. A variety of programming languages such as PL/I, Cobol, Fortran, etc. has been made available for the IBM 360/system, as well as general programs for the solution of problems in the field of statistics, numerical analysis, and artificial intelligence.

### **Operations Staff**

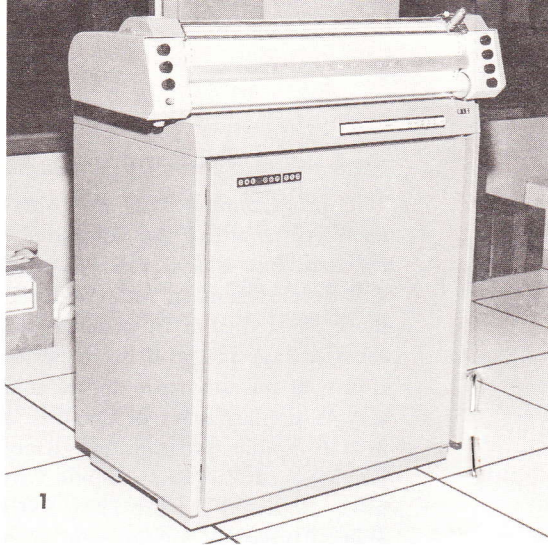
The operations staff consists of specialists trained in the operation of the computer and its associated auxiliary equipment. Once the programs and data for the computer have been prepared, this group takes control and handles all elements of processing which require the use of any hardware.

The center maintains a key punch section where programs and data are prepared for the computer by transferring the information to punch cards.

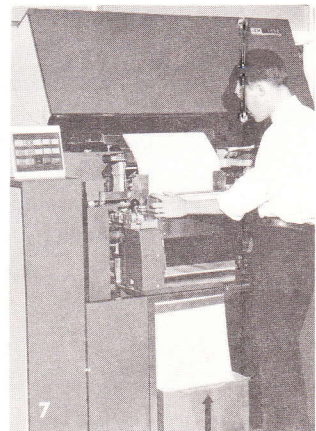
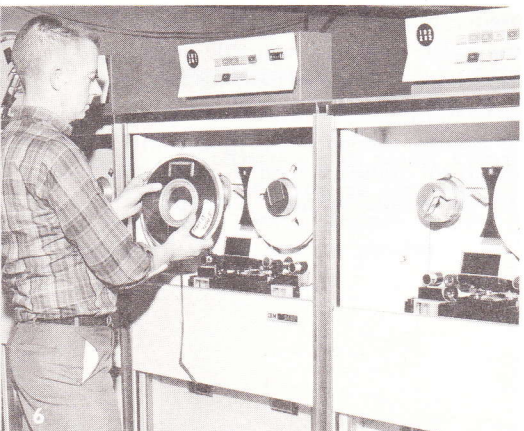
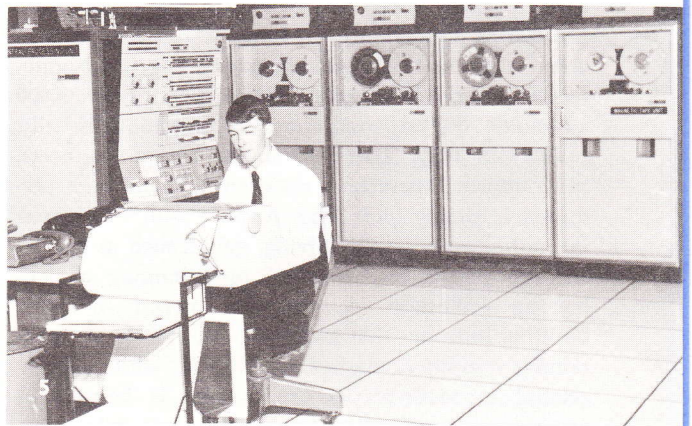
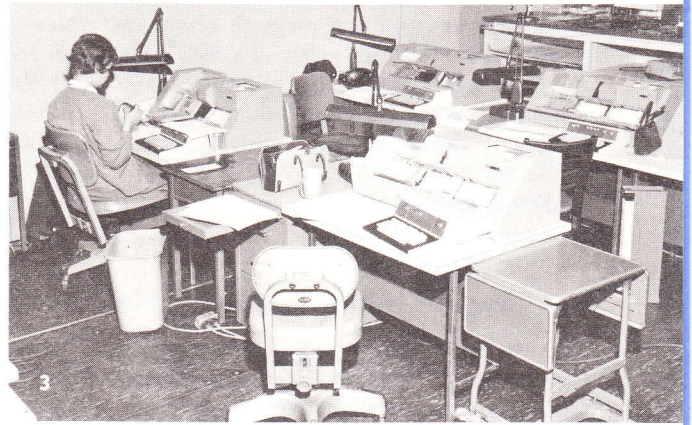
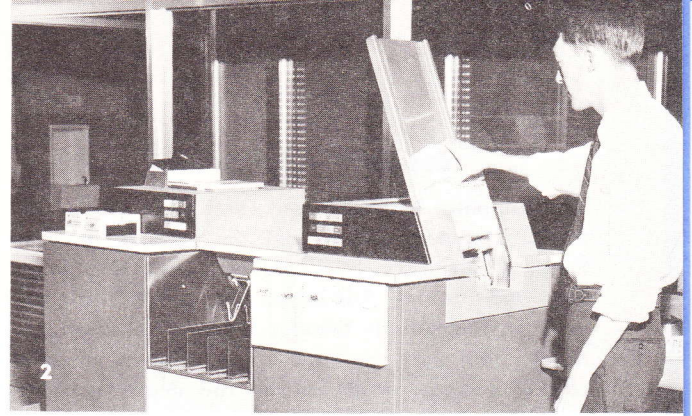
The dispatch area which is located next to the computer is where all programs are submitted to be processed on the computer.

### **University Uses of the Computer Educational Activities**

Courses designed for students especially interested in high-speed computation or data processing are taught in the department of Information Science. Center personnel also instruct other departments in which the computer is used as a tool for problem solving. The computer is also a valuable teaching aid for example, students in the school of Business Administration practice management decision making using the "Management Game" a program which simulates the detergent industry with a complexity which would be impossible without a large scale computer.



1. Calcomp—Plotter
2. Card Reader—Card Punch
3. Key Punch Section
4. Dispatcher Area
5. Computer Area
6. Magnetic Tape Drives
7. High Speed Printer
8. Disk Drives

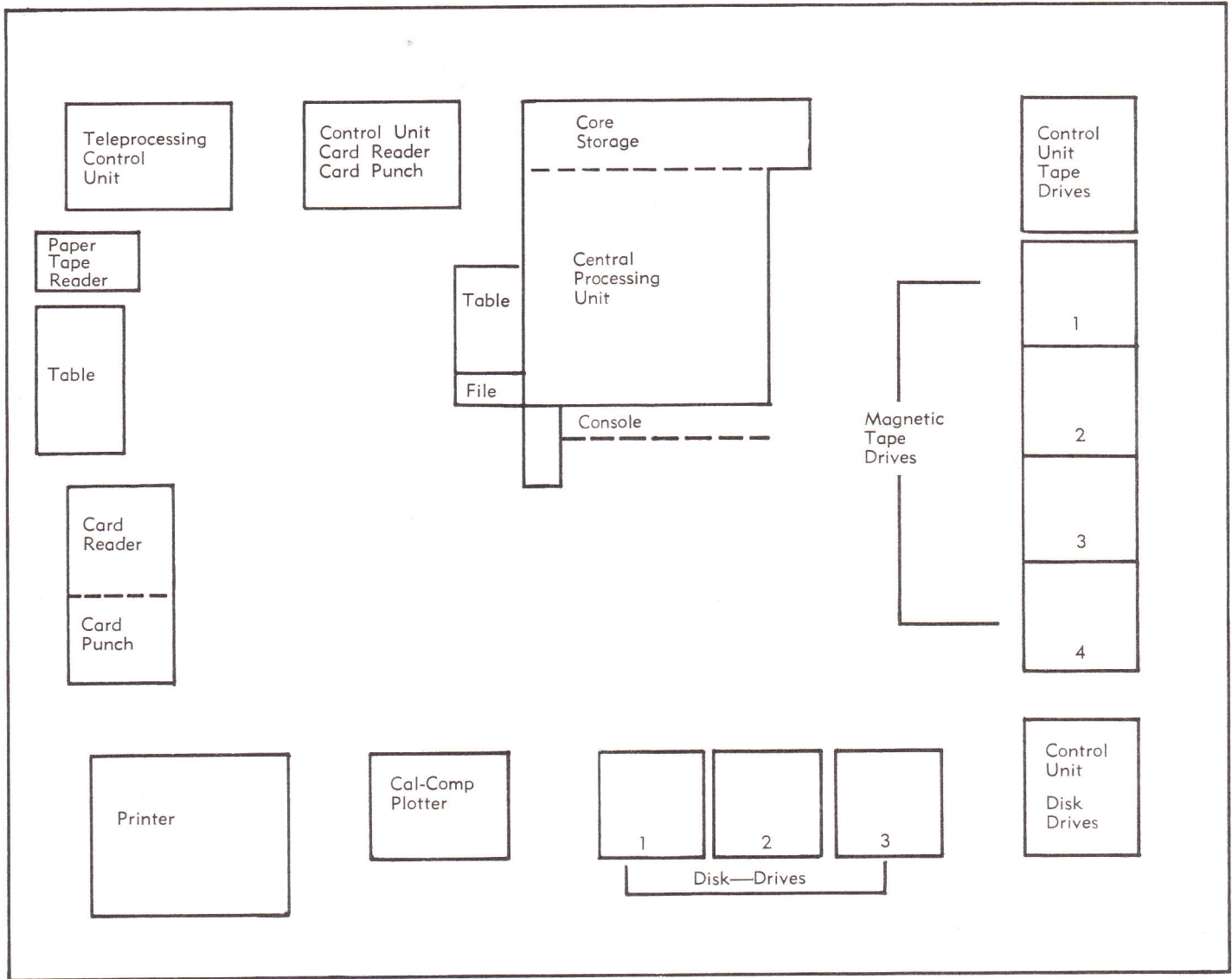


## **Research Applications**

The computer has been used extensively for faculty research, student theses, and dissertations in such fields as Chemistry, Physics, Biostatistics, City Planning and Business Administration, and is being applied in increasingly broader areas of investigation. Among its more unusual applications is a news editing program produced by the departments of Journalism as an aid in its research in communications. The news editing program produces a "Newspaper" which is quite easy and satisfying to read. In the field of Library Science KWIC (key word in context) a program which indexes publications and documents by important words in their titles, is available. The program has indexed in areas such as medicine, applied mathematics, and chemical patent research.

## **Careers in the Computing Field**

The computing profession is approximately twenty four years old. From its beginning with the construction of the first automatic digital computer, the Harvard Mark I (Harvard IBM Automatic Sequence Controlled Calculator) in 1944, it has had experienced a phenomenal growth, paralleling the computer "Population Explosion." There were about 39,000 automatic digital computers in operation in this country in 1967. The demand for design engineers, programmers, operations, maintenance, and sales personnel is greatly increasing. Anyone with an interest in mathematics, puzzle solving, games such as bridge, checkers and chess, will find programming a challenging profession. A student's interest in radio building indicates that a career in designing or maintaining computers might be enjoyable, while a background in mathematics or statistics is helpful in programming, computers find applications in so many areas that a specialized knowledge of any field may be useful.



**COMPUTER AREA**

"The computer's usefulness is...in what it has forced us to do. In order to use the computer, we have had to discard outmoded procedures; we have had to think through systems problems and establish specific decisions, rules and logic. These aspects, together with the tremendous ability to process large amounts of operating business data for analysis, makes it perhaps the most powerful tool for management planning and measurement and decision making yet devised."—Gerald L. Phillippe, president, General Electric Co.

". . . Any philosophy or policy about automation must necessarily start from clear recognition that unrestrained technological advance is not only inexorable, but essential to the maintenance and elevation of the standard of living. Full employment in this country is completely dependent on our being more efficient producers than our competitors in a world where the competition is tougher every day. The alternative to automation would be economic stagnation.

"Machines now have, in general, a high school education—in the sense that they can do most jobs that a high school education qualifies people to do. So machines will get the unskilled jobs, because they work for less than living wages. Machines are, in the most real sense, responsible for putting uneducated people out of work.

"The answers are not to smash the machines. They are to recognize that the individual versus the machine is as unfair a match today as the individual versus the corporation was in the last century, and that advancing technology requires the exercise of collective—public and private— responsibility for its effects and collective measures to carry out this responsibility."—W. Willard Wirtz, Secretary of Labor

"The Second Industrial Revolution is based upon the intense application of the powers of the human brain, amplified and extended by the use of electronic—and perhaps in the future optical—machines, to solve the increasingly complex problems of our modern economic and industrial society. New technology demands the complete discarding of built-in constraints in our thinking which have been ingrained by long experience. It is vital to lift our eyes to the infinite reach of horizons which have now been revealed, and to appraise our new capabilities with the question 'why not?' rather than 'why should we?'"—Dr. Herbert W. Robinson, president and chairman of the board, C-E-I-R, Inc.

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