Preface

The attempts to create machines capable of character-by-character direct printing in the 18th and 19th centuries were motivated by the sociological and technological changes brought about by the industrial revolutions in the Old and New Worlds. As industries became larger and more complex, the demand for the rapid dissemination of information created a need for immediate production of the printed word, and hence in the early 20th century the manual typewriter became the instrument for producing correspondence and other documents. This fostered a worldwide industry for the production of typewriters for almost every known language with subsidiary industries for producing paper, ribbons, etc. and also created a need for skilled operators. Although the quality and reliability of typewriters constantly improved with time, they largely remained manually operated mechanical devices that printed one letter per keystroke from a single typebar that impacted a ribbon and transferred the character to the paper.

In the 1920's and 30's the typewriter became electromechanical with subsequent improvements in operation, better print quality, and proportional spacing, but the basic printing mechanism remained unaltered. The typebar, however, was now powered by an electrically driven power roller engaged by the depression of a key. Much less effort was needed for keying than with a manual machine, and it produced uniform print quality. This kind of electric typewriter remained the standard for several decades.

The introduction of the ®SELECTRIC typewriter in the 1960's altered not only the way in which characters were printed but also the interaction of the operator with the machine. The printing element was a sphere upon which all of the characters were embossed; depression of a key caused a sequence of events that oriented the sphere with the proper character in position; the sphere then impacted the ribbon, transferring the character image to the paper. The manner in which the operator depressed the key or the serial speed of keying had no effect on the print sequence, since printing was controlled entirely by a series of interrelated mechanical processes for the location, orientation and impact of the sphere upon the ribbon and paper. The print element of the SELECTRIC typewriter moved back and forth across a fixed paper carriage (in contrast to the movable carriage of typebar machines). The printing element was interchangeable by the operator and allowed the use of many type styles on the same machine. Print quality was better than that of the typebar machines.

The SELECTRIC typewriter, originally an entirely electromechanical device, was eventually capable of being driven by electrical signals and, conversely, of emitting electrical signals. This led to its adaptation as a printer in numerous systems. These machines could then be controlled by electrical signals from keyboards or memory storage devices. By these means the operators gained control of the input and output which allowed them to edit, compose, organize, and structure printed documents.

In the early 1970's the "Daisy Wheel" (printwheel) typing element appeared. This was a planar element with the print characters at the end of flexible fingers, much like the petals of a daisy. The indexing of this element in printing was also controlled by electrical means and printing was done by striking the character finger with a solenoid-activated hammer. The printwheels were removable so that other typing fonts could be used. As in the SELECTRIC typewriter, the carriage was fixed and the print mechanism was moved across the paper.

In the ensuing decade, the application of microelectronic devices allowed electronic control of all aspects of these machines. With large memories and printing under microprocessor control the operator could perform many functions previously not available. While these machines could justifiably be called electronic typewriters, the print operation still required the mechanical impact of a type character upon a ribbon to transfer the character image to the paper.

In the recently announced SELECTRIC System/2000 typewriter/printers, a new nonimpact typewriter/printer, the ®QUIETWRITER, was introduced. The development of its resistive ribbon print technology required fundamental work in materials, ribbon handling and electronics. Character printing is accomplished by local Joule heating within the ribbon. Character form is determined by interchangeable plug-in font modules. All of the QUIETWRITER functional operations are controlled by microprocessors; the only moving parts are the printhead carrier, ribbon assembly, and paper transport mechanisms. Since the printing is nonimpact, the machine is virtually noiseless. The QUIETWRITER is truly an electronic typewriter. Also included in the SELECTRIC System/2000 series is an impact typewriter, the ®WHEELWRITER. Although the printwheel technology is used in this machine, its function has been improved by the application of the software and hardware concepts used in the QUIETWRITER. Both machines, through the use of novel and improved technologies, set new standards for function, quality, and reliability. This special issue of the *IBM Journal of Research and Development* is devoted to the new technologies incorporated in the recently announced SELECTRIC System/2000. The articles which follow give insight into some of the key technical and engineering issues in the development of these machines.

W. F. Voit, Jr.
Information Products Division
Lexington, Kentucky