CHARLES BABBAGE INSTITUTE
NEWSLETTER
Volume 9, Number 4
Summer 1987

THE CENTER FOR THE HISTORY OF INFORMATION PROCESSING

CBI Publishes New Guide

History of Computing Resources in the U.S. and Canada

Researchers and archivists searching for archival collections relating to the history of computing face a difficult task in locating sources. Traditional union guides and databases poorly represent the scope of resources that are currently available in archival repositories. CBI had attempted to meet that problem by acquiring finding aids and collection descriptions from other repositories, but the receipt of this information was sporadic and the material was difficult to use off-site. During the past two years CBI has increased its effort to assemble comprehensive collection information and will soon make available a publication titled, *Resources for the History of Computing: A Guide to U.S. and Canadian Records.*

The purpose of the guide is twofold. It will be a resource guide to researchers seeking information about archival collections relating to the history of computing. It will also be a guide for archivists interested in understanding the range of records that have been collected, and improving the documentation available for the history of computing. In this respect the guide is an essential element of CBI's National Collecting Strategy (see *CBI Newsletter* vol. 9, no. 2, Winter 1986).

Over 350 entries from academic, corporate, state, private and government repositories will be included. Most of these describe individual collections that focus on records relating to any and all developments and applications of the electronic computer, both digital and analog. Some entries outside the scope of electronic computers were included because they were relevant to computing in general. Most of the collections date after 1935.

The project surveyed as many likely sources of records as possible. In the case of academic repositories, it quickly became apparent that nearly every institution had some records relating to computer center records. Therefore, the project focused on universities and colleges that were active developers of computers or computer applications, rather than users. The guide also is not intended as a general survey of records not already held by repositories. This distinction eliminated many valuable but difficult sources held by federal agencies in the United States and Canada. CBI hopes to investigate this area in the future.

The guide will be the first, single compilation of resources found at institutions with significant holdings relating to the history of computing. All pertinent collections included in the *National Union Catalog* and the RLIN database have been included. Repositories with a recognized commitment to the history of computing are well-reflected in the guide; collection-level descriptions have been submitted by the Computer Museum, Hagley Library, Harvard University, Library of Congress, Massachusetts Institute of Technology, Smithsonian Institution, Stanford University, University of Illinois, University of Pennsylvania, as well as the Charles Babbage Institute. Corporate collections also will be well-represented by Bell Canada, Control Data, Dataproducts, Hewlett-Packard, IBM, ITT, MITRE, Unisys, Texas Instruments, and others. In all, over seventy repositories already have contributed to the guide.

The guide will follow typical archival conventions. Each entry will include information about size, inclusive dates, local catalog numbers, a description, restrictions, and source of information. All entries have been submitted to the originating repository for verification. Arrangement will be by state or province and name of the repositories. Indexing will be provided. While the price of the

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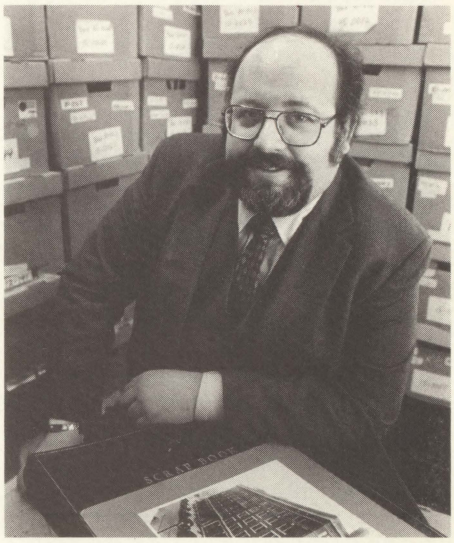
Project Historian Joins CBI Staff



Sheldon Hochheiser

Our last newsletter (vol. 9, no. 3, Spring 1987) described a new project CBI is undertaking on Documenting Industrial Activity for the History of Computing, with support from the National Historical Records and Publications Commission and the Control Data Corporation. In this project, CBI will employ the documentation strategy approach to probe three areas broadly representative of the development and application of the electronic digital computer. The three case studies will help us develop appraisal information for records in the computing industry, test the effectiveness of the approach for archivists involved in collecting industrial records, and assess the value of records available outside of the company as an alternative source of historical documentation. We are pleased to announce the appointment of Dr. Sheldon Hochheiser as Project Historian for this project.

Dr. Hochheiser brings excellent qualifications to the position. He received a bachelor's degree from Reed College in 1973 with an interdisciplinary major in history and chemistry, a master's degree

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Oral History Guide Update

Since the release last year of the *Guide to the Oral History Collection of the Charles Babbage Institute*, a number of interviews have been added to the collection and opened to research. The transcripts of all of the interviews described here are available on MS-DOS diskette. The *Guide* is still available from CBI for $5.00 per copy.

Interviews listed in the 1986 guide that are now available for research use:

Oliver, Bernard M. OH 97 (only the first half was listed in the guide; see below for a complete description).

Cohen, Arnold A. OH 58.

The following are new interviews that were not included in the guide and are open to research:

Bauer, Friedrich L. Interview, February 17, 1987, in Munich, West Germany. Conducted by William Aspray. Audio cassette (1-60 min.). Transcript (19 pp.). OH 128.

Bauer begins with a brief discussion of his early life and education in Bavaria through his years in the German army during World War II. He discusses his education in mathematics and theoretical physics at the University of Munich through the completion of his Ph.D. in 1952. He explains how he first came in contact with work on modern computers through a seminar in graduate school and how he and Klaus Samelson were led to join the PERM group in 1952. Work on the hardware design and on compilers is mentioned. He then discusses the origins and design of the logic computer STANISLAUS, and his role in its development. The next section of the interview describes the European side of the development of ALGOL, including his work and that of Rutishauser, Samelson, and Bottenbrach. The interview concludes with a brief discussion of Bauer's work in numerical analysis in the 1950s and 1960s and his subsequent work in programming methodology.

Herr, Robert. Interview, May 19, 1987, in Minneapolis, MN. Conducted by Arthur L. Norberg. Audio cassettes (2-60 min.). Transcript (58 pp.). OH 111.

Herr reviews his family background and education at Haverford College, education at the University of Minnesota in the 1930s, wartime activity, and his postwar work. During World War II Herr worked for the U.S. Navy's Bureau of Ordnance, primarily on methods of defending U.S. ships against magnetic mines. The bulk of the interview concerns his work starting in 1946 at Minnesota Mining and Manufacturing Company (3M) on magnetic tape development. After the introduction of magnetic tape in 1949, Herr started the Electrical Products Lab in 1952 at 3M, and later was vice president of the Data Recording Products Division. He also discusses 3M's relationship with Engineering Research Associates and Control Data Corporation.

Mullaney, Frank C. Interview, June 2, 1986, and June 11, 1986, in Minneapolis, MN. Conducted by Arthur L. Norberg. Audio cassettes (3-60 min.). Transcript (107 pp.). OH 110.

Mullaney begins by reviewing his family background and upbringing, early interests in ham radio, and his education in St. Paul public schools and the University of Minnesota. After earning his B. S. in electrical engineering in 1943, he worked for General Electric for a year and then for the U.S. Navy installing electronic equipment on ships. The bulk of the interview concerns his years at Engineering Research Associates (ERA) beginning in 1947. Mullaney was involved in several projects at ERA including the Goldberg project, Demon I, the ATLAS computer and was project engineer for the 1101 (the commercial version of the ATLAS). He discusses ERA's production technology and quality control efforts in the late 1940s and early 1950s. As an engineer on various projects, Mullaney witnessed ERA's transition from a designer of equipment for specific contracts to a designer of general-purpose equipment suitable for a range of problems. Mullaney continues by comparing and contrasting various ERA products including the ATLAS I and II, and the 1101, 1102, and 1103. He discusses the sale of ERA to Remington Rand, the differences and antagonism between the two companies, the departure of Mullaney, William Norris and others, and the formation of the Control Data Corporation. The last part of the interview focuses on the early years of Control Data. Many co-workers at both ERA and CDC are mentioned, including Seymour Cray, who initiated Control Data's efforts to build a general purpose computer when Control Data was still exploring various market niches.

Oliver, Bernard M. Interview, August 9, 1985, and April 14, 1986, in Palo Alto, CA. Conducted by Arthur L. Norberg. Audio cassettes (4-60 min.). Transcript (111 pp.). OH 97.

The interview covers Oliver's early life, education, and work experiences at Bell Laboratories and Hewlett-Packard. Oliver began his formal education at California Institute of Technology at the age of fifteen and transferred to Stanford University for his junior and senior years to study electrical engineering with Frederick Terman. There he became associated with William Hewlett and David Packard. After receiving his degree in 1935 he returned to California Institute of Technology for graduate work, from which he joined Bell Laboratories in 1939. His initial assignment there was in the television research group under Axel Hansen. During World War II he worked at Bell on radar. Later he continued his work in television technology and worked with Claude Shannon on information theory. He discusses the organizational climate and objectives at Bell Laboratories in the 1940s and compares it to Hewlett-Packard, which he joined in 1950 as director of research. Many aspects of Hewlett-Packard are discussed: vertical integration, distribution of projects, company structure, competitors, associations with Stanford University, military contracts, the jet ink printer, product lines, marketing, research and development expenditures, foreign operations, and recruiting issues. Oliver also discusses his associations with William Hewlett, David Packard, and others at the corporation.

Schwarschild, Martin. Interview, November 18, 1986, in Princeton, NJ. Conducted by William Aspray. Audio cassettes (1-60 min.). Transcript (25 pp.). OH 124.

Schwarschild describes his early training in automatic computing when he assumed the position of director of the Watson Scientific Computation Laboratory at Columbia University upon the resignation of Wallace Eckert. Schwarschild describes the computa-

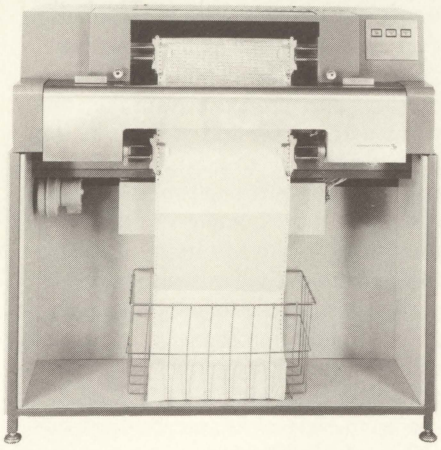
continued on page 6. . .

Selective Chronology of Printer Technology and Industry

This chronology lists selective key events in the development of computer printer technology and the emergence of an industry to develop, manufacture, and market this technology. The list is reasonably inclusive for the incipient period of development, which we consider to be the years through 1958. For the later years, the list is more selective. Only the first instance of a new type of printer product and its first major competition are listed for the modern period; subsequent products without major marketing or technological advances are not included. An effort has been made to include the founding dates of all companies of any general importance whose principal activity is in the computer printer field.

Information about advances in the printer field is not generally as widely available as information on the development of the hardware of the central processing or storage units, or on the development of systems software. CBI would appreciate hearing from individuals who have information or source materials on printers. Please contact CBI Research Assistant Robbin Clamons at the address or telephone number listed on the back cover.

1843 Georg Scheutz completes printing calculating machine
1867 Christopher Scholes and Carlos Glidden build typewriter
1870 Baudot code introduced
1935 IBM markets electric typewriter
1946 ENIAC punched card output used to run IBM printer
1948 Remington Rand introduces electric typewriter
1949 Telecomputing Corp. produces digital plotter
1949 North American Aviation introduces drum plotter
1950 California Computer Products founded
1950 Benson-Lehner Corporation modifies Dactylograph flat-bed plotter
1950 Electronic Associates adapts Analog Plotting Board
1950 SEAC punched paper tape output used to run Friden Flexowriter
1950 Hogan Laboratories develops electrolytic recorder
1950 Engineering Research Associates develops Magnetic Numeroscope printer
195? Electronic Associates converts Analog Plotting Board to digital plotter
1951 UNIVAC magnetic tape output used to run Uniprinter typewriter
1951 Anelex Corporation completes Synchroprinter line printer
1951 Control Instrument Co. completes model of Wire Writer matrix printer
1952 Remington Rand introduces 600 lpm drum line printer for UNIVAC
1952 Potter Instruments introduces 300-900 lpm single wheel line printer
1952 Shepard Laboratories introduces model #100 line printer
1952 Atomic Instrument Co. develops thermal dot-matrix printer
195? GE investigates ferromagnetographic printer
195? Consolidated Vultee Aircraft developes Charactron xerographic printer
195? Eastman Kodak introduces photoelectric and dot-matrix label printers
1954 Radiation Inc. founded
1956 Burroughs introduces dot-matrix electrostatic WHIPPET printer
1956 IBM introduces xerographic card and label printer
1957 IBM introduces dot-matrix line printer
1958 Anelex introduces multiple carbon heat transfer form printer
1958 NCR introduces thermal transfer printer
1958 Stromberg-Carlson introduces xerographic printer
1958 Universal Drafting Machine Corp. introduces digital plotter
1958 Gerber Scientific Instrument Co. introduces digital plotter



The First Dataproducts Printer, Serial No. 1.

The Dataproducts 3300 Line Printer was introduced in 1962 as the world's first moderately-priced commercial line printer. Innovations included the Mark I impact hammer and single cabinet construction. The first one was sold to Scientific Data Systems. The price was $15,000. After a long working life of dependable service, it was bought by Dataproducts for retirement to a permanent place of honor on company premises. It still works, almost as well as it did in 1962.

1959 IBM introduces 1403 chain and train line printer for 1401
1959 A. B. Dick markets Videograph Printer-Plotter system
1959 Stromberg-Carlson offers video- photographic microfilm system
196? Selectric mechanism used on STRETCH console printer
1961 IBM introduces Selectric mechanism
1961 General Dynamics plots from computer code
1962 Data Products founded (name later changed to Dataproducts)
1963 Data Products introduces low cost, low speed line printers
1963 Radiation Inc. builds page printer for Lawrence Radiation Laboratories
1963 R. G. Sweet developes ink-jet printer at Stanford University
1964 IBM offers 1403-N1 for System/360
1969 Viatron robot prints from computer via Selectric mechanism
1970 Band line printer introduced
1971 Telex introduces line printer
197? Centronics introduces dot-matrix serial printer
1972 Diablo introduces daisy-wheel printer
1974 Honeywell introduces electrostatic page printer
1973 Xerox introduces 1200 xerographic page printer
1975 Sanders Technology Systems (Santec) founded
1975 IBM introduces 3800 laser printer for System/370
197? Wang, Hewlett Packard and Siemens introduce laser printers
1976 Printronix ships dot-matrix line printers
1977 Xerox developes 9700 using laser scanning techniques
1978 Santec introduces letter quality dot-matrix printer
1979 Centronics offers 1000 lpm non-impact printer
1981 Qume introduces new daisy-wheel drive and microprocessor control
198? Seiko Epson, Okidata, C. Itoh Electronics enter serial dot-matrix game
1982 Dataproducts offers daisy wheel printer
1985 Qume offers laser printer
1985 IBM offers Proprinter nine-wire serial dot matrix printer for PC □

A Report on the IBM Technical History Project

This article was prepared by Dr. Emerson W. Pugh, Manager of the IBM Technical History Project.

An IBM engineer checks one of the six magnetic core storage units of the STRETCH computer, built for the Los Alamos Scientific Laboratory. This 1961 photograph is from CBI's collection.

The IBM Technical History Project was begun in 1980 following a suggestion two years earlier by Emanuel R. Piore, former IBM vice president and chief scientist, to Frank T. Cary, then IBM chairman, that a book be written on IBM's technical history. Early in the discussions, the Thomas J. Watson Research Center in Yorktown Heights was selected as the project's home. Its excellent library, convenient access to corporate archives, and tradition of scholarly research were expected to provide an appropriate environment. It was also decided that the authors should have the technical background and experience to write with authority.

Charles J. Bashe, whose career with IBM began in 1949, was the first manager of the project. He had served in many engineering positions, including manager for the development of the company's first large-scale electronic computer for accounting applications, the IBM 702. By the end of 1980, two more individuals had been chosen to join Bashe in planning, researching, and writing the proposed book. The first was John H. Palmer, who had studied in Howard Aiken's computation laboratory at Harvard University before joining IBM in 1940 to work first in engineering and later in programming development. The second was Lyle R. Johnson, who had installed a UNIVAC in the Pentagon and an IBM 702 computer at the Ford Motor Company before joining IBM in 1958. At IBM, he held positions in research and on the corporate staff and served as editor of the IBM Systems Journal. I did not join the project until shortly before completing a book I had undertaken on my own, *Memories that Shaped an Industry—Decisions Leading to IBM System/360*. Published early in 1984, it became the first volume in the MIT Press Series in the History of Computing.

Two primary goals established for the Technical History Project's book were readability and accuracy in technical and historical content. Finding good evidence for all statements in the book—an essential element in satisfying the more important of the two goals—was rather frustrating. The problem is that records were created and preserved for project management and business purposes, not for the benefit of historians. Documents frequently omitted critical information that everyone knew at the time, and many were discarded when no longer needed. The rapid growth of the company, with people and projects moving from old to new sites, added to the difficulties. Thus, although substantial use was made of the company's archival facilities, much of our information was obtained from individuals who had participated in the development programs. In addition to providing us with their recollections, many had saved important documents. Our freedom of access to these records and recollections ultimately permitted us to answer most of the questions we had the wisdom to ask. Personal recollections of individuals were invaluable in determining the tone of the times, the flow of events, and the roles of various individuals. But never did we rely on the recollections of a single individual for a significant event, and we insisted on having written records for key dates and technical facts.

The first tangible results of our effort was publication of *IBM's Early Computers* by the MIT Press in 1986. The size of the book may be intimidating to the reader, but for the authors, it was barely adequate to tell a story of technical developments from approximately 1945 to 1962—a period in which IBM invested over 70,000 man-years in research and development. On average, 100 man-years of R&D effort are summarized in each of the 700 pages of the book. Clearly, only a small part of the information we obtained could finally be used. Deciding which development efforts and which individuals should be included was our most difficult task. Our objective was to provide as accurate and complete a portrayal of the era as possible in the limited space of the book. Shortly before *IBM's Early Computers* was published, C. J. Bashe retired, leaving Johnson, Palmer, and me to undertake a second volume devoted primarily to the development of IBM System/360.

Published books will be the most evident results of our efforts, but we have increasingly become aware of the importance of the references we have accumulated and the interviews we have made. These are being retained for use by us and future scholars. In charge of this activity is Caroline C. Coppola, the third person to join the project in 1980. Serving now as our publication specialist and archivist, she also continues to be responsible for all word-processing activities. □

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