

## CBI Director Bob Seidel is "On Board"

### CBI Acquires Griswold Papers

Ralph Griswold, a prominent figure in the history of programming languages, and his wife, Madge Griswold, have donated the first of a series of historically valuable records to CBI. In 1962, Ralph Griswold began to develop SNOBOL, a unique string-oriented programming language, at Bell Laboratories. He launched Icon in 1977, a language similar to SNOBOL4 but with more emphasis on efficient pattern matching. He and Madge Griswold have written extensively in this area of programming languages. After a visit to CBI last summer, the Griswolds agreed to donate their collection of records, then housed at the University of Arizona, to CBI.

Ralph Griswold joined Bell Laboratories after completing his doctorate in electrical engineering at Stanford University. He began work in the Programming Research Studies Department where he developed SNOBOL in collaboration with Ivan Polonsky and Dave Farber. In 1971 he married Madge Griswold, who worked at Bell Labs as a technical editor, and left Bell Labs to head the computer science program at the University of Arizona in Tucson. Ralph Griswold continued to work with SNOBOL and later worked on Icon.

The papers contain extensive information about SNOBOL, Icon, and variants of those languages, representing perhaps the best record of any programming language presently documented at

*Griswolds continued on page 3...*

Bob Seidel, a historian of modern science and technology, has joined the Charles Babbage Institute as its director. He was selected after a two-year search after CBI's previous director, Arthur Norberg, announced he would step down in 1992.

Bob has extensive experience in public history. At Los Alamos, he produced the *Laboratory Overview*,



*Bob Seidel, new director of CBI*

planned and coordinated the 50th anniversary celebration of the Laboratory in 1993, and was administrator of the Bradbury Science Museum. Bob previously was research historian for the Laser History Project and the Lawrence Berkeley Laboratory (LBL) history project, and director of research of the History of Engineering Program at Texas Tech University, where he taught the history of science and technology.

Bob received his Ph.D. from the University of California, Berkeley, in

1978. He was a Woodrow Wilson Fellow and, while a graduate student, won the Bicentennial Essay Contest of the National Science Teachers Association for his work on the rise of physics research at the California Institute of Technology, the University of California, and Stanford University between the wars. While at Berkeley, Bob also designed "Nuclear Science at Berkeley-The Lawrence Years," the central exhibit at the Lawrence Hall of Science. He studied with Carlo Cipolla, the author of several seminal works in the history of technology, John Heilbron, one of the leading historians of modern physics, and Roger Hahn, the author of a well-known history of the Paris Academy of Sciences.

Bob brings to CBI a long record of participation in team research in the history of science and technology. He worked with former CBI Director Norberg in the Project for History of Science and Technology of the Bancroft Library at UC, directed graduate students in research related to the history of engineering in the Southwest, ranging from studies of the semiconductor industry to the identification of historic engineering sites in Texas, New Mexico, Arizona and Nevada at Texas Tech, supervised the work of several graduate and postdoctoral researchers on the LBL history project, and directed a history project involving political scientists and historians at the graduate and postdoctoral levels at Los Alamos.

At the Bradbury Science Museum, Bob oversaw the construction of several new exhibits, including one on comput-

*Seidel continued on page 4...*

## CBI Offers 1995-96 Tomash Fellowship

The Charles Babbage Institute is currently accepting applications for the Adelle and Erwin Tomash Graduate Fellowship, sponsored by the Charles Babbage Foundation, to be awarded for the 1995-1996 academic year to a graduate student whose dissertation will address some aspect of the history of computers and information processing. Topics may be chosen from the technical history of hardware or software, business or economic aspects of the information processing industry, or institutional, social, or legal contexts of computing.

There are no restrictions on the venue of the fellowship. It may be held at the home academic institution, the Babbage Institute, or any other location where there are appropriate research facilities. The stipend will be \$10,000 plus an amount up to \$2,000 for tuition, fees, travel to the Babbage Institute and relevant archives, and other approved research expenses. Priority will be given

### CHARLES BABBAGE INSTITUTE NEWSLETTER

The Charles Babbage Institute, Center for the History of Information Processing, is sponsored by the University of Minnesota and the information processing community. Robert W. Seidel, Director.

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to students who have completed all requirements for the doctoral degree except the research and writing of the dissertation.

There is no special application form. Applicants should send biographical data and a research plan. The plan should contain a statement and justification of the research problem, a discussion of procedure for research and writing, information on availability of research materials and evidence of faculty support for the project. Applicants should arrange for three letters of reference and certified transcripts of graduate school credits to be sent directly to the Institute.

Complete application materials should be received by January 15, 1995. Send materials to:

Charles Babbage Institute  
103 Walter Library  
117 Pleasant Street S.E.  
Minneapolis, MN 55455, U.S.A.  
Telephone 612/624-5050. □

## Audrey Grosch Dies

Audrey Grosch, professor of library science at the University of Minnesota and former president of the American Society for Information Science (ASIS), died of cancer on July 16. She authored a number of books and articles on computers and library science. In addition to her ASIS work, she was president of the Twin Cities Chapter for the Association for Computing Machinery, a national board member of the Association for Women in Computing, and a member of the Northwest Chapter of the Data Processing Management Association. Professor Grosch was a Friend of CBI since 1982, served on the search committee for the CBI Archivist, and advised CBI on its use of microcomputer technology. The CBI staff will miss her support and advocacy. □

## New Friends of CBI

CBI gratefully acknowledges the support of three additional friends for 1994: Walter M. Carlson at the Patron level, Milton S. Ferguson at the Participating Associate level, and Henry G. Baker at the Associate level. □

## Fellowships Offered at Hagley, Dibner

The University of Delaware offers two- and four-year fellowships for a course of study leading to an M.A. or Ph.D. degree for students interested in careers as college teachers or as professionals in museums, historical agencies, and archives. The focus of study is the history of industrialization, including social, labor, business, and economic history, material culture, and the history of science and technology, American industrial history, and the industrialization of Europe and non-western societies. Resources for research include the manuscript, imprint, pictorial and artifact collections at the Hagley Museum and Library. Fellowships cover tuition, a yearly stipend and support travel to conferences, archives, and museums. Apply to the Coordinator, University of Delaware-Hagley Program, Department of History, University of Delaware, Newark, DE 19716, (302) 831-8226. The deadline for applications is Jan. 30.

The Dibner Institute for the History of Science and Technology invites applications to its Resident and Visiting Fellows Program for 1995-96 from candidates with advanced degrees and substantial scholarly accomplishment and professional experience in appropriate fields. Dibner Fellows are expected to reside in the Boston area during the term of their grants, to participate in the activities of the Dibner Institute community and to present their current work at appropriate occasions during their fellowship appointments. The Dibner Center includes the Burndy Library and provides office space, support facilities and full privileges at the library and at the libraries of consortium universities. Please send requests for further information and for application forms directly to: Trudy Kontoff, Program Coordinator, Dibner Institute for the History of Science and Technology, Dibner Building, MIT E56-100, 38 Memorial Drive, Cambridge, MA 02139 (Telephone 617-253-6989; Facsimile 617-253-9858; E-mail: kontoff@mit.edu). □

## Griswold Papers

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CBI. Among the 25 cubic feet of records already at CBI are publications relating to SNOBOL and Icon families, text and pattern programming techniques, and international correspondence primarily about SNOBOL 4 and Icon from about 1977 through 1990. The material is open to research, although access to the records will improve as the collection is further processed.

The Griswolds plan to donate the remainder of the collection over the next few years. In addition to all of the publications and books listed in the Griswolds' extensive bibliography (Ralph E. and Madge T. Griswold, compilers, *Bibliography of SNOBOL, SL5, Icon, and Related Programming Languages* Tucson: University of Arizona Dept. of Computer Science, 1990), these records will include paper correspondence, technical reports, bound notes, program listings, project documents, research notes, oral history recordings, electronic mail files, and even memorabilia (see Icon tee shirts in photograph).

The collection is the first acquired by CBI to include electronic mail files. Both Ralph and Madge Griswold were early users of electronic mail at the University of Arizona, and the files represent over twenty years of electronic correspondence. The files reveal valuable international discussion of programming languages and computer science interspersed with more routine communications. The size and volume of this machine-readable file preclude easy access to information. Many archives now face the question of how to preserve and provide access to electronic mail and have found no quick solution. CBI intends to use the Griswold file to investigate issues surrounding the use of historical electronic mail, and archivists from other institutions have expressed interest in the file. Until some privacy and access issues revolving around e-mail are resolved, researchers will not have access to this part of the collection.

The collection complements two oral histories of Ralph and Madge Griswold already available at CBI. David S. Cargo

## Griswold Oral Histories tell many stories

**C**BI oral histories with Ralph and Madge Griswold cover many aspects of the history of computing. In addition to specific programming languages, the interviews offer information about technology transfer and the computing environment over the past thirty years. We offer below excerpts from those interviews. The first compares the portability of SNOBOL and Icon. **SNOBOL4 was not very well structured; it was written at the time when the only viable implementation language was assembly language, and it's a very different kind of thing. It is, in fact, quite portable in certain kinds of computer architecture, although it doesn't fit the current ones very well. [Icon] is an entirely different thing. [SNOBOL] was much more of an**



*Madge and Ralph Griswold at the Univ. of Arizona Computer Science Dept. picnic wearing Icon tee shirts (ca. 1990).*

conducted the first interview (OH 201), which was part of a project about the history of Icon. Judy O'Neill conducted the second interview (OH 256) in 1993, which was broader in scope than the Cargo interview.

As records are sent to CBI, the staff will organize and create finding aids to the Griswold papers. Researchers interested in the collection should contact the CBI archivist, Bruce Bruemmer. □

**academic exercise, and an original exercise in implementation technique. [Ralph Griswold, CBI OH201]**

In another comment, Ralph Griswold tells how and why SNOBOL was developed and gives a special view of the fun he led to it.

**We had originally developed [SNOBOL] as a tool for our own use. Didn't have any anticipation that anybody else would want to use it. ... As a group we were just doing something that was fun and all of a sudden became very popular, which was puzzling. ... [Dave Farber] thought [SNOBOL] was a neat thing and wanted other people to know about it and wanted it to be distributed outside [of Bell Laboratories], but there wasn't any group focus on this. There were just individuals who were enjoying themselves and not thinking very coherently about anything like goals and objectives. [Ralph Griswold, CBI OH256]**

Finally, Ralph and Madge give different perspectives on becoming a programmer in the early 1960s.

**...when I went out looking for a job, I discovered everybody wanted programmers. ...They were desperate for programmers and every place I interviewed, they wanted me to be a programmer. The term "programmer" means something different now, but at that time these were high level technical positions. I decided in the process of these interviews that I did not want to be a programmer. These people had large programs to write or new computers and were trying to convert things and I just really didn't want to do that. I wanted to do research. [Ralph Griswold, CBI OH256]**

**When I was hired at Bell Laboratories, I was hired for a specific job as an editor at a much lower technical rank, even though I had a bachelors degree, than people with math majors who were hired in as programmers. I was told specifically by the personnel department, "We hire nobody but math majors or physics majors to**

*Griswold Oral Histories continued on page 4...*

## INRIA History of Computing Conference

Pierre-E. Mounier-Kuhn  
CNRS-Centre Roland-Mousnier  
Paris-IV Sorbonne  
1 rue Victor-Cousin 75005

The Institut National de Recherche en Informatique et Automatique (INRIA) in Sophia-Antipolis, France hosted the third "Colloque sur l'Histoire de l'informatique" in October 1993. This "technopole" (science park) groups a variety of public research facilities (INRIA, CNRS, France Telecom) and electronics companies (DEC, etc.), the IBM La Gaude laboratory, and the University at Nice. Two previous conferences on the history of computing at the University of Grenoble (1988) and the Conservatoire national des Arts et Metiers in Paris (1990) preceded this meeting, and a fourth conference is planned for November 1995.

The conference included related fields such as mechanics, automation, and control, and their interfaces with computing and compared historical with economists' and sociologists' approaches to the history of computing.

Lectures focused on five themes: (1) history of the computer industry (industrial policies, computer manufacturers, service and software companies, trades, norms, press and media); (2) history of teleprocessing and networks; (3) history of automation and control theory and of their relationships with computing; (4) evolution of knowledge representation and processing (evolution of the concepts and tools of man/machine communication, contribution of informatics to the theory of knowledge); and (5) the impact of computing on the conception and manufacturing of industrial products (computer imaging, integration of computing devices in various products).

More than sixty lectures were given in parallel sessions in three days and more than one hundred people attended the conference. The meeting featured an exhibition of vintage computing devices, including tabulators and electronic number crunchers of the heroic age, lent by the Musee des Arts et Metiers, Federation des Equipes Bull, IBM, and others, and ended with a special session about the computer museum at Sophia-

Antipolis.

The proceedings for this conference (Actes du 3e colloque Histoire de l'informatique) are available by contacting: Monsieur Guy Renard, INRIA, 2004 route des Lucioles, Sophia-Antipolis - 06565 Valbonne, France (Telephone: 33 - 93 65 78 64; Fax: 33 - 93 65 79 55; E-mail: simoneti@sophia.inria.fr)

A fourth conference in the history of computing is planned for November 1995 at INRIA/IRISA, Rennes, France. There will be two primary themes of the conference: (1) communication between people, machines and systems and (2) information processing and the military. The committee will consider papers on all subjects concerning the history of information processing, in France and abroad, as long as they are truly historical in nature. Possible subjects include the utilization of information by the public, by businesses and by government, history of companies, commercial strategies, research in universities and large organizations, and industrial research.

Anyone wishing to present a paper should submit three copies of a two page proposal to: 4th Colloque sur l'Histoire de l'Informatique, Jacques Andre, IRISA/INRIA Renne,

Campus universitaire de Beaulieu,  
35042 Rennes Cedex, France  
Telephone: 33 - 99 84 73 5  
Fax: 33 - 99 84 71 71  
Proposals must be submitted by 30 November 1994. □

## Griswold Oral Histories

*continued from page 3*

**become programmers." ... But while [Ralph] remembers everyone being hired as programmers, I remember them being specifically selected from math majors and taking anyone who had majored in math. ... You couldn't just walk in and say, "I really am interested in being a programmer. I want to do it." [Madge Griswold, CBI OH256] □**

## New CBI Director

*continued from page 1...*

ing, and planned a new museum that opened in the spring of 1993. He also planned and coordinated several scholarly meetings, including the 1993 meeting of the History of Science Society in Santa Fe.

Bob's research focuses upon the history of modern physical science and related technologies. With Heilbron, he is writing a history of the LBL (formerly the Radiation Laboratory of the University of California), of which the first volume, *Lawrence and his Laboratory* has appeared. Bob has published articles on the history of particle accelerators, lasers, and radar.

Bob's wife, Chris, is a speech pathologist. His daughter, Mary, entered high school this fall. Although his father's family is from New Mexico, his mother's lives in Minnesota, where he visited frequently as a boy. He is an avid hiker and canoeist and is eager to explore all of the outdoor activities offered by Minnesota. □

## CBI Director to speak at New Orleans Conference

The History of Science Society (HSS) will meet in New Orleans, LA on October 13-16, 1994, with the Society for Social Studies of Science (4S). The meeting will be at the Clarion Hotel, near the French Quarter, and features over 80 sessions. CBI Director Robert Seidel will present a paper, "Nuclear Policy, Computers, and Big Science, 1946-1963" in the 4S Session *American Nuclear Policy and Domestic Culture* at 9:00 a.m. on Thursday October 13. He will also participate in a panel on *Writing Contemporary History of Science in the Field: The Historian as Ethnographer and Employee*, on Sunday, October 16, at 9:00 a.m. □

*Production of this newsletter is supported by Analysts International.*

# Staff, Trustees, and Faculty Craft New Plans and Directions for CBI

by Bob Seidel

Nineteen-ninety-six will be the year of the computer—an exciting time to be associated with the Charles Babbage Institute! We are already engaged in plans for a variety of projects to celebrate 50 years of electronic computing. These include a traveling exhibit and a special number of *Annals of the History of Computing*. As a newcomer to CBI, I am excited by the potential of the Institute for growth which includes the possibility of a new home for the Institute in the University of Minnesota's Archives Center, which is now being planned.

We are casting a new vision for the future. Our staff, trustees, and University of Minnesota faculty will gather on September 30 for a strategic planning exercise that will help define the direction of CBI. The following observations, based upon my experience at the Institute and my visits to other centers during the past few months, indicate the opportunities which we will be considering in that process.

*Expanded Cooperative Research:* Centers like CBI have been established by practitioners of various fields so that historians of science and technology can accomplish what individual researchers have found difficult to do, e.g., projects like the just-completed CBI history of DARPA's Information Processing Techniques Office, which require cooperative, coordinated research in history and a support infrastructure which is seldom available to individual scholars.

The Center for History of Physics of the American Institute of Physics, the Center for the History of Chemistry, and the IEEE History Center have established the utility of this kind of research over the years. CBI can now perform similar research on topics of interest to the information processing community.

There is a clear need for such research. Contemporary concerns about international competitiveness, technology transfer, and dual-use technologies have focused considerable attention on the computer industry. It is an exemplar of the best America has to offer in



Bob Seidel and Pierre-E. Monier-Kuhn, a recent CBI visiting researcher

innovation and competitiveness. In science, business, and industry the computer has created new opportunities for a diverse population, a trend that will continue. The end of the Cold War offers new perspectives on the postwar development of science and technology, including a reevaluation of the contributions of the computer. There are many projects CBI can undertake, given staff resources and support.

*Enhanced Collection Access:* Last year we received 352 requests for information from patent law firms, photo researchers, and firms related to information in our collection. The acquisitions of the records of the Burroughs Corporation and Control Data Corporation have brought these collections to a total of 5000 linear feet. Unisys has generously supported the processing of the Burroughs Collection. The processing of other collections to make them accessible to scholars more rapidly and efficiently, and protect them better from the ravages of time, requires additional support. Among the projects proposed to do this are:

- creation of a database of over 600 videotapes and 200 films produced between 1946 and 1988, including

- duplication of deteriorating film resources
- development of a digital image database of 2000 photographs from the Burroughs and Control Data Corporation photograph collections

- enhancing accessibility of our records via Internet and CD-ROM

- research into processes and tools to make large e-mail files, such as the Griwsold mail files mentioned elsewhere in this *Newsletter*, accessible to research.

*Education of the Next Generation:* In addition to research and public service, CBI also has an educational role.

Through the Tomash Fellowships, CBI and the Charles Babbage Foundation have trained many of the scholars who are now contributing to the exploration of the history of information processing. At the postdoctoral level, there is a window of opportunity presented by the current structure of the historical disciplines involved. Because many scholars begin by examining the history of a scientific discipline or technological specialty in their graduate research, they may be more likely to assess the impact of the computer on that discipline or technology at the second stage of their scholarly careers if they are encouraged to do so.

Postdoctoral fellowships would attract other scholars into the history of computing while staffing our research projects. In addition to fellowships for graduate students and postdoctoral fellowships, CBI can work to facilitate the research of mature scholars in the field as the Rockefeller Foundation, the Center for the History of Physics, and other organizations have done.

*Forging Strategic Alliances:* History centers have traditionally enjoyed the support of disciplinary societies. Since the demise of AFIPS, CBI has not enjoyed the patronage of a major professional organization. We need to demonstrate to those organizations that exist in the computing field the need to provide for the history of information processing, and encourage affiliations whenever possible. To publicize the results of our

*CBI Plans continued on page 7...*



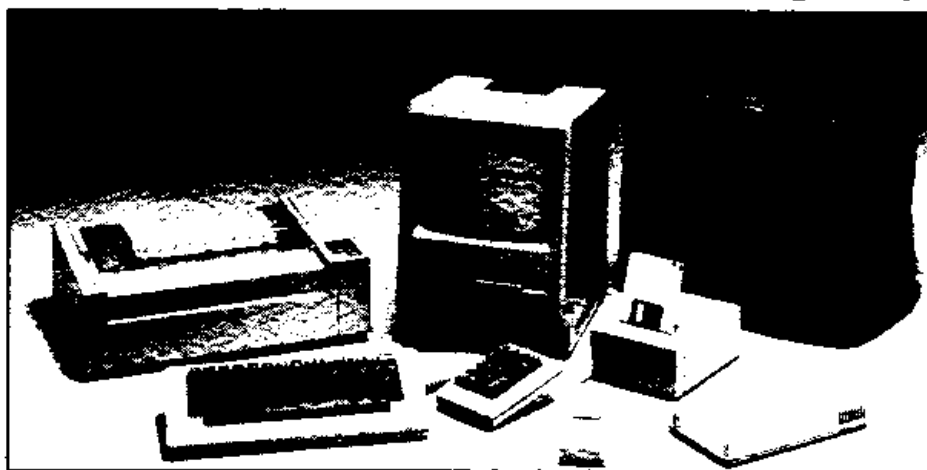
# Hobbyists will welcome new Collectors Guidebook and Registry

A growing number of collectors of outmoded microcomputers, minicomputers, and calculators try to keep up with the rapid turnover in computer technology. CBI continually receives inquiries from hobbyists interested in learning more about machines from Burroughs adding machines to microcomputer kits. This growth market has inspired Thomas F. Haddock to write *A Collector's Guide to Personal Computers and Pocket Calculators* by (Florence, Alabama: Books Americana, 1993; 366 pages, \$14.95, ISBN 0-89689-098-8).

Haddock strives to be comprehensive: his guidebook contains an enormous number of entries. He has cast his net broadly, using the following criteria to define personal computers:

- (1) Devices manufactured for sale to the public, at least in kit form. The definition does not include "Homebrew," other custom machines, or kits consisting solely of instructions.
- (2) Devices aimed (at least in part) at the home or hobbyist market, as opposed to those machines marketed exclusively to the professional or scientific market.
- (3) Devices that operate digitally.
- (4) Devices that operate electrically or electronically.
- (5) Devices that are programmable for different tasks by an operator. In the case of calculators, the book drops the requirement for programmability.

Although these criteria are broad, they do not define the content of the book. On the one hand, machines are included



*The Macintosh computer, announced in early 1983 with 128K of RAM and a 3.5" 400K floppy disk, retailed in 1984 for \$2495. The Collector's Guide lists the present value of the computer at \$200 to \$300 (photo courtesy of Apple Computer).*

simply because of their collector interest. On the other hand, not all machines fitting these definitions are part of this compilation. The guidebook includes virtually every early hobbyists' machine. The inclusion of a machine does not mean that it represented a major step forward. Some machines represented no technological change or even a reversion to obsolete technologies, but were popular and marketing successes and therefore collectibles.

The values listed in this work will intrigue, if not dismay, most users of microcomputers, many of whom will remember their retail value when their machines were the state of the art. The prices represent the market value of a complete, basic system, as originally sold with case, keyboard, monitor, etc., but does not assume that the system operates.

The guide is arranged by type of equipment and by date of introduction or

of production.

Haddock plans to update his information to enhance the accuracy of future versions and welcomes input from any knowledgeable people through his publisher. He hopes to replace his occasionally inferior pictures by higher-quality photographs and encourages collectors to submit pictures of their machines.

The *Collector's Guide* grew out of the Computer Collector's Register, a registry established several years ago, to estimate the interest, demand, and prices for various machines listed in this guidebook. Haddock hopes that the register will help communication between collectors, and provide a forum for collectors from all over the world. For further information, write:

Computer and Calculator's Register  
Post Office Box 2626  
Ann Arbor, MI 48106. □

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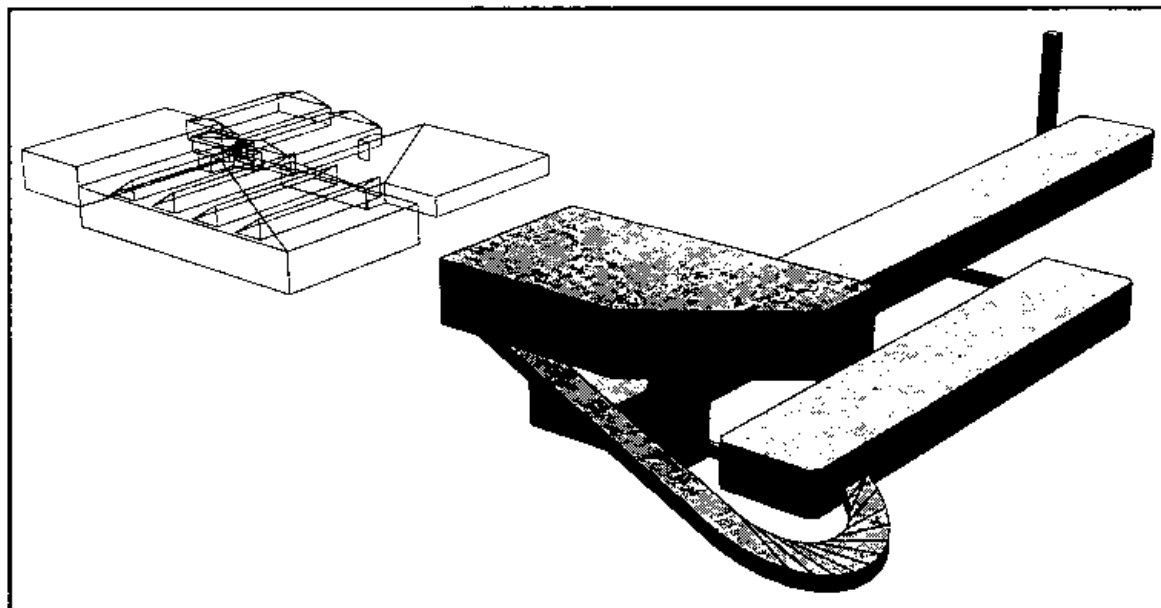
## CBI Plans include new home in UM Archives Building

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research to the broader community of information processing professionals, we can use exhibits, occasional publications, brochures, newsletters, and electronic means.

The information-processing industry can make use of our expertise in collection development. CBI has three full-time staff devoted to solving problems of access to, and organization of, industry records. Historians will make use of these records only if they are well-organized and accessible, and firms can benefit from our experience in organizing their own collections.

CBI can respond to all of these opportunities if the endowment of the Institute is strengthened in the next few years. An endowment campaign to be launched this fall will seek to provide that support for CBI and other University of Minnesota facilities, and the new archives center now being planned at the University of Minnesota offers an opportunity for CBI to move into expanded quarters. The endowment campaign can provide for growth, and will rely upon the support of friends of CBI, trustees, and directors. We would like to provide a level of basic support greater than that which CBI has enjoyed



Computer image of proposed Archival Facility showing office superstructure and underground storage cells (courtesy of Meyer, Scherer & Rockcastle, Ltd.).

in the past.

At present, we have very limited facilities for visiting scholars and the growth of our collections has all but filled the space presently available to us in Walter Library. The future growth of CBI will depend in important ways upon our response to the opportunity presented by the new Archives Center, which will not only provide better facilities for the storage and processing of historical records, but also a more accessible, attractive, and functional venue for

research by visiting scholars, Tomash Fellows, and post-doctoral and mature researchers.

We have a wonderful opportunity to provide for the future of the Charles Babbage Institute in the new facility. A new reading room, storage facilities, and offices will allow us to accommodate more staff, visitors, post-doctoral researchers, and graduate assistants. We will be seeking the support of our Trustees and friends in order to capitalize on these opportunities. □

## SHOT Conference highlights computer history in four sessions

The Society for the History of Technology (SHOT) will hold its annual meeting October 6-9, 1994 at the Lowell Sheraton Hotel in Lowell, Massachusetts. The Information, Computing, and Society special interest group will meet during the lunch break on Friday Oct. 7.

Several sessions and papers will address the history of computing and information: the session *Electronics, Business Strategy and the State* includes "Why Build Computers? The Cold War, Project Whirlwind, and Air Defense, 1945-58," by Paul N. Edwards, Stanford University, "Technical Advance and the Organization of R&D: The Cases of Shockley and Fairchild," by Daniel Holbrook, Carnegie Mellon University, and Judy E. O'Neill, CBI Associate Director, will present "'Prestige Luster' and 'Snowballing Effects': IBM's

Development of Computer Time-Sharing." Tomash Fellow Paul Ceruzzi of the National Air and Space Museum will comment. *The Computer in Historical Context* will feature talks on "Theory and Practice: Obstacles and Opportunities in the Development of the British and American Differential Analyzers," by Mark Bowles, Case Western Reserve University, "Teaching the Computer to Count: The Struggle to Define Computing at MIT, 1940-1950," by Larry Owens of the University of Massachusetts, and "Computer, Culture and Power: An Organizational Perspective on the Development of Computer Systems," by Dirk de Wit, Erasmus Univ., Rotterdam. CBI Director Bob Seidel will assess the talks. A session entitled *Control, Information, and Management Systems 1930-1960* will include presentations on

"The Whirlwind Computer and the Development of Systems of Information and Control," by Jay Forrester of MIT, "From Machinery to Information: Control Systems Research at MIT in the 1930s," by David A. Mindell, MIT, and "'As Fast as Technology Will Allow': PERT and the Spinning of Seamless Webs in Cold War R&D Management," by Eric P. Rau of the University of Pennsylvania. *Between Technology and Markets: the Business of Electricity and Electronics in France* includes "Conquering Technical Independence? The Case of the French Computer Company," by Pierre-E. Mounier-Kuhn, CNRS and Centre Roland-Mousnier, and "Catching Up in Technology and Falling Behind in the Market: The Business of French Semiconductors," by Antonio Botelho of MIT and University of Pennsylvania. □

# Fortieth Anniversary of Naval Ordnance Research Calculator

Forty years ago, computer users hailed the NORC (Naval Ordnance Research Calculator), built by IBM for the U.S. Naval Proving Ground in Dahlgren, Virginia, as the "fastest and most powerful calculator yet developed." It featured electrostatic storage of 2000 sixteen-decimal digit words and an add time of 15 microseconds. It solved large problems relating to guided missiles, aerodynamics, hydrodynamics, and other scientific fields. At NORC's dedication at the Watson Scientific Computing Laboratory on December 2, 1954, Wallace Eckert introduced John von Neumann, who made the following remarks about the state of computers:

"In speaking of the importance of NORC, I would also like to add that while the speed which is achieved is of great importance--and I have indicated some of the reasons for this--some other things have been achieved here which are also of very great importance. Those of you present who have lived with this field, and who have lived and suffered with computing machines of various sorts and know what kind of life this is, will have appreciated the fact that this machine has been in a completely assembled state for less than two months,



*The NORC, ca. 1955 (from Martin H. Weik A Third Survey of Domestic Electronic Digital Computing Systems BRL Report No. 1115, 1961, p. 717).*

has been working on 'problems' less than two weeks, and that it ran yesterday for four hours without making a mistake. For those of us who have been exposed to the realities of computing machines, it will not be hard to see what this means. It is indeed sensational for an object of this size, and that this has been achieved is quite a reassurance regarding the state of the art and regarding the complexity to which one will be able to go in the future. This is a machine of about 9,000 tubes and 25,000 diodes. These numbers are very high, but such numbers have occurred before. But machines of this

type in the past took a year or more to 'break in.'\*\*

The NORC was placed in service at Dahlgren in the summer of 1955, and was decommissioned in 1968. It continued to operate reliably--remaining available 92% of the time--and inspired several design features of IBM's first commercial computer, the IBM 701. □

\* From John von Neumann, *Problems in High Speed Computing: On the occasion of the first public showing of the IBM Naval Ordnance Research Calculator, December 2, 1954*. U.S. Government Computing Collection, Naval Agencies, CBI 63; Reprinted in *Papers of John von Neumann on Computing and Computer Theory*, CBI Reprint Series for the History of Computing, Volume 12.

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