



# The Charles Babbage Institute

## The Center for the History of Information Processing

### EARLY COMPUTER SURVEYS

Often CBI receives inquiries about early computers and installations of the post-war period. Questions about early machines largely relate to technical characteristics: How large was the internal storage? How fast was the processor? For machines introduced in the late-1950s there is greater interest in their marketing aspects: When was it introduced? What was its price? Where was it installed? In both cases researchers need information to compare one machine to another. Luckily the government and the computer industry were quick to develop a number of surveys of digital computers.

Historians of computing owe the largest debt to the Navy's Office of Naval Research (ONR), which was responsible for producing some of the earliest comparative surveys available to individuals both in government and outside. *A Survey of Large-Scale Digital Computers and Computer Projects* first came out as a Monthly Research Report in 1947 and was later revised four times (1948, 1950, 1953, and 1954). The first three issues offered narrative descriptions of the earliest U.S. digital computers, with a small section devoted to machines developed in Britain and other countries. The 1953 revision was expanded greatly and the narrative descriptions replaced by a standardized format each a page in length. Approximately 100 computers, both foreign and domestic, were described in this invaluable survey.

The ONR produced two other publications of general interest to researchers. The first, the *Digital Computer Newsletter*, is well known to individuals in the early computer industry. Begun in April, 1949, the *Newsletter* was issued quarterly to provide "information concerning recent developments in various digital computer projects." It originally contained descriptions of computers, but later was expanded to include news of computing centers, components and special projects. From 1954 through 1957, the *Newsletter* also appeared in the *Journal of the Association for Computing Machinery*; after 1958 it was moved to *ACM Communications* until 1960, when ACM stopped reprinting it. The *Newsletter* ceased publication in 1968.

The second ONR publication of note was a series of descriptions of computing in other countries. Nelson Blachman of the ONR's London Branch authored articles in 1959 and 1960 that described machines and computing centers in many western and eastern European countries. Much of

this information was summarized in *European Scientific Notes*, another ONR London Branch publication. All of the pieces provide historians with valuable state-of-computing synopses. CBI has citations to earlier ONR writings about computing in other countries, but those have not been examined.

The most comprehensive early computer survey from a U.S. government agency was the Ballistic Research Laboratories' *A Survey of Domestic Electronic Digital Computing Systems*, authored by Martin H. Weik. The first survey (BRL Report 971) was released in December, 1955, and included factual information about each computer, as well as

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### FROM CBI'S PHOTOGRAPH COLLECTION



*A demonstration of Zatocoding, a punched card information retrieval system developed by Calvin N. Mooers in 1947. The photograph is part of a large collection of records recently donated to CBI by Mooers with the assistance of the Massachusetts Institute of Technology Archives. The collection includes the records of the Zator Company, as well as Mooers' personal records.*

## **CBI PAST FELLOWSHIP RECIPIENT COMPLETES DISSERTATION**

William McHenry, the third recipient of the Charles Babbage Institute Predoctoral Fellowship, has recently completed his doctoral dissertation at the University of Arizona. The title is "The Absorption of Computerized Management Information Systems in Soviet Enterprises." Dr. McHenry uses historical analysis extensively in his economic and policy study. His main aim is to ascertain the extent to which computerized management information systems have been absorbed into Soviet enterprises, the factors facilitating or hindering this absorption, and the long-term prospects for these systems. The extensive raw and processed information about Soviet computing collected in the dissertation should prove valuable for further historical study.

Dr. McHenry has been appointed assistant professor in the School of Business Administration at Georgetown University (Washington, D.C. 20057), where he will teach Management Information Sciences and continue his research on Soviet computing. Copies of the dissertation are available directly from Dr. McHenry or from University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106.

## **CBI ANNOUNCES PREDOCTORAL FELLOWSHIP AND PROFESSIONAL INTERNSHIP FOR 1986-87**

CBI is accepting applications for a **Graduate Fellowship** to be awarded for the 1986-1987 academic year to a graduate student whose dissertation will address some aspect of the history of computers and information processing. Thesis topics may be chosen from, but are not limited to, the infrastructure of the information processing industry, and specific technological developments in the information sciences, including both hardware and software. Proposals which deal with the economic and organizational milieu of these developments, or with the economic, legal or social history of computing are especially encouraged.

There are no restrictions on the location of the academic institution which will be the venue for the Fellowship. Residence can be at the home academic institution, other research facility where there are archival materials, the Babbage Institute, or some combination of these. The stipend will be \$5,000 plus an amount up to \$2,500 for tuition, fees, travel, and other research expenses. Priority will be given to students who have completed all requirements for the doctoral degree except the research and writing of the dissertation, though less advanced and incoming graduate students will also be considered. Fellows may reapply for up to two one-year continuations of the Fellowship.

Applications should include biographical data and a research plan. Applicants should arrange for three letters of reference, certified transcripts of college credits and GRE scores (or their equivalents abroad) to be sent directly to the Institute.

The **Professional Internship** is to be awarded for a period of three to nine months between June 1, 1986, and May 31, 1987. It is available to professional staff interested in an introduction to the history of information processing. Appropriate applicants might include, but are not limited to, historians and social scientists interested in the history of information processing and its infrastructure, academics interested in preparing new courses in this history, or records managers and archivists interested in related archival problems.

Residence is required at the Babbage Institute, on the University of Minnesota campus. Interns are required to conduct a research project under the direction of the Institute staff. Routine office and clerical support services are provided.

The stipend for the Intern Fellowship is \$1,000 per month. Interns may receive additional outside support, but must devote their full time to the history of information processing while the Internship is in effect.

Applications should include biographical data, a statement of research interests, a proposal of dates during which the Internship would be held, and the names, together with telephone numbers and addresses, of three references.

Applicants for the Predoctoral Fellowship and the Professional Internship should send their materials to The Charles Babbage Institute, University of Minnesota, 104 Walter Library, 117 Pleasant Street S.E., Minneapolis, MN 55455, U.S.A. by January 15, 1986. No special application forms are required. Dependent upon funding one or both of these awards may be made.

## **CSAC PROVIDES A VALUABLE SERVICE TO SCHOLARS OF THE HISTORY OF SCIENCE AND TECHNOLOGY**

During the twelve years it has been in existence, the Contemporary Scientific Archives Centre (CSAC) in Oxford has produced over a 100 catalogues for collections processed by the Centre's staff. Their work is broadly focused on the papers of scientists and engineers, but includes the personal papers of a number of individuals whose activities influenced developments in computer science. CBI is very pleased to have been able to contribute to the Centre's program and to the preservation of materials related to the history of information processing by providing financial support for the Centre's activities during the past five years.

Historically, the Centre developed from the growing concern from the 1950s onwards by official institutions and by individual scientists and historians about the preservation of the manuscript records and papers of distinguished scientists and engineers. This concern was felt acutely by Professor Margaret Gowing, official historian of the UK Atomic Energy Authority, who found in the course of her research that little or no provision was made to preserve the papers of leading figures in the scientific and political development of the wartime and postwar atomic project.

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## INTERNATIONAL COMPUTER DEVELOPMENT 1941-1955

In our efforts to better understand the development of computing internationally, CBI has been collecting basic information about computer equipment and companies outside the United States to compare with our detailed information about U.S. computing. The accompanying chart provides information about computers in operation or in advanced stages of completion outside the U.S. by 1955. This period was chosen to examine the character of computing before commercially manufactured computers were predominant. Dates given in most cases were when the machines first became fully operable. Information for this chart was taken from various surveys of computing equipment, reports of private consulting companies, reports of the U.S. Office of Naval Research—London branch, and accounts of first person participants. We recognize the incompleteness of this record and would welcome comment and additional information.

Country	Organization	Machine	Year
Belgium	Bell Telephone Manufacturing Co.	—	1954
Britain	Government Code and Cypher School (Bletchley Park)	Colossus	1943
Britain	Elliott Brothers	*152	1947
Britain	Cambridge University	EDSAC	1949
Britain	Manchester University	Mark I	1949
Britain	Imperial College, London University	*ICCE	1950
Britain	National Physical Laboratory (Teddington)	Pilot ACE	1950
Britain	Atomic Energy Authority (Harwell)	*—	1951
Britain	Leo Computers (Lyons Electronic Office)	Leo I	1951
Britain	Ferranti	Mark I	1951
Britain	Birkbeck College, London University	APE(R)C	1952
Britain	Elliott Brothers	Nicholas	1952
Britain	Elliott Brothers	Eccles	1953
Britain	Elliott Brothers	401	1953
Britain	Manchester University	Transistor prototype	1953
Britain	Ministry of Supply (Malvern)	MOSAIC	1953
Britain	Royal Aircraft Establishment (Farnborough)	*RASCAL	1953
Britain	Telecommunications Research Establishment (Malvern)	TREAC	1953
Britain	Ferranti	*Mark I	1954
Britain	Manchester University	MEG	1954
Britain	Powers-Samas	*PCC (Punched-Card Calculator)	1954
Britain	British Tabulating Machine Co. (BTM)	HEC 1200 (Hollerith Electronic Computer)	1955
Britain	Elliott Brothers	WREDAC	1955
Britain	Elliott Brothers	402	1955
Britain	English Electric	DEUCE	1955
Britain	Manchester University	MV950 prototype	1955
Britain	Ferranti	PEGASUS	1955
Britain	Atomic Research Establishment (Harwell)	CADET	1955
Czechoslovakia	Res. Inst. for Mathematical Machines	SAPO	1951-1958
Denmark	Regnecentralen (Dansk Institut for Matematikmaskiner)	DASK	1953-1958
East Germany	Carl Zeiss Optical firm (Jena)	*Oprema	1955
France	Machines Bull	Gamma 2	1951
France	Machines Bull	Gamma 3	1952
France	Société d'Electronique et d'Automatisme (SEA)	CUBA (Calculateur Universel Binaire de l'Armement)	1952
France	SEA	Cab 2000 series	1955
Israel	Weizman Institute (Rehoboth)	WEIZAC	1955
Italy	Inst. Naz. per le Applic del Calcolo	FINAC	1955
Italy	University of Pisa	CEP (Calcolatrice Electronica Pisa)	1955-1957
Japan	Tokyo University	*Statistical relay computer	1939-51
Japan	Tokyo University	TAC	1952-59
Japan	ETL	*Mark I	1952
Japan	ETL	*Mark II	1955
Netherlands	Mathematisch Centrum	*ARRA I	1951
Netherlands	Mathematisch Centrum	ARRA II	1953
Netherlands	Post-Telephone-Telegraph Laboratory	PTERA	1953
Netherlands	Fokker Airplane Works (Amsterdam)	FERTA	1955
Norway	University of Oslo (Norwegian Computing Center)	NUSSE	1953

Russia	Mathematical Institute, Ukranian Academy of Science, Kiev	MESM	1950
Russia	—	BESM 1	1952
Russia	—	M1	1952
Russia	—	M2	1953
Russia	Ministry for Machine Building	STRELA	1953
Russia	Ministry of Precise Mechanics	URAL 1	1954
Russia	—	M3	1955
Sweden	Board for Computing Machiner	*BARK	1950
Sweden	Board for Computing Machinery	BESK	1953
Switzerland	ETH, Zurich	ERMETH	—
West Germany	*Zuse	Z-3	1941
West Germany	Zuse KG	*Z-4	1950
West Germany	Zuse KG	*Z-5	1953
West Germany	Max Planch Institute (Göttingen, later Munich)	G-1	1953
West Germany	Max Planch Institute (Göttinger, later Munich)	G-2	1954
West Germany	Technische Hochschule (Munich)	PERM (Programmgesteuerte Electronische Rechenlage München)	1950-1956
West Germany	Technische Hochschule (Darmstadt)	DERA	—

\*Does not meet all requirements of a general purpose, digital, electronic, stored program calculating system.

## PUBLICATIONS

- *Proceedings of a Symposium on Large-Scale Digital Calculating Machinery* (Held at Harvard University, 7-10 January 1947). Vol. 7, CBI Reprint Series for the History of Computing. New introduction by William Aspray. (Cambridge, MA: MIT Press; Los Angeles: Tomash Publishers, 1985.) ISBN0262081520.

This volume is a facsimile of the original edition published in 1948 by the Harvard Computation Laboratory.

- *A Manual of Operation for the Automatic Sequence Controlled Calculator* (by the Staff of the Computation Laboratory). Vol. 8, CBI Reprint Series for the History of Computing. New introduction by Paul Ceruzzi. (Cambridge, MA: MIT Press; Los Angeles: Tomash Publishers, 1985.) ISBN0262010844.

This volume is a facsimile of the original edition published in 1946.

- Recent articles of interest in the history of computing:

William Aspray, "The Scientific Conceptualization of Information: A Survey," 7(April 1985):117-140.

William Aspray, "Should the Term Fifth Generation Computers Be Banned?," *Jour. of Computers in Mathematics and Science Teaching*, Spring 1985, pp. 36-38.

Martin Campbell-Kelly, "Christopher Strachey, 1916-1975," *Annals of the History of Computing*, 7(January 1985):19-42.

R. L. Graham and Pavol Hell, "On the History of the Minimum Spanning Tree Problem," *Annals of the History of Computing*, 7(January 1985):43-57.

Cuthbert C. Hurd, "A Note on Early Monte Carlo Computations and Scientific Meetings," *Annals of the History of Computing*, 7(April 1985):141-155.

Margaret Milligan, "Data Processing Digest: Thirty Years Before the Masthead," *Annals of the History of Computing*, 7(July 1985):245-250.

John C. Nash, "The Birth of a Computer (An interview with James H. Wilkinson)," *BYTE*, February 1985, p. 177ff.

Mina Rees, "The Federal Computing Machine Program," *Annals of the History of Computing*, 7(April 1985):156-163.

James E. Tomayko, "NASA's Manned Spacecraft Computers," *Annals of the History of Computing*, 7(January 1985):7-18.

James E. Tomayko, "Helmut Hoelzer's Fully Electronic Analog Computer," *Annals of the History of Computing*, 7(July 1985):227-240.

George E. Valley, Jr., "How the SAGE Development Began," *Annals of the History of Computing*, 7(July 1985):196-226.

The Charles Babbage Institute For the History of Information Processing is sponsored by AFIPS and the information processing community. Arthur L. Norberg, Director.

The Charles Babbage Institute *Newsletter* is a publication of the Charles Babbage Institute for the History of Information Processing, University of Minnesota, 104 Walter Library, 117 Pleasant Street S.E., Minneapolis, Minnesota 55455, telephone (612) 376-9336. The *Newsletter* reports on Institute activities and on other developments in the history of information processing. Permission to copy without fee all or part of this material is granted provided that the source is cited and a copy of the publication containing the copied material is sent to the Institute.

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descriptions of installations. Most of the data are presented in a standard form, though the form varies according to the amount of information supplied by manufacturer or installation. Three subsequent revisions were released in 1957 (BRL 1010), 1961 (BRL 1115) and 1964 (BRL 1227). The 1964 version was actually a supplement to the 1961 revision; the others were cumulative. The size of the surveys followed the growth of the computer industry: the first was 273 pages long; the second, 453 pages; and the third, 1131 pages. All four versions contain valuable glossories and comparative lists.

Once the use of the computer was accepted by the business community, the publishing industry was quick to take over the task of surveying computing equipment. However, only a few publishers started prior to 1960; most popular computing surveys such as Auerbach's *Standard EDP Reports*, Adams Associates' *Computer Characteristics Quarterly*, and Gille Associates' *Data Processing Equipment Encyclopedia* all began publication in the early 1960s. One 1950s survey, Gille's *The Punched Card Data Processing Annual*, included some information about digital computers, but nothing beyond the information in the Weik surveys.

One interesting survey that began in 1955 was R. Hunt Brown's *Office Automation*. It described itself as a "non-technical work on office electronics in business language." In 1957, it was divided into *Office Automation*, which was devoted to hardware, and *Office Automation Applications*, which covered computer applications for various businesses. While much of the series is a general introduction to business automation, it includes good descriptions of a number of early commercial installations and systems through the use of case studies. By 1959, seven specialized editions of *Office Automation* were being produced for banking, government, distribution, operations research, manufacturing, insurance and utilities. The basic series was eventually taken over by Hitchcock Publishing Company.

The commercial equivalent of the *Digital Computer Newsletter* was Edmund C. Berkeley's *Computers and Automation*, which started under various titles during 1951. Actually Berkeley was involved in providing assessments of computer developments as early as 1948. These were written for Prudential Insurance (his employer at that time), but widely circulated (and prized) by others involved in computing at that time. During the 1950s, *Computers and Automation* featured articles about individual machines, system applications and computing techniques. It also carried a "Roster of Automatic Computers," which contained information on the type, size and quantity of each computer being produced. *The Computer Directory* was published as an annual supplement to every June issue and included a "Roster of Products and Services" in the computing field. While the rosters are little more than comprehensive lists, they can be helpful to researchers.

CBI has less information about early foreign-produced surveys, although two surveys from the United Kingdom

are relatively well-known. Both were published by Computer Consultants Limited. The first, *British Commercial Computer Digest*, was originally issued in 1959 with subsequent editions through the 1960s. It contains basic information about memory, price, physical characteristics and installations for machines marketed in the U. K. The second is *A Record of Vintage Computers*, a 1965 retrospective compilation of "all vintage computers developed and manufactured throughout the world." It includes a page of standardized information on each computer, including year of introduction and the number of installations in Britain or the "U. S. A. and the rest." A number of useful lists are found in the appendices.

As with all surveys, factual information must be viewed with some suspicion. Often system configurations or machine versions vary between surveys, so seemingly similar machines may be described quite differently. All of the surveys mentioned avoid subjective analysis of computers or systems. Thus researchers needing information about a computer's market position or competition should view these surveys as a starting point for research.

CBI is interested in any other information about early surveys, both domestic and foreign. The Institute is eager to preserve outdated surveys for historical research, and welcomes donations of such records.

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Before the Centre began work, in April 1973, several important decisions had already been taken which still define its operations. It is concerned primarily with the papers of individuals, not with departmental or institutional records as such; the term "contemporary archives" is roughly defined as the papers of those dying after 1945; more important, the Centre is not an "archive" and does not retain the collections which it locates and processes. The normal mode of procedure is that, when an inquiry has been authorized, the Centre's staff will assemble and collect material from families, colleagues or executors and bring it to Oxford, often from several sources and over a considerable time span; it will then be sorted and catalogued, and an index of correspondents compiled; the completed collection is then delivered for permanent deposit in an appropriate national or university library or archive in accordance with the wishes of the family. This system is very cost-effective and has proved its worth. The receiving library takes in a collection boxed, catalogued and ready for shelving, and with any relevant conditions of deposit and access agreed in advance; material can be made available to scholars subject to restrictions of confidentiality where applicable; and the Centre maintains a continuous flow of work always keeping something like fifteen collections in hand at various stages of completion so that no time is wasted in unforeseen or unavoidable delay.

The mention of restricted access is of particular relevance to the Centre's activities. The material it handles is almost

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always of very recent date. This obviously involves special problems of sensitive material and confidentiality, and much detailed work is required to enable adequate recommendations to be made on conditions of access. The Centre is very conscious of its responsibility as mediator between families and donors who entrust papers to its care, and archivists or curators who accept and service the completed collections.

What type of "contemporary archives" are dealt with? They vary with individuals and disciplines. Theoreticians keep less than experimentalists; mathematicians exchange ideas by correspondence; and there is always the temperamental divide between the "squirrels" who keep everything and the "scorched-earthers" who keep nothing. Generally speaking, one hopes to find (a) biographical material perhaps with details of career, appointments, honours, war service, special interests or family concerns; (b) material of scientific or professional interest dealing with research and discovery, academic or educational career as lecturer, head of institution, or director of research, talks and lectures, membership of learned societies or associations, participation in conferences and the international scientific world; (c) material reflecting the important role played by scientists in wider aspects of public life such as service on advisory boards, government commissions, industrial consultancies, secondment overseas or to developing countries, political interests, broadcast or television appearances and many similar activities.

To date, the Centre has published 106 catalogues with several in varying degrees of completion, as well as its twice-yearly Progress Reports which are widely circulated and a short guide for scientists and their families on "Preserving Scientific Source Materials." Complete sets of the catalogues are held in the U. S. at the Library of Congress

and the American Philosophical Society, Philadelphia, Pennsylvania.

The following short list is confined only to work on mathematics and computing; the place of deposit all in the U. K.

Keith Fredric Bowden (Computer Science), CSAC Catalogue no. 105/2/85, 17 pp., deposited in Essex University Library.

Edward Crisp Bullard (Geophysics), CSAC Catalogue no. 100/4/84, 373 pp., deposited at Churchill College, Cambridge. (As part of ECB's work, he was active in developing computer applications for the processing of large amounts of observational data.)

Stanley Gill (Computer Science), CSAC Catalogue no. 57/1/78, 73 pp., deposited in Science Museum Library, London.

Albert Percival Rowe (Telecommunications Engineer), CSAC Catalogue no. 47/1/77, deposited in Imperial War Museum, London.

William Renwick (Computer Science), CSAC Catalogue no. 84/2/82, 9 pp., deposited in University Library, Cambridge.

Christopher Strachey, (Computer Science), CSAC Catalogue no. 71/1/80, 197 pp., deposited in Bodleian Library, Oxford.

Alan Turing (Mathematics of Computation), CSAC Catalogue no. 53/7/77, 19 pp., also supplement, CSAC 104/1/85, 16 pp., deposited in King's College, Cambridge.

The Centre cannot offer reading space. Inquiries about specific collections should be addressed to the archivists at the relevant place of deposit. Copies of catalogues may be purchased from the Centre (16 Wellington Square, Oxford OX1 2HY, UK).

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