CHARLES BABBAGE INSTITUTE
NEWSLETTER
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THE CENTER FOR THE HISTORY OF INFORMATION PROCESSING

Origins of the Computer Industry

A Study of ERA

In an effort to effectively develop archives resources, CBI is engaged in several historical research activities. These help define the events to document and reveal the records most appropriate to seek. One activity focuses on the origins of the industry, and one aspect of this activity is the study of Engineering Research Associates (ERA) to complement the studies of other early entrants into the digital industry.

Technological and entrepreneurial development always contain interconnections of groups that make success possible. Several times we have called attention in this Newsletter to accomplishments of people with ERA, Inc., and the ERA Division of Remington Rand, Inc. There are photographs of equipment and people to help to bring those halcyon days to life for us. Genealogies of the many companies that trace their origins to ERA reinforce the idea that ERA was a major episode in the development of high-technology industry. The connections obvious in the chart and assembled through a collage of photographs help us to understand the history of the industry. In this report, CBI goes beyond this type of connection to a few more subtle and less well known examples of connections that were very important in ERA's history.

For the past year, CBI has been studying ERA's surviving records and talking with many people who were with the company. A richer story of the origins is unfolding as we seek the previous connections of people who joined the company in 1946 and 1947. The basic story of the founders group was narrated well in the article by Erwin Tomash and Arnold A. Cohen—two ERA veterans (*Annals of the History of Computing*, 1(October 1979)). The men behind the idea—Howard T. Engstrom, Ralph Meader, and William C. Norris—represented two aspects of the wartime Naval intelligence apparatus. Engstrom and Norris were at the intelligence facility in Washington, D. C. Meader was stationed at the Naval Computing Machine Laboratory in Dayton, Ohio. Meader became the link between the three technical founders and an investment group.

Meader served as contracting officer for the NCML. He had a counterpart in an Army installation in Chicago, Nelson Talbot. One of Talbot's contractees was the Northwestern Aeronautical Corporation of St. Paul. Meader it seems talked to Talbot, who in turn discussed the plan of Engstrom and Norris with Parker. This is interesting because initially Engstrom and Norris sought financing from several private enterprises in high-technology, especially in aviation. Parker had been investing in aviation companies for over a decade, and had served on the boards of several. He immediately responded to the idea for a company such as ERA. Thus, the two groups came together. Because Parker's wartime venture was in St. Paul, it is not surprising to find ERA settling there and a few local financiers associated with the new firm.

Some early employees of ERA came from the group Engstrom and Norris were part of in the Navy, but by no means all. Other connections play an important role in the staffing. For example, a student of Engstrom's at Yale, Robert Gutterman, did wartime service at the Naval Ordnance Laboratory (NOL). Engstrom and Gutterman became close social friends. Gutterman also became friendly with a col-

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CBI Awards Two Pre-Doctoral Fellowships for 1986-87

Encouraged by the increased quality and number of fellowship applications, CBI is awarding two fellowships for 1986-87 to doctoral candidates writing dissertations in the history of information processing: Clifford I. Nass of the Department of Sociology at Princeton University, and Stuart S. Shapiro of the Program in Applied History and Social Sciences at Carnegie-Mellon University.

In his dissertation Nass investigates the shift in the United States from an industrial to a "post-industrial" society by examining changes over the period 1870-1980 in the distribution of workers across those tasks that produce or distribute information. His method is to build a general model of the information economy as an information processing system in which information flows from one worker (processor) to another until the information is consumed.

Nass holds a bachelor's degree in mathematics from Princeton. He has collaborated on sociocybernetics with James Beniger of the Annenberg School of Communication. He has also worked for IBM Research Center on a graphics system and for Intel on the software development of an engineering work station. The fellowship will support intensive summer work to complete the dissertation. This fall Nass will join the Stanford University Communications Department, where he will continue his study of the information processing industry.

Shapiro, who holds the 1985-86 Babbage Fellowship, will continue his dissertation research on the historical development of computer software, partly in an effort to better understand the software "crisis" that some perceive to be occurring today. Shapiro has broken the technological advance of software into five chronological periods. For each of

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league in his section Arthur Hammindinger. Gutterman was entertained by Hammindinger and his roommate Sidney M. Rubens. At the time Gutterman learned from Engstrom what was afoot with ERA, he excitedly passed on the information to Hammindinger. Rubens later reported he suggested they also tell Howard Daniels, because Daniels was from Minneapolis and might like to get back home. Indeed, Gutterman, Rubens, and Daniels all came to work for ERA in 1946. Examples of this type of word of mouth passing of information are common in technical networks. What we should notice especially is that almost all of this group was working on magnetic problems. ERA began with a good contingent of magnetism specialists.

A third example of connections illustrates the importance of a major university in the vicinity of high-technology companies. ERA, like a number of other electronics and computer companies, relied on the local university—the University of Minnesota for engineers. Two years in particular stand out in ERA's interactions with the electrical engineering department of the university. Eight of the members of the EE class of 1943 joined ERA: Robert S. Erickson, Clifford J. Helms, William R. Keye, Robert M. Madrig, Frank C. Mullaney, Robert P. Murnane, Edward A. Nelson, and Erwin Tomash. 1944 and 1949 run a close second to 1944. The class of 1949 is famous for its brilliant member Seymour Cray. Carrying this type of search into the following two decades would reveal many such connections in the Minnesota industry, but in the aggregate this is known. In the ERA story it is what these men brought to ERA in their training. ■

AFIPS Celebrates 25th Anniversary at NCC '86

The American Federation of Information Processing Societies (AFIPS) will celebrate its 25th anniversary at the National Computer Conference (NCC) in Las Vegas, June 16-19, 1986.

Several special events are planned. A two- hour session at 9:00 a.m. on Tuesday June 17 will review computer advances of the last 25 years and will make projections about the industry in the 21st century. Willis Ware will moderate the session, and William Miller, Chief Executive Officer of SRI, and William C. Norris, founder and retired Chairman and Chief Executive Officer of Control Data Corporation, will be the featured speakers.

In the afternoon session on Tuesday two panels will discuss AFIPS and Its Sphere of Influence. Gene M. Amdahl, Walter M. Carlson, Bernard A. Galler, Bruce Gilchrist, George Glaser, Walter L. Anderson, Willis Ware, Keith W. Uncapher, Isaac L. Auerbach, and Richard I. Tanaka will comprise the panels.

For additional information contact Herbert B. Safford, GTE Data Services, 4750 Lincoln, Blvd., Marina del Rey, CA 90292, U.S.A. Telephone number 213-821-9511. ■

Research Forum at NCC '86 to Focus on CBI National Collecting Strategy

As announced in our last newsletter, CBI has recently initiated a three year program to develop a National Collecting Strategy for the history of computing. Arthur Norberg and William Aspray will describe the project and indicate how computer professionals can participate in a presentation at the National Computer Conference Research Forum. The presentation is scheduled for Monday, 16 June 1986, from 2:30-3:30 p.m., in Room E-1 in the Las Vegas Convention Center. Conference attendees are cordially invited to attend. ■

List of Records *continued from page 2. . .*

Reports by Sydney M. Lamb on the machine translation project:
"The Sememic Approach to Structural Semantics" (1963)
"A System for Analyzing Russian Texts" (1960)

Reports published by the Electronics Research Laboratory:
"Equivalent Stochastic Sequential Machines" (1961)
"Generalized Coding and Uniform Finite Memory Codes" (1960)
"State-Identification Experiments in Finite Automata"

Reports on Fortran programming.

University of California, Davis

B6700 system users manual.

University of California, Irvine

"Computer Assisted Student Affairs System for IBM System/360" (1968)
"ISIS, Irvine Symbolic Interpretive System for The IBM System/360 Model 50"
"Reference Manual for Course Author Language"

A progress report on the distributed computing system.

University of California, Los Angeles

Reports published by the Department of Engineering:
"Beginners Guide to SWAC"
"Assignment of Inventory of a Variable Structure Computer"

Proceedings of the 1952 Electronic Computer Symposium.

Carnegie-Mellon University

About 20 reports including:
"Management Information Systems: Progress and Perspectives" (1968)
"IEEE Symposium on Speech Recognition"
"Optical Elements for Computers" (1952)
"Speech Understanding Systems" (1971)

Case Institute

Twenty-three reports on topics including:
"A Heuristic Approach to Solution of Checkerboard Puzzles"
"Finite Representability" (1963)
"General Systems Theory Models of Organization"
"A SOAP II Compiler for the IBM 650" (1957)
"The Control of Linear Multivariable Systems" (1962)

Several reports on aspects of Runcible I.

University of Chicago

Sample of holdings:
Quarterly Report for the Institute for Computer Research (Oct. 1, 1965).
Abstracts from AIEE Workshop on Integrated Logic (Oct. 11, 12, 1962).

Columbia University

"Review of Studies in The Flow of Information Among Scientists," Volume II. Prepared by Columbia's Bureau of Applied Social Research for the National Science Foundation in January, 1960.

Cornell University

Reports by the Aeronautical Laboratory Inc., and the Cognitive Systems Research Program:
"On the Convergence of Reinforcement Procedures in Simple Perceptions" (AL, 1960)

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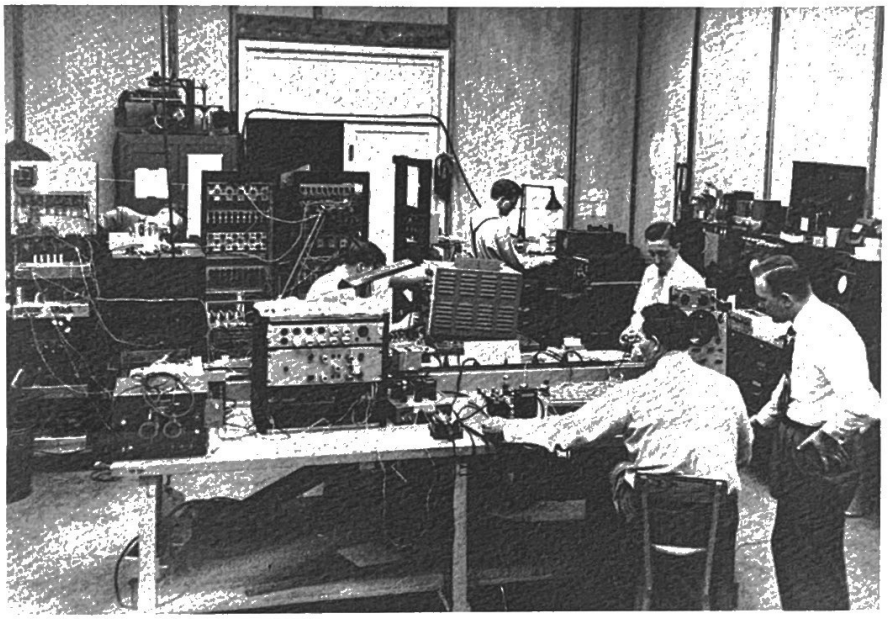
ERA Records Available at CBI

While naval contracts were largely responsible for sustaining the economic life of Engineering Research Associates, they also affected the amount of records available to individuals interested in the history of ERA. Since most of the records relating to government contracts were classified, the paper trail left by the company is small and elusive. This is especially true of records prior to ERA's status as a division of Remington Rand after 1951.



Laboratory setting, circa 1951 at ERA's main facility at 1902 Minnehaha Avenue, St. Paul, Minnesota.

CBI has been engaged in work to preserve any remaining documents, many of which are held by former-ERA employees. Although none of the records includes government-classified material, they do contain interesting information about the company and the products it developed. A number of records have been donated to CBI by individuals who have been eager to preserve ERA's history. The archival collection includes correspondence, reports, technical manuals and drawings, product literature, photographs and interviews, all available for use at CBI.

By far the largest group of ERA records at CBI is a collection of technical material about the 1103 and 1103A (also known as the Univac Scientific). It includes programming manuals (produced both by ERA and users), reference manuals, descriptions of peripherals (such as the 1103 Controlled Reproducer and Line Printer), 1103 Central Exchange newsletters, sub-routine libraries, and Univac Scientific Exchange (USE) minutes and reference material. While the 1103 was a powerful computer in its day, it had its share of detractors. Among the technical material is an anonymous critique of the 1103. Its author was particularly troubled by the slow input and output devices used on the computer and found it "hard to excuse the juxtaposition of [the 1103's] fine internal speed alongside its notoriously lagging articulation with the external world."

CBI has a complete set of product literature produced by ERA. Of the relatively few products that were offered commercially, few were produced on a large enough scale to justify an extensive production of sales literature, though the material illustrates the marketing emphasis of the company. ERA's major strength, magnetic storage drums, are well- represented by a number of leaflets. Brochures were also produced for ERA's two commercial computers, the 1101 and 1103, as well as for the ERA 1101 Computation Center in Arlington, Virginia. One pamphlet was designed to attract engineers to join the company; it described ERA and the Twin Cities as "a pleasant congenial living and working atmosphere located in the midst of a world famous playground." CBI also holds literature about ERA products unrelated to computers, such as the Bore-Hole Camera, Self-Recording Accelerometer, and the company's extremely successful Automatic Antenna Coupler. Most of the commercial and government products are described in a book produced by Univac's Product Planning Division in 1959.

Not all of the ERA material at CBI is technically oriented. Through individual donations, CBI has accumulated information about the company's administration and personnel. Among the administrative documents are employment contracts, stockholder lists, organization charts, and "Management Policies and Administrative Procedures." Also included are employee directories and a series of "Biographical Sketches of the Professional Staff" starting in 1948. More general information may be obtained from a collection of newspaper clippings and a set of ERA's house organ, *The Orbit*.

A "suitcase chassis" is replaced in this 1950 photograph of ERA's first commercial computer, the 1101.

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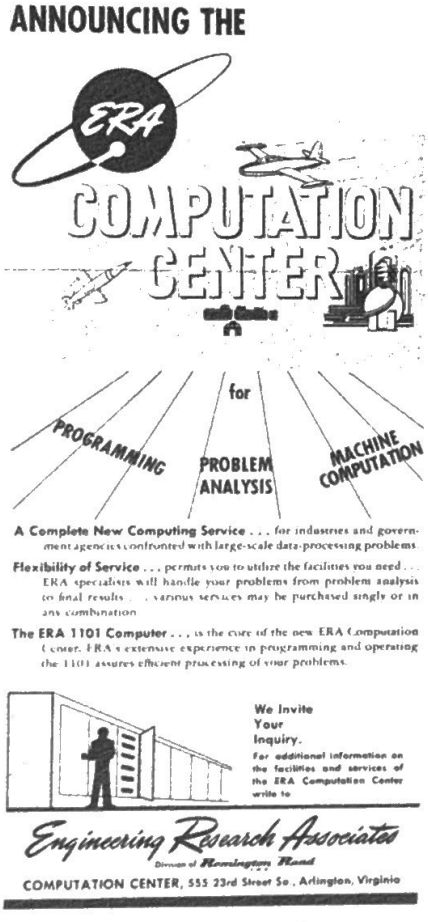
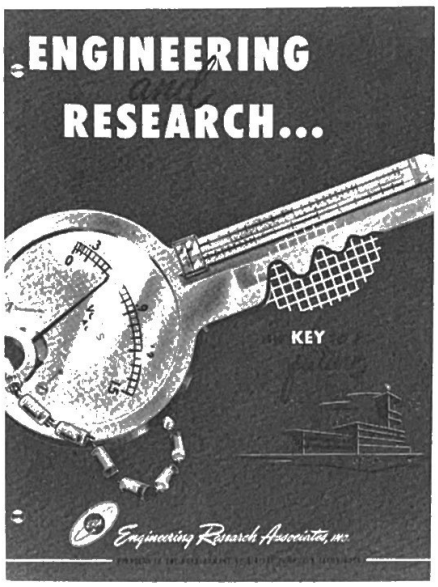
An interesting series of reports are found in a collection of records donated by John L. Hill. The reports summarize trips made by ERA employees to the Eckert Mauchly Division and Norwalk Laboratories after ERA had been bought by Remington Rand. They describe projects underway at Remington Rand and also show the beginning signs of friction between the E-M Division and ERA. Other reports and memos describe the development of magnetic storage (1956), Bell Telephone transistors (1956), the 409 Computer (1954), and RCA Selectron Tubes (1947). The collection gives detailed information about some of Hill's work, including the Message Delay Relay (1950), the John Plain Company Speed Tally system (1951- 1954), and vacuum tube life (1954-1955). Also among the records are descriptions of ERA professional employee seminars on computing (1947- 1949), including a description of the COGNAC (COGitating Numerical Adder and Computer), designed by Arnold Cohen as "an inexpensive, impractical hypothetical machine, for illustrative purposes only."



Advertising copy for the ERA Computational Center. The center was located in leased quarters in Arlington, Virginia in 1952. It received an 1101 the following year, which later was relocated at the Georgia Institute of Technology.



Cover of a 1952 promotional brochure designed to attract engineers to work at ERA.

Another collection of ERA records are found in the Robert M. Kalb papers, though only a fraction of the material predates the acquisition of the company. Included is information on the Ore-Car Coding system (still in operation in Superior, Wisconsin), IBM/Sperry information interchange, Flight Plan Storage equipment, air traffic control systems, and wages. The collection also contains general records relating to legal actions of interest to Sperry Rand: Sperry Rand vs. IBM (1956), Federal Communications Commission Inquiry (1966-1968) and Honeywell vs. Sperry Rand (1971-1972), for which Kalb testified about the IBM/ Sperry information interchange.

CBI has been given a number of photographs of such subjects as the 1101, 1103, the File Computer, magnetic drums, magnetic recording heads, antenna couplers, testing equipment, production facilities, computer chassis, and core memories. Good photographs of individuals have been difficult to locate for both the administrative and professional staff, though Sperry Corporation has maintained a complete negative file from the ERA period. Among the photographs of individuals is an early shot of John Parker signing an agreement with the local machinists' union.

Even among this variety of records, much more information is needed to completely understand ERA's contributions to computing. CBI has filled this need by developing a series of interviews with key ERA employees. At this time interviews have been conducted with Erwin Tomash, John Parker, James Wakelin, Sidney Rubens, James Thornton, Robert McDonald, Arnold Cohen, John Hill, and William Butler; most of these interviews are being edited and are not currently open to research use. Oral histories of other ERA individuals are planned.

CBI continues to collect records and photographs relating to Engineering Research Associates. In addition to CBI's collections, a few other repositories hold some excellent records relating to ERA. These will be discussed in a subsequent newsletter. Individuals interested in donating items or wishing further information about records available at CBI are urged to contact CBI's archivist. ■

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