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The Research and Development (RAND) Corporation Videohistory Collection, 1987-1990

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Collection Overview

Repository:	Smithsonian Institution Archives, Washington, D.C., *osiaref@si.edu*
Title:	The Research and Development (RAND) Corporation Videohistory Collection
Identifier:	Record Unit 9536
Date:	1987-1990
Extent:	15 videotapes (Reference copies). 23 digital .wmv files and .rm files (Reference copies).
Creator::	
Language:	English

Administrative Information

Prefered Citation

Smithsonian Institution Archives, Record Unit 9536, The Research and Development (RAND) Corporation Videohistory Collection

Historical Note

The RAND (Research and Development) Corporation of Santa Monica, California, began as a United States Air Force Project in 1945 under contract to the Douglas Aircraft Company. Its broadly defined function was to study American national security and, in particular, the role of airpower in that context. Three years later, the Ford Foundation endowed RAND as a private, nonprofit research corporation "to further and promote scientific, educational and charitable purposes" to the nation's general benefit. As one of the first American "think tanks," however, its staff focused primarily on military and strategic issues funded by the U.S. government.

Introduction

The Smithsonian Videohistory Program, funded by the Alfred P. Sloan Foundation from 1986 until 1992, used video in historical research. Additional collections have been added since the grant project ended. Videohistory uses the video camera as a historical research tool to record moving visual information. Video works best in historical research when recording people at work in environments, explaining artifacts, demonstrating process, or in group discussion. The experimental program recorded projects that reflected the Institution's concern with the conduct of contemporary science and technology.

Smithsonian historians participated in the program to document visual aspects of their on-going historical research. Projects covered topics in the physical and biological sciences as well as in technological design and manufacture. To capture site, process, and interaction most effectively, projects were taped in

offices, factories, quarries, laboratories, observatories, and museums. Resulting footage was duplicated, transcribed, and deposited in the Smithsonian Institution Archives for scholarship, education, and exhibition. The collection is open to qualified researchers.

Descriptive Entry

Curator Joseph N. Tatarewicz, historian Martin Collins, and curator Paul Ceruzzi of the Smithsonian Institution's National Air and Space Museum (NASM) conducted the eight interview sessions with three RAND moderators and twenty-two participants to document the unique role RAND played after 1945 in the military-industrial complex. In the first three sessions Tatarewicz and Collins interviewed three men who discussed the aerial reconnaissance technology RAND developed for the Air Force. In the fourth session Collins and RAND vice president Gus Shubert interviewed six former division heads who discussed the changing intellectual culture of the Corporation as it related to strategic policy development. In the last four sessions Paul Ceruzzi and RAND staff researchers Robert Anderson and Willis Ware interviewed thirteen men who helped pioneer computer development at RAND between 1945 and the late 1960s. Most of the sessions featured diagrams, photographs, and various artifacts to complement the discussion. The interviews were recorded in Santa Monica, California, and Washington, D.C., between January 1987 and June 1990.

This collection consists of eight interview sessions, separated into three series, totaling approximately 22:36 hours of recordings and 497 pages of transcript.

Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

Subjects:

Interviews
Military history
Oral history
Science -- History
Technology -- History

Types of Materials:

Transcripts
Videotapes

Names:

Anderson, Robert H. (Robert Helms), 1939-
Augenstein, B. W.
Barlow, Edward J.
Bernstein, M. I. (Morton I.)
Ceruzzi, Paul E., interviewer
Collins, Martin J., 1951- , interviewer
Davies, Merton E.
DeLand, Edward C.
Greenwald, Irwin
Katz, Amron H.
Klein, Burton H.

Levison, Walter
Rand Corporation
Shaw, J. Clifford (John Clifford), 1922-1991
Shubert, Gustave H.
Specht, Robert D.
Speier, Hans
Tatarewicz, Joseph N., interviewer
Uncapher, K. W. (Keith William), 1922-2002
United States. Air Force
Ware, Willis H.
Wohlstetter, Albert

Container Listing

Series 1: Aerial Reconnaissance Photography

In Sessions One through Three, Collins and Tatarewicz interviewed three participants to review the development of aerial reconnaissance photography between 1940 and 1970. In this period engineers had to develop cameras, lenses, shutters, and film for use at ever higher altitudes and usually at higher velocities. The United States benefitted from the improvements at the tactical level in World War II and in the Korean War, and at the strategic level in surveying nuclear capability in the Soviet Union and Cuba. Sessions were recorded at Amrom Katz's home, in Santa Monica, California, and the National Air and Space Museum in Washington, D.C.

Session One's participant, Amrom Katz, contributed to the field throughout the period discussed. He studied mathematics and physics at the University of Wisconsin before beginning work for the U.S. government in 1938. From 1940 to 1954 he mastered approaches to aerial photography at Wright-Patterson Air Force Base in Dayton, Ohio, and led the photographic missions for the Bikini Island atomic bomb tests and the Inchon invasion in 1950. In 1954 he joined the senior staff at RAND, concentrating further on the related issues of aerospace surveillance, arms control and the institutional attitudes that help and hinder these processes.

In Sessions Two and Three, Katz was joined by two other aerial reconnaissance experts. Merton E. Davies completed his B.A. and graduate studies in mathematics at Stanford University in 1938. After ten years of design and engineering work for Douglas Aircraft, he joined RAND's engineering department. His research on satellite reconnaissance photography led not only to its development for military intelligence purposes, but for arms control verification and extraterrestrial exploration as well. Walter Levison received a B.A. in physics at City College of New York before joining Katz at Wright-Patterson and the Bikini tests during and after World War II. Although he never worked directly for RAND, Levison spent the 1950s researching and directing the development of camera and lens technology at Boston University's Physical Research Laboratories for the Air Force surveys of the Soviet Union. Levison continued in this field with the Laboratories and Itek Corporation until 1974.

The discussions detailed technological and methodological developments in photoreconnaissance. The sessions provide visual documentation of high-altitude cameras and photography and the tools of photointerpretation.

	Interviews
Interviews	**Session 1: January 6, 1987**
Interviews	In Amrom Katz's home in Santa Monica, California, featured Katz on his career in aerial reconnaissance photography and photointerpretation, c. 1940-1960, including: work at Wright-Patterson Air Force Base Laboratory in World War II under George Goddard; Air Force resistance to Lab innovations; Lab contacts with other research groups; development of strip camera; photo techniques for Inchon invasion preparation; photointerpretation in the 1950's and the 1980's; six theorems of photo interpretation; applications of Katz's views on data processing and dissemination to organizational theory; reasons for joining RAND; satellite reconnaissance and arms control. Visual documentation included: flip chart for Katz's examples; Katz's photo interpretation slide rule; Wright Patterson resolution test photographs; negative strips demonstrating image-motion compensation; World War II and

Inchon aerial reconnaissance photographs; photographs by large-camera pioneer George Lawrence.

Interviews	Transcript, pages 1-65 of videotape recording, 4 hours.

Interviews   Recording of Interview: Total Recording Time: 4 hours

Note:
- Original Masters: 4 U-Matic videotapes
- Preservation Masters: 4 Motion jpeg 2000 and 4 mpeg digital files
- Dubbing Masters: 4 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 4 Windows Media Video and 4 Real Media digital files

Interviews   **Session 2: December 16, 1987**

Interviews   At the National Air and Space Museum's *Looking at Earth* Gallery, Washington, D.C., featured Katz, Levison and Davies on the development of aerial reconnaissance photography, c. 1946-1956, including: biographical information on interviewees; postwar research and development at Wright-Patterson Laboratory; U.S. intelligence requirement for aerial photographic capability, 1948; perceptions of origins of strategic photography on communist countries; expansion of Wright-Patterson Lab during Korean War; Levison's perspective as Lab chief of operations in reconnaissance section; Lab contacts with other research groups; early RAND proposals for satellite photography and use of balloons; development and history of balloon program; Katz on dealing with bureaucracies; diplomatic dangers of balloon photography; role of president's Scientific and Advisory Committee on Intelligence and Reconnaissance. Visual documentation included: photography from satellite feasibility studies; photography from 1951-1956 balloon programs; mechanics of duplex and horizon cameras from Project Genatrix.

Interviews   Transcript, pages 59, of videotape recording, 3 hours.

Interviews   Recording of Interview: Total Recording Time: 3 hours

Note:
- Original Masters: 3 1" reels
- Preservation Masters: 3 Motion jpeg 2000 and 3 mpeg digital files
- Dubbing Masters: 3 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 3 Windows Media Video and 3 Real Media digital files

Interviews   **Session 3: December 17, 1987**

Interviews   At the National Air and Space Museum's *Looking at Earth* Gallery, featured Katz, Levison, and Davies on development of aerial photography and interpretation, c. 1955-1970, including: history of Project Genatrix;

contributing factors in development of satellite technology; RAND as locus for theoretical and practical advances; development of rotary panoramic cameras and red-sensitive microfile film; development and operation of HYAC (High Acuity) camera; application of satellite camera technology to balloons; Curtis LeMay's approval of HYAC program; proposed use of HYAC for arms control verification; RAND participation in Geneva Surprise Attack Conference, 1958; photo interpretation in Korean War, Cuban Missile Crisis, and current planetary research; contents of 1968 photointerpretation kit; interaction of camera designers and photointerpreters; cultural biases in interpretation. Visual documentation included: HYAC camera, lens and interior mechanics; 1968 photointerpretation kit; panoramic camera diagram.

Interviews	Transcript pp. 1-57, of videotape recording, 3 hours.
Interviews	Recording of Interview: Total Recording Time: 3 hours

Note:
- Original Masters: 3 1" reels
- Preservation Masters: 3 Motion jpeg 2000 and 3 mpeg digital files
- Dubbing Masters: 3 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 3 Windows Media Video and 3 Real Media digital files

Series 2: RAND Culture

In Session Four, Collins and Senior Vice President Gus Shubert interviewed six participants on their experience of the intellectual culture as it pertained to nuclear strategy studies at RAND in the 1950s and early 1960s. The period 1958-1962 marked a relative decline in RAND's sponsorship by its initial and exclusive patron, the United States Air Force. This was due in part to conflicts over the definition of RAND's role, diversification of RAND's clientele, the appearance of other research centers, and the departure of a significant number of RAND personnel. The participants in this session attempted to analyze the concomitant changes in the Corporation's mission and consequently in its culture. All were senior staffers or division heads by the late 1950s; the first three listed below had departed by 1963 while the others remained or returned to RAND later.

Edward J. Barlow was born in 1920 and received a B.E.E. at Cooper-Union in New York City in 1942 before combining work on radar for Sperry Gyroscope Company on Long Island with studies at New York University. Sperry underwrote his scholarship at Columbia University until he went to RAND. From 1948 to 1960 he worked in RAND's Engineering Division, specializing in aeronautics and space flight. In 1960 he left for a vice presidency at Aerospace Corporation, and took over the presidency of Varian Corporation's Instruments Division in 1969 before retiring in 1984.

Burton H. Klein was born in 1917 and majored in economics at Harvard University for his B.S. in 1940. After stints with the U.S. Strategic Bombing Survey, the Commerce Department, and the President's Council of Economic Advisors, Klein finished his Ph.D. at Harvard and joined RAND's Economics Division in 1952. His published interests include strategic planning and the factors affecting research and development policy. In 1964 he left RAND to become the head of the Economics Department at the California Institute of Technology, where he remained until his retirement.

Albert Wohlstetter was born in 1912, graduated from City College of New York in 1933, and later earned an M.A. at Columbia in mathematical logic. During World War II he consulted for the War Production Board and supervised production control at his brother's Acme Aircraft Company in New York City. After working in the public and private sectors on the problem of post-war housing shortages, he joined his wife, Roberta May Morgan Wholstetter, at RAND in 1951. His exhaustive studies of Air Force basing policy led to a major revision of strategic defense policy. He left RAND in 1963 for the Stanford Research Institute and moved to the University of Chicago's Economics Department two years later. He formed his own consulting firm, PanHeuristics, in 1974, and continued to be involved in the national debate on nuclear deterrence.

Bruno W. Augenstein was born in Germany in 1923, earned a double B.A. in mathematics and physics at Brown University twenty years later and an M.S. at the California Institute of Technology in 1945. After teaching aeronautics at Purdue University he joined RAND's Physics Division in 1949, where he developed additional interests in space and weapons systems, systems analysis and strategic policy formation. Although he left in 1958 for stints at Lockheed Corporation, the U.S. Department of Defense, and the Institute for Defense Analyses, Augenstein returned to RAND in 1967 as a vice president and senior scientist.

Gustave Shubert received his B.A. from Yale University at the age of nineteen in 1948, and his M.A. from New York University in 1955. After working on radar and communications systems in the United States and France, he joined RAND's staff in 1959, researching national security issues related to aerospace technology. After heading the Economics Department for two years, Shubert left RAND 1964 to lead the U.S.-NATO Defense Planning Teams. On his return in 1966 he became a member of the Research Council and co-authored several studies of American policy in Southeast Asia, including the *Pentagon Papers*. Since 1968 Shubert has led RAND's involvement in domestic social policy research, including the New York City-RAND Institute and the Institute for Civil Justice, both of which he founded. Shubert stepped down as Senior Vice President in 1989 but continued to consult with RAND as a Senior Fellow/ Corporate Advisor.

Robert D. Specht was born in 1913, received an A.B. from the University of Florida in 1936, and a Ph.D. in mathematics from the University of Wisconsin in 1942. During the war he rose from Assistant Physicist to Associate Mathematician at the U.S. Navy's David Taylor Model Basin. From 1945 to 1949 he taught mathematics at the University of Wisconsin. He joined RAND's Mathematics Department in 1949; upon retirement in 1979 he became a consultant in the fields of applied mathematics and mechanics.

Born in 1905, Hans Speier arrived in New York City from Berlin in 1933 with his Heidelburg doctorate to teach sociology at the New School for Social Research. During World War II he worked in the State Department's Intelligence Service and Overseas Branch, and led the Occupied Areas Division from 1945 to 1947. As head of RAND's Social Sciences Division for twelve years, he authored numerous books on the effect of military power on domestic and foreign policy, focusing on modern Germany in the Cold War period. Speier rose to the RAND Research Council in 1961. In 1969 he began teaching at the University of Massachusetts at Amherst and retired in 1975. Speier died February 17, 1990.

The discussion detailed the intellectual culture at RAND and relations with the Air Force between 1948 and 1963. The session documents group interaction.

Interviews

Interviews	**Session 4: January 27, 1989**
Interviews	At RAND headquarters in Santa Monica, California, featured Augenstein, Barlow, Klein, Shubert, Specht, Speier, and Wohlstetter on intellectual culture at RAND, c. 1948-1989, including: RAND's interdisciplinary analytic style; toleration of individual research techniques; Herman Kahn's briefings; John D. Williams as administrator; Strategic Offensive Forces Study (SOFS); increasing emphasis on applied research by Air Force; RAND opposition to B-70 bomber; other sponsors and increase in social science research; end of the Mathematics Department and decline in technological research in 1960s; changes in recruiting; departure of staff in early 1960's; decline of interdisciplinary reports; effect of RAND "recommendation" on a project; efforts to continue "risky" research; trend towards funding larger projects; competition with other research groups; current RAND organization and budget. Visual documentation included: group interaction.
Interviews	Transcript, pages 1-99, of videotape recording, 4 hours.
Interviews	Recording of Interview: Total Recording Time: 4 hours

Note:
- Original Masters: 3 1" reels
- Preservation Masters: 3 Motion jpeg 2000 and 3 mpeg digital files
- Dubbing Masters: 5 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 3 Windows Media Video and 3 Real Media digital files

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Series 3: Computers

In Sessions Five through Eight, Paul Ceruzzi, Robert Anderson, and Willis Ware interviewed thirteen participants to discuss RAND's role in the post-1945 development of computers. Along with the University of California, Los Angeles (UCLA) and the Lawrence Livermore Laboratory in Livermore, California, RAND pioneered computer engineering and programming on the West Coast. The Air Force initially funded this work as a means of accelerating systems analysis and missile and nuclear weapon development, but became somewhat more reluctant to underwrite RAND's research when staff there began to develop more interactive applications for computers in the 1960s. Sessions were shot at RAND Corporation headquarters in Santa Monica, California. Besides the listed participants for each session, other session participants often contributed as members of an audience.

Participants for this first session contributed to the development of computer hardware between 1945 and 1965. Paul Armer joined Project RAND in 1947 as a mathematician and desk calculator operator. Five years later he became head of the Computer Sciences Department. In 1968 Armer left RAND to direct the Stanford University Computation Center, and since then has also headed the Charles Babbage Institute for the History of Information Processing in Minneapolis, Minnesota, and presided over the American Federation of Information Processing Societies.

William F. Gunning started working for Douglas Aircraft in their Flight Test laboratory in 1941. In 1947 he transferred to Project RAND where he worked as an electronic engineer on the development of the Random Number Generator, the modification of the REAC (Reeves Electronic Analog Computer), the Williams memory of the SWAC (Standard Western Analog computer), and the JOHNNIAC.

William P. Myers began working at RAND as Tabulating Department shift leader in 1948. With the arrival of the IBM 604 programmed calculator in 1951, he headed the Operations Group of the Numerical Analysis Department before moving to the Systems Development Department. In 1958 Myers returned to the Numerical Analysis Department in various managerial capacities; he switched to the Computer Science Department in the 1970s and retired in 1984.

Robert T. Nash worked at RAND from 1948 to 1957. He rose from IBM Cards Processor to Administrative Assistant of the Numerical Analysis Department by 1955. Nash then filled the same position for the Programming Department of the Systems Development Division, where he arranged for the settlement of SDD staff at air bases of the SAGE (Semi-Automatic Ground Environment) defense system. In 1956 he became manager of Field Services for the SDD and kept the position in 1957 when RAND spun off the Division into an autonomous corporation.

Keith W. Uncapher also arrived at RAND in 1950 and focused on computer engineering. He began with designing components for the REAC, and was responsible for development of the Selectron memory store of the JOHNNIAC. In the late 1950s he oversaw the RAND contract with Telemeter Magnetics for the first 4,096-word, 40-bit, magnetic core store; in the 1960s he managed the development of JOSS (JOHNNIAC Open Shop System), the RAND tablet, the GRAIL system, the acquisition by RAND of larger computers, and the development of a hardened communications system for the Air Force. Uncapher left RAND in 1972.

Willis H. Ware received his B.S. in electrical engineering from the University of Pennsylvania in 1941 and his S.M. from the Massachusetts Institute of Technology one year later. After spending World War II at Hazeltine Electronics Corporation, he joined John von Neumann's Electronic Computer Project at the Institute for Advanced Study in Princeton, New Jersey. He completed his Ph.D. at Princeton in 1951 and immediately joined RAND, where he helped lead the engineering on the JOHNNIAC, particularly its Selectron and magnetic core memories. Between 1964 and 1971 Ware headed the Computer Science Division, during which time he initiated debate on computer security as a technical subject. Ware joined the Corporate Research Staff in 1973 and advised various agencies on the applications of large computer systems. Throughout his career, Ware also helped found and support professional groups associated with computing.

Participants for Session Six contributed to the development of computer software between 1945 and 1965. Morton I. Bernstein joined RAND in 1954 as an assistant mathematician. For three years he wrote programs for the IBM 701 computer, the Linear Programming group, the Logistics Department, and consulted on various war games. In 1957 Bernstein assumed responsibility for the JOHNNIAC, concentrating on programming language design and implementation. Between 1961 and 1963, when he left RAND, Bernstein worked with the engineering staff on the RAND tablet.

Irwin Greenwald worked for RAND from 1950 to 1960 and from 1964 to 1969. During the 1950s he was responsible for programming JOHNNIAC's first assignment, the computations on UNIVAC I for the first H-bomb test, RAND's system and utility programming of the IBM 701 and 704 computers, PACT-II (Project Advanced Coding Technique), and the formation of the first users' group, SHARE (Society to Help Avoid Redundant Effort). In the 1960s Greenwald masterminded the major components of the JOSS-II system and the initial software for the RAND Videographic System.

J. Clifford Shaw spent twenty-three years at RAND, beginning in 1950. He specialized in systems software, beginning with the IBM Card-Programmed Calculator, the IBM 701, and the JOHNNIAC; and in artificial intelligence, where he worked with Allen Newell and Herbert Simon on various AI programs and IPL's (Information Processing Languages) I-VI. In the early 1960s he developed JOSS and its language and the system and demonstration software for the RAND tablet. Shaw died in March 1991.

Paul Armer and Willis Ware also appeared in this session.

Participants in Session Seven contributed to the development of computer graphics hardware between 1960 and 1965. Raymond W. Clewett began working in 1937 as a machinist, model builder, and laboratory foreman for Douglas Aircraft Company. After World War II he joined Lear Incorporated as machine shop foreman and design engineer for six years, returning to Santa Monica as shop manager and design engineer for RAND in 1951. His contributions there included design and construction of JOHNNIAC, other computer hardware, nuclear reactor test equipment, the RAND tablet, and closed circuit television reading devices for the visually impaired. After 1977, Clewett was an independent design consultant and owner of HY-TECH Engineering and Development Lab.

Thomas Ellis joined RAND in 1953 after graduate research on computer engineering at UCLA, and worked on most of the projects discussed in these sessions before he left in 1972. He was responsible for the JOHNNIAC's input/output machinery, design of the JOSS (JOHNNIAC Open Shop System) terminals, the RAND tablet, GRAIL (Graphic Input Language), and the RAND/IBM Videographic system.

Paul Armer, Morton Bernstein, and Willis Ware also appeared this session.

Participants in Session Eight contributed to the development of computer graphics software between 1965 and 1975. Robert Anderson received degrees in physics, philosophy, and applied mathematics between 1962 and 1968 at the University of California at Berkeley and Harvard University. He joined RAND in 1973 as head of its Information Sciences Department while holding teaching and research appointments at the University of Southern California. In 1981 Anderson founded his own computer systems consulting firm. After 1986 he was director of RAND's Institute for Research on Interactive Systems (IRIS) and resident consultant.

Barry W. Boehm received his degrees in mathematics from Harvard University and UCLA between 1959 and 1964. Concurrently with his graduate work at UCLA, Boehm headed RAND's new Information Sciences Department. From 1973 to 1989 he was Chief Scientist of TRW's Defense Systems Group, after which he became Director of the Defense Advanced Research Project Agency's Information Science and Technology Office. Boehm has written three books on software engineering.

Edward C. DeLand started working at RAND after finishing his Ph.D. in mathematics at UCLA in 1956. He spent the next six years managing the analog computers, REAC and TRAC, and then began developing mathematical models for blood biochemistry. After switching to physiological research in 1963, DeLand

helped construct the BIOMOD program. DeLand left RAND in 1972 for UCLA's Department of Surgery where he continues to develop applications for computers in medical instruction and diagnosis.

Gabriel F. Groner was finishing a Ph.D. in electrical engineering at Stanford University when he joined RAND in 1964. His interests in character recognition, interactive systems, computer graphics and medical applications of computers were manifested in his contributions to the GRAIL program; the BIOMOD simulation system; the study of computer applications to industrial automation; and the CLINFO data system for medical research. Groner left RAND in 1978.

Thomas Ellis also appeared in this session.

The discussions detailed the development at RAND of computer hardware and software in the post-war era. Sessions provide visual documentation of early computer components.

Interviews

Interviews	**Session 5: June 12, 1990**
Interviews	At RAND Corporation Headquarters in Santa Monica, California, featured Armer, Gunning, Myers, Nash, and Uncapher on computer hardware development, c. 1945-1955, including: RAND's entrance into computing field; random number generation; use of CPCs (Card Programmable Calculators); modifying the REAC; plugboards and first analog-to-digital converter; ComboMat program and concept of user-friendliness; work environment at RAND; use of IBM 602, 604, 701, and 704 computing machines; SWAC at UCLA; drawbacks of Williams' memory tubes and choice of Selectron memory; JOHNNIAC computer; design and marginal testing of components; Robert Beamer's square root board; East and West Coast computer design philosophies; MADDIDA (Magnetic Drum Digital Differential Analyzer); William Orchard-Hays and LP (Linear Programming); Telemeter Magnetics Company and hardware construction; RAND support of SHARE (Society to Help Avoid Redundant Effort). Supplemental footage, shot after the interview, featured Clewett, Gunning, and Ware regarding the JOHNNIAC, c. 1952-1955, including: approach to computer design; chassis and tube alignment; exterior design; construction in RAND machine shop; moving JOHNNIAC from old to new RAND headquarters. Visual documentation included: photographs of hardware discussed; upstairs control box of JOHNNIAC.
Interviews	Transcript, pages 1-72, of videotape recording, 2 hours, 30 minutes.
Interviews	Recording of Interview: Total Recording Time: 2 hours, 30 minutes

Note:
- Original Masters: 3 U-Matic videotapes
- Preservation Masters: 3 Motion jpeg 2000 and 3 mpeg digital files
- Dubbing Masters: 3 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 3 Windows Media Video and 3 Real Media digital files

Interviews	**Session 6: June 12, 1990**

Interviews   At RAND Corporation headquarters in Santa Monica, California, featured Armer, Bernstein, Greenwald, and Shaw on computer software development, c. 1945-1965, including: change from analog to digital programming; overlap of programming and hardware staffs; concerns for reliability; operating systems from CPC's to EIP (External/Internal Programming); survival of FORTRAN; anarchy or standardization as a software development trend at RAND; languages as stimulant to software design; Cecil Hastings's role at RAND; PACT (Project Advance Coding Technique); horizontal vs. vertical languages; Shaw on IPL (Information Processing Language) and AI (artificial intelligence); JOSS (JOHNNIAC Open Shop System) and JOSS 2; JOSS on JOHNNIAC instead of RAND's IBM 704; development of terminals and timesharing concept; beginnings of RAND tablet; Bernstein on advantages of JOHNNIAC hood instruction; RAND computer contributions to space program. Visual documentation included: photographs of terminals.

Interviews   Transcript, pages 75, of videotape recording, 3 hours.

Interviews   Recording of Interview: Total Recording Time: 3 hours

    Note:
- Original Masters: 3 U-Matic videotapes
- Preservation Masters: 3 Motion jpeg 2000 and 3 mpeg digital files
- Dubbing Masters: 3 U-Matic videotapes
- Reference Copies: 2 VHS videotapes, 3 Windows Media Video and 3 Real Media digital files

Interviews   **Session 7: June 13, 1990**

Interviews   At RAND Corporation headquarters in Santa Monica, California, featured Armer, Bernstein, Clewett, and Ellis on computer graphics hardware development, c. 1960-1965, including: RAND writing tablet and stylus; problems with reverse plotter and light pen; research at other institutions; resistance to tablet concept by military and commercial interests; current graphic input technology; lack of standard computing interfaces. Visual documentation included: printed circuit for tablet.

Interviews   Transcript, pages 1-18, of videotape recording, 1 hour.

Interviews   Recording of Interview: Total Recording Time: 1 hour

    Note:
- Original Masters: 1 U-Matic videotape
- Preservation Masters: 1 Motion jpeg 2000 and 1 mpeg digital files
- Dubbing Masters: 1 U-Matic videotape
- Reference Copies: 1 VHS videotape, 1 Windows Media Video and 1 Real Media digital files

Interviews   **Session 8: June 13, 1990**

Interviews   At RAND Corporation headquarters in Santa Monica, California, featured
                              Boehm, DeLand, Ellis, and Groner, with Anderson moderating, on
                              software applications of the RAND tablet, c. 1965-1975, including: Shaw's
                              emendations to tablet discussion in Session Six; GRAIL (Graphic Input
                              Language); English and Chinese character recognition programming;
                              distribution of GRAIL and BIOMOD demonstration films; problems in
                              disseminating RAND technology; Graphic ROCKET, POGO (Programmer
                              Oriented Graphics Operation), and Videographic systems; computer,
                              terminal, and stylus technologies; BIOMOD system; video-to-film transfer
                              process; comparisons to current interactive and computer-aided design
                              systems; sources of funding. Supplemental footage, shot after the interview,
                              featured Ware explaining the importance of Cecil Hastings to RAND, c.
                              1945-1960, especially: Hastings' work on numerical approximations. Visual
                              documentation included: period photographs of computers and consoles;
                              Cecil Hastings's *Approximations for Digital Computers* (1955).

Interviews   Transcript, pages 1-52, of videotape recording, 2.5 hours, 30 minutes.

Interviews   Recording of Interview: Total Recording Time: 2 hours, 30 minutes
                  Note: •   Original Masters: 3 U-Matic videotapes
                                      •   Preservation Masters: 3 Motion jpeg 2000 and
                                           3 mpeg digital files
                                      •   Dubbing Masters: 3 U-Matic videotapes
                                      •   Reference Copies: 2 VHS videotapes, 3
                                           Windows Media Video and 3 Real Media
                                           digital files

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