



Guide to the  
Ames Research Center Central Computer Facility Collection, 1940-2022  
ARC22.16

NASA Ames Research Center Archives

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## **Descriptive Summary**

**Title:** Ames Research Center Central Computer Facility Collection

**Collection Number:** ARC22.16

**Creator:** Humbert, John E.

**Dates:**

Bulk: 1960-1998

Inclusive: 1940-2022

**Extent: 3 boxes** (1.65 cubic feet; approximately 2.8 linear feet)

1 letter Hollinger box, 1 record carton, 1 artifact box

32 digital items (68 Megabytes), PDF and JPG files

**Repository:** NASA Ames Research Center Archives, Moffett Field, California 94035

**Abstract:**

This collection provides insight into the evolution of computation and information technology infrastructure at Ames Research Center, largely through the development and advancement of systems and capabilities that originated in the Central Computer Facility. The collection includes a historical manuscript, some supporting overview files, plans, reviews, and technical documentation, as well as ephemera and objects.

**Administrative Information**

**Access:** Restricted Possibly. Based on the content, this collection may contain information that has proprietary restrictions.

**Distribution Limits:** Partly Public; NASA employees contact the archivist regarding restricted materials.

**Publication Rights:** This collection may contain copyrighted material. The researcher assumes full responsibility for conforming with the laws of copyright. Securing permission to publish or use materials is the sole responsibility of the researcher.

**Languages and Scripts:** All records are in English.

**Acquisition Information:** Transferred by John Humbert on September 16, 2015 (Accession 2015-010), July 15, 2022 (Accession 2022-016) and August 8, 2022 (2022-018).

## Administrative History Timeline

Timeline of computing at Ames, derived from John Humbert's manuscript *NASA Ames Research Center Central Computer Facility: 40 Years of Computing Service, 1960-2000, A Historical Perspective*, which chronicles the evolution of computation at Ames from the 1940s to the early 2000s.

1940s and 1950s	Human computers process wind tunnel test data using slide rules and mechanical calculators
1948	First electronic computer, a Reeves Analog Electronic Computer (REAC) goes into service
1951	First digital computer, an IBM Card Programmed Electronic Calculator (CPC)
1952	First computing organization called the Electronic Machine Computing Branch forms in the Theoretical and Applied Research Division
1954-circa 1956	Two Electrodata-Datatron computers installed to provide on-line data reduction for the Unitary and 6 by 6-foot wind tunnels
1955	An IBM 650 is installed for theoretical calculations
1958	An IBM 704 replaces the IBM 650 for theoretical calculations
<b>1959</b>	Approval to construct a "data reduction facility" (the Central Computer Facility, CCF, Building N233)
1960-1962 circa early 1960s	Construction of the CCF completed and the facility becomes operational The CCF facility houses the Electronic Machine Computing Branch and mainframe computer systems, including: an IBM 7094/7090 system for scientific computing, a Honeywell 800/200 system for wind tunnel data reduction, and an IBM 1401 system for administrative computing (financial and payroll processing). The Honeywell H800 computer system replaces the Electrodata computers for wind tunnel data reduction.
1966	Computation Division created, incorporating the Electronic Machine Computing Branch and data processing staff from the administrative organizations
1967	An IBM 360/50 replaces the IBM 1401 for administrative processing
1969	An IBM 360/67 Duplex computer system installed mainly for wind tunnel data reduction
1970	Major effort launched to locally develop new application software and custom communications equipment in all 12 wind tunnels to link the tunnels to the IBM 360/67 system
1971	Advanced Computation Facility (ACF) addition (Building N233A) is constructed to house the ILLIAC-IV and its staff
1972	The ILLIAC-IV installed and development for use begins. The Advanced Computation Division is created to manage the supercomputer. The Institute for Advanced Computation (IAC) formed between NASA and the Advanced Research Projects Agency (ARPA) to oversee the development and application of the ILLIAC-IV for NASA and Department of Defense (DoD) research.
1973	The wind tunnel application software becomes operational to provide real-time data reduction for Center's 12 tunnels
1975	The ILLIAC-IV becomes operational, though reliability is a major issue. Remote user access is confined to the emerging Advanced Research Projects Agency Network (ARPANET). Also, a Control Data Corporation CDC 7600 system is acquired and becomes the principal processing resource of the CCF for theoretical research in computational fluid dynamics and computational chemistry. Installation of the CDC 7600 system necessitates modifications to the N233 facility in order to house the liquid cooling and 400-Hz electrical power equipment required by the processor. The IBM 7094 processor decommissioned and removed when the CDC 7600 is installed.
1977	A VAX "front end" is developed for the CDC 7600
1979	The Numerical Aerodynamic Simulator (NAS) project launches to formulate specifications for a system 40 times faster than currently-available supercomputers

late 1970s to 1980s	Emergence of distributed computing with "minicomputers" such as Digital Equipment Corporation (DEC) VAX computer systems to support engineering groups, research projects, and test facilities
late 1970s	New, standardized systems for modular high-speed data acquisition with local processing developed by Teledyne are in use across the center's wind tunnels
circa 1980	A "VAX Farm" is installed in the CCF
early 1980s	Two IBM 4300 series systems are installed to replace the IBM 360/67 system. ARCLAN, a campus data network, is implemented and extends to most facilities on the center. A Telecommunications Division is created to provide the center with voice, data, and video communications services.
1981	ILLIAC-IV supercomputer decommissioned and removed from the CCF to accommodate a Cray-1s supercomputer system installed the same year
1984	A CDC Cyber 205 supercomputer system is installed (to compare against the forthcoming Cray-2 supercomputer). The system is shared with NASA Langley Research Center. A Cray XMP/22 system replaces the Cray 1s. The IBM 360/67 system is decommissioned. A digital PBX telecommunications system is installed and based in Building N263 (this system is replaced with a voice-over-IP in 2020).
circa 1984	A Telecommunications Gateway Facility is established in Building N254
circa 1985	A Cray-2 with two Amdahl computers for mass storage and front-end processors is installed in N233A. (After extensive evaluation of the CDC Cyber 205 against the Cray-2 afterward, Ames determines the latter has the superior advanced supercomputing architecture for theoretical research.)
Mid 1980s	Approximately 40 DEC VAX systems in research facilities and 13 systems in the CCF "VAX Farm" are in operation. DEC reports that one of the largest VAX/DECNet installations in the country is at Ames. CCF support for processing wind tunnel test data is no longer required.
circa 1986	A Cray XMP/48 is installed. Construction of the Numerical Aerodynamic Simulation facility (NAS, Building N258. Later it was renamed the NASA Advanced Supercomputing Facility and retained the same NAS acronym) is completed to house the center's supercomputing systems.
1988	The Cray-XMP/48 is replaced by a Cray-YMP.
Late 1980s	NASA Science Internet (NSI), an IP-based network, links NASA staff and university collaborators with NASA centers. Ames builds the "Federal Internet Exchange -West" (FIX-WEST) where federal agencies can connect their networks to the emerging Internet. About five years after FIX-WEST, a Metropolitan Area Exchange-West (MAE-WEST) is created for commercial carriers to interconnect their networks with large Internet Service Providers. Macintosh personal computer systems are widely used at the Center.
Circa early 1990s	Most major communications carriers have high-capacity fiber optic communications trunks installed in Building N254 and interconnect with FIX-WEST and MAE-West. A communications hub for NASA's NISN wide-area network is established in Building N254. The CCF shifts its purpose toward supporting local area network services and providing centralized server services for the center (e.g., email, calendaring, website hosting, databases, mass storage, etc.). The center's first two-person computer security team addresses threats posed by systems being connected to public networks.
1992	The Cray-YMP is replaced by the Cray C90. Supercomputing resources are moved to the new Numerical Aerodynamic Simulation facility in Building N258. By the end of this year, supercomputers are no longer in the CCF.
Mid 1990s	NSI network grows to be one of the first large scale IP-based networking systems, linking NASA staff and external organizations (per Humbert, NSI was a factor in the eventual expansion of the Internet). The NASA Research and Education Network (NREN) development project is established to develop higher performance networks than NSI.
2001	Installation of a new ARCLAN-2000 network begins, to replace ARCLAN.
2003	The ARCLAN-2000 network is completed.

#### Sources Consulted

Bugos, Glenn E. *Atmosphere of Freedom: Seventy-Five Years at the NASA Ames Research Center.*

Washington, D.C.: NASA SP-4314, 2014.

Hartman, Edwin. *Adventures in Research: A History of Ames Research Center, 1940-1965.* Washington, D.C.: NASA SP-4302, 1970.

Humbert, John E. *NASA Ames Research Center Central Computer Facility: 40 Years of Computing Service, 1960-2000, A Historical Perspective.* Ames Research Center. Moffett Field, CA, May 2022.

Page & Turnbull. *State of California Department of Parks and Recreation property survey forms for Ames Research Center.* 2005.

#### Scope and Content

This collection provides a historical overview of computation and information technology infrastructure at Ames Research Center, largely through the lens of the development and evolution of systems, networks, and capabilities that originated in the Central Computer Facility (CCF). This view is presented by John E. Humbert who supported that facility and the center's computing-related efforts for nearly six decades. Of principal note is Humbert's manuscript, *NASA Ames Research Center Central Computer Facility: 40 Years of Computing Service, 1960-2000, A Historical Perspective*, which chronicles the implementation, employment, and evolution of technology and systems at Ames, and includes a 30-page appendix of photographs showing staff and computing technologies, from the IBM 360/67 Computer System to the CDC Cyber 205 Supercomputer System. In addition, the collection contains supporting overview files, plans, reviews, and some technical documentation, as well as ephemera and objects, such as an early supercomputer memory plane that was constructed by hand on a loom with the aid of a microscope.

#### System of Arrangement

In the absence of a discernable original order, the bulk of this collection is arranged chronologically by subject area and format, with the manuscript and primary supporting files placed first.

#### Existence and Location of Originals

Digital copies in the form of high resolution scans of Ames Research Center photographs are included with the collection. The originals are held by the Ames Research Center Photograph Library.

#### Indexing Terms

The following terms may be used to index this collection.

##### Corporate Name

Ames Research Center. Central Computer Facility

##### Personal Name

Humbert, John E.

##### Subjects

Apple Computers

CDC 7600 Computer  
 CDC Cyber 205 Computer  
 Center of Excellence for Information Technology (U.S.)  
 Computer Networks  
 Computing Platforms  
 Cray Computers  
 Data Processing  
 Electronic Data Processing  
 Honeywell 200 Computer  
 Honeywell 800 Computer  
 IBM 1401 Computer  
 IBM 360/50 Computer  
 IBM 360/67 Computer  
 IBM 7094 Computer  
 Illiac 4 Computer  
 Information Technology  
 Internets  
 Mainframe Computers  
 Supercomputers  
 VAX Computers

**Separated Material**

The following materials were separated from this collection:  
 Three faded, copies of photographs mounted on rigid board.

**Related Collections**

At the Ames Research Center Archives  
 AFS5107: Automatic Data Processing Acquisition Planning Records, 1965-1997  
 AFS1070.8A: Archives Reference Collection  
 PP09.16: Amelia Reid National Advisory Committee for Aeronautics (NACA) Human  
 Computer Papers, 1945-1958

**Container List**

<b>Box</b>	<b>Folder</b>	<b>Title</b>	<b>Date</b>	<b>Restrictions</b>
1	1	NASA Ames Research Center Central Computer Facility: 40 Years of Computing Service, 1960 to 2000. A Historical Perspective. By John E. Humbert (Digital)	2022	Unrestricted
1	2	High resolution photographs used in the NASA Ames Research Center Central Computer Facility: 40 Years of Computing Service, 1960 to 2000 manuscript (Digital)	1972-1988	Unrestricted
1	3	CCF Historical Overview file, May 1986	1986	Unrestricted

Box	Folder	Title	Date	Restrictions
1	4	CCF On_line (newsletter) June 1989 Anniversary Edition file. Includes copies of the anniversary newsletter, computer processor growth charts and system configuration diagrams.	1987-1989	Unrestricted
1	5	Newspaper Articles, Reference - Ames, 1978-1992. News clippings related to Ames computing	1978-1992	Unrestricted
1	6	Control Data Cyber 70 Model 76 Computer System Site Preparation Manual, Section 2 - System Data (John Humbert's copy)	circa 1975	Unrestricted
1	7	Control Data Cyber 70 Model 76 manual (John Humbert's copy)	circa 1975	Unrestricted
1	8	ILLIAC IV MOU (1 of 2). Agreements and requirements documentation between NASA and the Advanced Research Projects Agency (ARPA), the University of Illinois, Burroughs Corporation, and other institutions concerning the ILLIAC IV computer. Includes a March 19, 1971 article about the ILLIAC IV in Scientific American. The documents were in a binder that belonged to Marcie Chartz-Smith.	1967 - 1971	Restricted Possibly
1	9	ILLIAC IV MOU (2 of 2)	1967 - 1971	Restricted Possibly
1	10	Overlap in the ILLIAC IV Control Unit, January 10, 1977 (Pat Hiss's copy)	1977	Unrestricted
1	11	ILLIAC IV Machine Reference Manual for the Programmer, Revised July 1977 (Marcie Chartz-Smith's copy)	1977	Unrestricted
1	12	14 Reference Manual. ACL User Guide to 14DDT, May 1978 (ILLIAC)	1978	Unrestricted
1	13	RC Division Perspective, December 1986, RCD Branch	1986	Unrestricted
1	14	Center-wide ADP Plan, FY 1988-1992, August 24, 1987	1987	Unrestricted
1	15	ICE RFP, May 1988 (Interactive computer systems) Procurement RFP for UNIX systems (per Humbert, the UNIX systems were called interactive systems at this time)	1988	Unrestricted
1	16	Numerical Aerodynamics Simulation Program Plan (NP-1000-01-N01), October 21, 1988	1988	Unrestricted
1	17	Applied Information Technology Review for Code I Director, May 5, 1997	1997	Unrestricted
1	18	Applied IT Division Review for Director of Code J, February 1998	1998	Unrestricted
1	19	Ephemera. Programmer's reference cards (3 items): NASA Ames TSS Reference Data, SEL 840A/MP Programmer's Reference Card, Basic System Digital PDP-8/1 Instruction List	circa 1970s	Unrestricted
1	20	Ephemera. CDC-7600 Job Header punch cards, blank	circa 1975	Unrestricted



<b>Box</b>	<b>Folder</b>	<b>Title</b>	<b>Date</b>	<b>Restrictions</b>
2		IBM 360/67 drum storage magnetic recording heaps, 1965-1970 (Item 001. 7"w x 5"h x 2.5"d - dimensions include box)	1965 - 1970	Unrestricted
2		IBM-360/67 logic module, 1970 (Item 002. 3.5"w x 3"h x .5"d)	1970	Unrestricted
2		CDC-7600 logic module, 1975 (Item 003. 3.5"w x 1.5"h x 3.5"d)	1975	Unrestricted
2		Teledyne Corporation signal conditioner card, 1975 (Item 004. 7.25"w x 8.25"h x .5"d). Used in Ames Standardized Wind Tunnel Systems (SWTS). Decommissioned in 1999.	1975	Unrestricted
2		CRAY XMP input/output processor logic module, 1990 (Item 005. 8"w x 9"h x .5"d)	1990	Unrestricted
2		IBM 360 input/output connector (3 megabytes per second), circa 1967 (Item 006. 5.75" x 13"h x 3.5"d)	circa 1967	Unrestricted
2		Module from the ILLIAC IV (Item 007. 3.5"w x 4.25"h x .5"d)	circa 1972	Unrestricted
3		CDC memory plane from a CDC7600 LCM stack, circa 1975 (Item 008. 14.5"w x 20"h). The plane was hand-loomed with the use of a microscope. Caption included with the piece: This plane is one of 16 which comprise the LCM stack. It is arranged in a 512 x 512 matrix. Total individual cores = 262,144. These cores are then used to make up 4,096 64-bit (4-bit parity) words.	circa 1975	Unrestricted