



Guide to the
NASA Ames Motion Simulator Research Collection, 1959-1994
ARC18.13

NASA Ames History Archives
NASA Ames Research Center

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Descriptive Summary

Title:

NASA Ames Motion Simulator Research Collection, 1959-1994

Collection Number:

ARC18.13

Creator:

Ames Research Center

Dates:

Inclusive: 1959-1994

Bulk: 1960-1985

Extent:

Volume: 2.45 cubic feet

Repository:

NASA Ames History Archives
Moffett Field, California 94035

Abstract:

This collection primarily contains photographs depicting motion simulator research at Ames Research Center, the University of Southern California's (USC) Human Centrifuge apparatus testing for Ames Research Center, and the Johnsville Centrifuge Program's spacesuit development in collaboration with NASA. Remaining materials include administrative files from the division and branch managing the flight simulator facilities at Ames Research Center.

Administrative Information

Access:

Collection is open for research.

Publication Rights:

Copyright does not apply to United States government records. For non-governmental material, researcher must contact the original creator.

Languages and Scripts:

All records are in English.

Preferred Citation:

Expanded:

NASA Ames History Archives, NASA Ames Research Center. Moffett Field, California.
ARC18.13, NASA Ames Motion Simulator Research Collection, [Container number] :
[Folder number]. [Identification of item]. [Date, if available].

Abbreviated:

NASA ARC. ARC18.13, [Container number] : [Folder number]. [Identification of item].
[Date, if available].

Acquisition Information:

Transferred by Bonnie Andro-Avila on September 19, 2018 (Acq. 013-2018).

Scope and Content

Spanning from 1959 to 1994, this collection covers a period of Ames Research Center's motion simulator research in the form of photographs and administrative files. The photograph files in Series I capture motion simulator research at Ames Research Center, USC's Human Centrifuge apparatus testing for Ames Research Center and Johnsville Centrifuge Program's spacesuit development for NASA. The administrative files in Series II include documentation on two simulator facilities, a flight simulator facility assessment, and the managing division's reorganization documents.

The bulk of this collection contains photograph files that document various simulators and centrifuges used at Ames from the 1960s to the 1990s. Also included are photograph files from two different Ames-commissioned studies that took place in facilities at other institutions in the 1960s: pilot seat and restraint system experiments conducted in USC's Human Centrifuge, and spacesuit testing at Johnsville Naval Air Development Center.

The remainder of the collection contains files from the managing organization at Ames Research Center. Covering a duration of 1984 to 1994, areas of focus include the Man-Vehicle Systems Research Facility (MVS RF), the Vertical Motion Simulator (VMS), Ames motion simulators write-ups, a Flight and Guidance simulation laboratory review and assessment, and the 1994 reorganization of the Aerospace Human Factors Research Division and Flight Human Factors Branch.

System of Arrangement

The materials are arranged into two series, organized mainly by format and function, and then in chronological order:

Series I: Simulator and Centrifuge Photographs, 1959-1993

Series II: Administrative Files, 1984-1994

Series Descriptions

Series I: Simulator and Centrifuge Photographs, 1959-1993

There are three sets of photograph files in this series: motion simulator facilities at Ames Research Center from 1970 to 1980, along with associated personnel and outreach activities; Ames-commissioned research to test pilot seats and restraint systems at USC's Human Centrifuge in the 1960s; and spacesuit development at the Johnsville Naval Air Development Center in the 1960s.

A photograph key and description sheet from 1969 are present for a subset simulators at Ames. Simulators and devices represented in these files include: Ames Aircraft Sound Simulators, Biosatellite Centrifuge (20G), Environmental Chamber, Man-Vehicle Systems Research Facility, Man Vehicle Systems Research Facility (MVSRF), Crew-Vehicle Systems Research Facility (CVSRF), Five-Degree-of-Freedom Motion Generator, Fixed-Base Transport Simulator No. 1 (C-134), Fixed-Base Transport Simulator Number 2, Flight and Guidance Centrifuge, Flight Simulator for Advanced Aircraft (FSAA), Height-Control Test Apparatus, Human Environmental Test Facility, Hydraulic Control Loader System, Man-Carrying Rotation Device (MCRD), Man-Carrying Vibration Device (MCVD), Midcourse Navigation (Apollo), Moving-Cab Transport Simulator, NASA Horizon Simulator, Portable Chairs, Portable Chamber, Six-Degree-of-Freedom Motion Simulator, Three-Degree Motion Simulator, Unlimited Freedom Space Vehicle, Vertical Acceleration and Roll Device (VARD), Vertical Motion Simulator (VMS), and Visual Flight Attachments.

Files showing Ames personnel are also included in this first set. Identified personnel photographs include A-40722-25: Charlie Duke, Gordon Hardy, R. Mueller; AC91-0680 (left to right): Chase Billings, Dominic Wong, Gary Uyehara, Barry S., Dave Bent, Mike Armstrong, Anna Debrowski, Jim Dixon, Sil Corpuz, Norm Stein, Israel Levram, Ramesh Panda, Bob Shiner, Ken Krecjoeski, Glenn Ellis, Trent Thrush, George Soler, Vic Loesch; A-31154-1: Joseph J. Tymczyszyn; A-40722-25: Charlie Duke, Gordon Hardy, R. Mueller; A73-3615: Al Paulsen and wife; A89-0809-5: Congressional Subcommittee on Aviation, James Oberstar, Robert Shiner; AC91-0680 (left to right): Chase Billings, Dominic Wong, Gary Uyehara, Barry S., Dave Bent, Mike Armstrong, Anna Debrowski, Jim Dixon, Sil Corpuz, Norm Stein, Israel Levram, Ramesh Panda, Bob Shiner, Ken Krecjoeski, Glenn Ellis, Trent Thrush, George Soler, Vic Loesch.

The final file in this first set features a NASA exhibit featuring simulators at the 1962 Aerospace Medical Meeting. The exhibit showcases NASA's research in space flight and long-term space travel, and includes a flight simulator chair. Also included are the exhibits of aerospace research conducted by various organizations.

Ames Research Center designed and developed a series of experiments to test pilot seats and restraint systems, then turned to the Human Centrifuge at USC to execute those experiments. Photograph files from pilot seat testing at USC's Human Centrifuge capture harness fittings, centrifuge operations, test simulations, control rooms, operations panels, harness sketches, pilot fittings, and pilots in test apparatuses.

The Johnsville Centrifuge Program files provide a glimpse into the various stages of spacesuit development, suit fittings, harnesses, pilot seats, seat restraints, and test apparatuses. Located on the former Johnsville Naval Air Development Center operated under the US Navy, The Johnsville Centrifuge was used for training NASA astronauts. The human centrifuge machine consisted of a capsule at the end of a rotating arm.

Series II: Administrative Files, 1984-1994

This series contains administrative files from 1983 to 1994. Key subject areas include the MVSRF, VMS, write-ups on Ames motion simulators, Flight and Guidance Simulation Laboratory review and assessment, and the 1994 reorganization of the Aerospace Human Factors Research Division and Flight Human Factors Branch.

Intended to support aeronautical human factor research, the MVSRF facility included the Advanced Concepts Flight Simulator (ACFS), Boeing 727-200, and Air Traffic Control (ATC) simulators. Between 1992 and 1994 the facility name was changed from MVSRF to Crew-Vehicle Systems Research Facility (CVSRF). File dates range between 1984 to 1994, with documents predating 1992 referring to the facility as MVSRF. Files pertaining to the Man and Crew Vehicle Systems Research Facility include presentations, an outline of proposed experiments, construction of facilities documentation, data collection methods and quarterly reports. Files specific to the Boeing 727 simulator include decommissioning correspondence.

VMS files from the early 1990s are primarily compiled of presentations, a readiness review package and an Advanced Cab and Visual System (ACAVS) interface control document. Recognized as the world's largest motion flight simulator, the VMS offers a unique range of motion to simulate the six ways an aircraft or spacecraft moves. The ACAVS originated as a conceptual design study and designed as a VMS component.

Articles and publications spanning from 1983 to 1991 cover topics such as the Human Performance Research Laboratory dedication keynote address, Boeing 727 advanced cockpit, MVSRF technical papers, conference proceedings on the evolution of the flight simulator and human factors in computing systems and three-dimensional virtual acoustic displays.

In 1989 the Human Factors Research Division at Ames Research Center conducted a research and development flight simulator assessment. This assessment's purpose was to identify flight simulator facility improvements. The assessment covered schedules, simulator usage percentages, an outline of facility upgrades, and implementation schedules. Briefing packages from the assessment include a summary of flight simulation facilities, identified issues, assessment of facility upgrade requests, findings and recommendations, notes on the review, and schematics of the Flight and Guidance Simulation Laboratory floors.

The remaining files in this series contain information on the reorganization of simulation facilities. During this period the Aerospace Human Factors Research Division and Flight Human Factors Branch managed the Ames simulation facilities. In 1994 Ames Research Center restructured the organization to the Flight Management and Human Factors Division

and Human and Systems Technologies Branch. Files pertaining to the reorganization and include construction of facilities proposals, Ames division and branch level reorganizations, facility and simulator reports, interface control documents, and meeting notes.

Indexing Terms

The following terms may be used to index this collection.

Corporate Name

Ames Research Center
Crew Vehicle Systems Research Facility (Simulation Laboratories (Ames Research Center))
Human Centrifuge (University of Southern California)
Johnsville Centrifuge Program
Simulation Laboratories (Ames Research Center)
SimLabs
Vertical Motion Simulation Complex (Simulation Laboratories (Ames Research Center))

Subjects

Advanced Cab and Visual System
Flight and Guidance Centrifuge
Flight Simulator for Advanced Aircraft
Five-Degree-of-Freedom Motion Generator
Fixed-Base Transport Simulator
Height-Control Test Apparatus
Human Environmental Test Facility
Man-Carrying Rotation Device
Man-Vehicle Systems Research Facility
Moving-Cab Transport Simulator
Six-Degree-of-Freedom Motion Simulator
Vertical Acceleration and Roll Device
Vertical Motion Simulator

Acronyms

| | |
|--------|--|
| ACAVS | Advanced Cab and Visual System |
| ACFS | Advanced Concepts Flight Simulator |
| ATC | Air Traffic Control |
| C of F | Construction of Facilities |
| CSRDF | Crew Station Research and Develop Facility |
| CVSRF | Crew-Vehicle Systems Research Facility |
| FSAA | Flight Simulator for Advanced Aircraft |
| MCRD | Man-Carrying Rotation Device |
| MCVD | MC Vibration Device |
| MVSRF | Man-Vehicle Systems Research Facility |
| TWA | Trans World Airlines |
| VARD | Vertical Acceleration and Roll Device |
| VFA | Visual Flight Attachment |
| VMS | Vehicle Motion Simulator |
| USC | University of Southern California |

Container List

Series I: Simulator and Centrifuge Photographs

| Box | Folder | Folder Title |
|-----|--------|--|
| 1 | 1 | Photograph Key, Simulator Descriptions |
| 1 | 2 | NASA Horizon Simulator, FSI Gunnery Tracking Trainer |
| 1 | 3 | USC Photographs |
| 1 | 4 | USC Centrifuge (1 of 2) |
| 1 | 5 | USC Centrifuge (1 of 2) |
| 1 | 6 | USC (1 of 2) |
| 1 | 7 | USC (2 of 2) |
| 1 | 8 | Johnsville Restraint |
| 2 | 1 | Johnsville (1 of 2) |
| 2 | 2 | Johnsville (2 of 2) |
| 2 | 3 | Johnsville Photographs |
| 2 | 4 | Unlimited Freedom Space Vehicle Simulator, A-28693 |
| 2 | 5 | Three Degree of Freedom Simulator, Boeing |
| 2 | 6 | SIGMA 7-8 |
| 2 | 7 | S.01 Six Degree Motion Simulator, AC79-0198-15 |
| 2 | 8 | S.01 Six Degree Motion Simulator, AC79-0198-16 |
| 2 | 9 | S.01 Six Degree Motion Simulator, AC79-0198-17 |
| 2 | 10 | S.01 Six Degree Motion Simulator, A-39901 |
| 2 | 11 | S.01 Six Degree Motion Simulator, A-36014 (1 of 2) |
| 2 | 12 | S.01 Six Degree Motion Simulator, A-36014 (2 of 2) |
| 2 | 13 | S.02 Simulator Chair--Stoland |
| 2 | 14 | S.02 Five Degree of Freedom Motion Generator |
| 2 | 15 | S.02 Five Degree Simulator Capsule |
| 2 | 16 | S.02 Five Degree of Freedom Motion Generator, Simulation with Gemini Suit |
| 2 | 17 | S.02 Five Degree of Freedom Motion Generator, TV Picture of Test Pilot Reaction to G-Force |
| 2 | 18 | S.03 Height-Control Test Apparatus |
| 2 | 19 | S.04 Fixed-Base Transport Simulator No. 1 (C-134) |
| 3 | 1 | S.05 MMI Fixed Based 1, A-40053-2 |
| 3 | 2 | S.05 MMI Fixed Based, AC78-0388-42 |
| 3 | 3 | S.05 MMI Fixed Based, AC79-0141-25 |
| 3 | 4 | S.05 MMI Fixed Based, A-40054-7 |
| 3 | 5 | S.05 Fixed-Base Transport Simulator No. 2, MMI |

3 6 S.07 VARD
 3 7 S.07 VARD, AC75-0496
 3 8 S.07 VARD, A-40075
 3 9 S.08 VMS, AC77-0571-1
 3 10 Flight and Guidance Simulation Laboratory, N243 Building Photographs
 3 11 S.08 VMS I Cab, AC79-0198-3, AC81-0716-1
 3 12 S.09 Flight and Guidance Centrifuge 50G
 3 13 S.09 50G, A70-5102
 3 14 S.09 Flight and Guidance Navigation, A-71-6490
 3 15 MVSRF and CVSRF
 3 16 Advanced Cab for Flight Simulation
 3 17 MVSRF and CVSRF Photographs
 3 18 Flight Simulator for Advanced Aircraft
 3 19 S.10 FSAA, A704399
 3 20 S.10 FSAA, A-36517, A-36518
 3 21 S.10 FSAA, A-42684-2 thru A-42684-17
 3 22 S.10 FSAA, A7341181
 3 23 S.10 FSAA, A-42684-5 thru A-42684-18
 3 24 S.10 FSAA, AC79-1026-14, C79-1026-16
 3 25 S.10 FSAA, A70-1628, A70-1923, A704927
 3 26 S.10 FSAA, A72-5475-50, A72-5475-51
 3 27 S.10 FSAA, AC77-0436-10 thru AC77-0436-12
 3 28 S.10 FSAA, AC77-0436-2 thru AC77-0436-9
 3 29 S.10 FSAA, A73-0752
 3 30 S.10 FSAA, A42375-1
 3 31 S.10 FSAA, A42375-5
 3 32 S.10 FSAA, AC79-0141-21
 3 33 S.10 FSAA, AC77-1051
 3 34 S.10 FSAA, A-10114-1 thru A-10112-5
 3 35 S.10 FSAA, A73-0753
 4 1 S.10 FSAA, A-40112-3
 4 2 S.10 FSAA, A73-4723
 4 3 S.10 FSAA, A70-4982
 4 4 S.10 FSAA, A-73-1442
 4 5 S.10 FSAA, A-71-2131
 4 6 S.10 FSAA, A70-1628
 4 7 S.10 FSAA, A42524-2 thru A42524-19

- 4 8 S.10 FSAA, 42375-8, 42375-9
- 4 9 S.11 MCRD, A-40699
- 4 10 S.11 MCRD, A-40699
- 4 11 S.12 Biosatellite Centrifuge 20G, A70-4617 thru A70-4622, A70-4616 thru A70-1642, PMGC-46
- 4 12 S.12 20G, A-39174, A-34429-10, A-37455, A-38586
- 4 13 S.12 20G, A-34429-2 thru A-34429-9
- 4 14 S.12 20G, AR-1632B-1093-372, AR-1632B-1726, A-35893, A-38582
- 4 15 S.12 20G, A-36034, A-35893, A-41620, A-36040, A-36041
- 4 16 S.12 20G, A-35893
- 4 17 S.12 20G, SFG-17, A-35869, A-36801, A-36825, A-34429-11, A-34429-13
- 4 18 S.13 Environmental Chamber, A71-6476
- 4 19 S.16 Moving-Cab Transport Simulator, 36726, A71-1996, A-30526-16
- 4 20 S.16 Moving-Cab Transport Simulator, 36838, A-40052-2, A-40052-6, A70-4399
- 4 21 Two-Axis Simulator
- 4 22 Flight Simulator, A36342
- 4 23 S.18 Human Environmental Test Facility, A-42021-1, A-42021-2
- 4 24 Enclosed/Portable Chairs (general)
- 4 25 Chair 2, AC79-0141-5, AC79-0141-11, AC79-1041-23
- 4 26 Chair 2, AC79-1098-5, AC79-1098-4
- 4 27 Chair 2, AC78-0765-1
- 4 28 Chair 2, A-718857
- 4 29 Chair 2, A71-3220
- 4 30 Chair 2, Saturn 5
- 5 1 Ch. 03 Computer Graphics
- 5 2 Computer Generated Images, AC-78-0728-1
- 5 3 Ch. 06 V/STOLAND UH-1 Experiments
- 5 4 VFA, AC79-0591-1, AC79-0591-2
- 5 5 VFA, AC79-0591-3, AC79-0591-4
- 5 6 VFA, 39458
- 5 7 VFA, A-40054-6
- 5 8 VFA, AC79-0141-5, AC79-0141-16
- 5 9 VFA A-70-1104
- 5 10 VFA-2 Visual Scene
- 5 11 VFA-4 GPS (RATL)
- 5 12 Trans World Airlines (TWA) Flight Simulator
- 5 13 Aerospace Medical Meeting in Atlantic City

5 14 Personnel Photographs

Series II: Administrative Files

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| 5 | 15 | Construction of Facilities, MVSRF Upgrade |
| 5 | 16 | MVSRF Data Problems |
| 5 | 17 | Construction of Facilities, MVSRF Rehab FY91 |
| 5 | 18 | MVSRF Experiment and Project Queue |
| 6 | 1 | MVSRF Stuff |
| 6 | 2 | Users Meetings |
| 6 | 3 | Presentation Photographs and View Graphs |
| 6 | 4 | Quarterly Reports, MVSRF |
| 6 | 5 | Research, Queue Completed |
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| 6 | 7 | Boeing 727 Decommission |
| 6 | 8 | Space Shuttle VMS Simulation |
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| 6 | 10 | ACAVS Interface Control Document (1 of 2) |
| 7 | 1 | ACAVS Interface Control Document (2 of 2) |
| 7 | 2 | Publications |
| 7 | 3 | Human Research Division Review and Facility Improvements |
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| 7 | 7 | Reorganization Code FL |
| 7 | 8 | Aeronautics Directorate Reorganization |
| 7 | 9 | Reorganization, Aeronautics Division |