



Smithsonian

National Air and Space Museum

Bruce McCandless II Papers

Sarah LeClaire

2024

National Air and Space Museum Archives
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Collection Overview

Repository:	National Air and Space Museum Archives
Title:	Bruce McCandless II Papers
Date:	1954-2012
Identifier:	NASM.2023.0036
Extent:	29.28 Cubic feet (75 boxes)
Language:	English , German , French , Japanese , Russian .
Summary:	<p>Bruce McCandless II (1937--2017) was a naval aviator, astronaut, and engineer who was the first human to conduct a spacewalk without a safety tether linked to a spacecraft. The youngest of 19 astronauts selected in 1966, he served as the voice of Mission Control during the Apollo 11 mission in 1969, talking with Neil Armstrong and Buzz Aldrin during their historic walk on the Moon. He helped develop an early maneuvering unit tested on Skylab in 1973-74 and then on the design and testing of the shuttle-era Manned Maneuvering Unit (MMU). McCandless also had a keen interest in creating tools for extravehicular activity, including a patented connection system that eased tool transport and use in space called the "McTether," which became a standard tool on Shuttle missions. Altogether McCandless logged 5,000 hours in jet aircraft and 312 hours in space. This collection consists of approximately 30 cubic ft of papers, including reports, presentations, notes, office files, photographs and video/film created or collected by Bruce McCandless II. The papers show McCandless' myriad contributions to spaceflight and space science at both NASA and Lockheed Martin Space Systems, focusing on his contributions to the MMU and inputs to the development of hardware and procedures for the Hubble Space Telescope and the Solar Maximum Repair Mission.</p>
Digital Content:	<p>Image(s): Astronaut Bruce McCandless II performing the first untethered Extravehicular Activity (EVA) using the Manned Maneuvering Unit (MMU) on February 7, 1984, NASM.2023.0036</p>

Administrative Information

Acquisition Information

Bruce and Pati McCandless, III, Gift, 2023, NASM.2023.0036

Related Materials

Space Shuttle *Discovery* from the Smithsonian National Air and Space Museum collection: [Space Shuttle Discovery, A20120325000](#) .

The Manned Maneuvering Unit (MMU) from the Smithsonian National Air and Space Museum collection: [Manned Maneuvering Unit, A20120325000](#) .

McTether Ratchet Wrench Tool from the Smithsonian National Air and Space Museum collection: [McTether, A20130114000](#) .

McCandless' name tag from the Smithsonian National Air and Space Museum collection: [McCandless' name tag, A19970596000](#) .

Robert J. Collier Trophy from the Smithsonian National Air and Space Museum collection: [Collier Trophy, A19520061000](#) .

Sketch of Capsule Communicator Bruce McCandless from the Smithsonian National Air and Space Museum collection: [Sketch, A19760552000](#) .

Hubble Space Telescope 1:5 model from the Smithsonian National Air and Space Museum collection: [Hubble model, A19830233000](#) .

Processing Information

Arranged, described, and encoded by Sarah LeClaire, 2024.

Preferred Citation

Bruce McCandless II Papers, Acc. 2023.0036, National Air and Space Museum, Smithsonian Institution.

Restrictions

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Biographical / Historical

Bruce McCandless II, astronaut, engineer and inventor, instantly became an icon of human ingenuity on February 7, 1984, when he was photographed free floating in the inky blackness of space, hundreds of feet from the Space Shuttle *Challenger*, using the Manned Maneuvering Unit (MMU), a machine he spent almost twenty years developing during his career at the National Aeronautics and Space Administration (NASA). He was born in Boston, Massachusetts, on June 8, 1937, to Rear Admiral Bruce and Sue McCandless. From a young age, he was interested in science, winning first place in a competition sponsored by the American Chemical Society as a teenager. Upon graduating from Woodrow Wilson High School in Long Beach, California, he enlisted in the Navy, just as his father and grandfather had done previously, both of whom were Medal of Honor recipients. In June of 1958, McCandless earned a Bachelor of Science degree, graduating second in his class from the Naval Academy in Annapolis, Maryland.

After flight training in Pensacola, Florida, and Kingsville, Texas, McCandless got his Navy wings in March of 1960 after six successful solo landings aboard the USS *Antietam*. While enrolled in additional aviation courses in Memphis, Tennessee, he met Bernice Doyle. A few months later, they married and moved to Key West, Florida, where he received further instruction in the Douglas F4D-1 Skyray. He was assigned first to Fighter Squadron 101, the *Grim Reapers*, and, later, to Fighter Squadron 102, the *Diamondbacks*, until February 1964. He saw duty aboard the USS *Forrestal* (CVA-59) and, during the Cuban Missile Crisis, the USS *Enterprise* (CVA(N)-65). He then served as an instrument flight instructor at the Naval Air Station in Oceana, Virginia. McCandless then reported for duty at the Naval Reserve Officers Training Corps Unit at Stanford University where he earned a Master of Science in Electrical Engineering in 1965 and immediately began pursuing his PhD in plasma physics. On April 4, 1966, McCandless left Stanford after finishing all his coursework but without completing a dissertation because, at age 28, he had been selected as the youngest member of NASA's Astronaut Group 5.

Two months later, the McCandless' and their two young children, Bruce III and Tracy, arrived in Houston, Texas. Any hope he had of finishing his dissertation while being an astronaut was quickly dashed by the relentless schedule. Classroom training in subjects such as orbital mechanics, geology, space medicine and navigation were conducted three days a week. The remaining days were reserved for field trips to the Grand Canyon in Arizona, the Kīlauea Iki Crater in Hawaii, the Pinacate Peaks of Mexico, and the volcanoes and ice fields of Iceland, to gain hands-on geology experience. The astronaut trainees also went to Panama and Nevada for survival training. The intensive schedule lasted until September of 1967.

In October 1966, the new recruits received their first technical assignments. McCandless was assigned to the Experiments Branch. In February of 1967, the Experiments Branch became part of the Apollo Application Program (AAP). Around this time, McCandless tested the Astronaut Maneuvering Unit (AMU, also sometimes referred to as the M-509 Unit) in a simulator. Developed by the United States Air Force, the AMU was a rocket pack worn over the pressure suit. First used with less-than-ideal results by Eugene Cernan during the Gemini IX-A mission, NASA continued to seek ways to enable astronauts to move efficiently and safely in both the near-vacuum of space and inside increasingly spacious spacecraft. McCandless, NASA's Charles E. "Ed" Whitsett, Jr. and Walter W. "Bill" Bollendonk from Martin Marietta worked on improving this "jet pack" technology for almost two decades. The next iteration was the Automatically Stabilized Maneuvering Unit (ASMU), which proved to be a distinct improvement and was used during Skylab 3 and 4. The trio eventually won The Collier Trophy in 1984 for the final version, the Manned Maneuvering Unit (MMU).

In 1969, McCandless served as Capsule Communicator (CAPCOM) for the Apollo 10 and 11 missions. His is the voice you hear saying, "Roger, Tranquility. We copy you on the ground. You got a bunch of guys about to turn blue. We're breathing again. Thanks a lot," in response to Armstrong's announcement that the *Eagle* had indeed landed on the lunar surface. Subsequent years saw him perform the same role for Apollo 14 (1971) and Skylab 3 and 4 (both in 1973). Additionally, he, along with Russell "Rusty" Schweickart and Story Musgrave, served as the backup crew for Skylab 2.

In 1978, McCandless was assigned to define and evaluate all the astronaut crew operational aspects of the Large Space Telescope, which included on-orbit maintenance. This required him to make countless drives in the Neutral Buoyancy Simulator (NBS) at Marshall Space Flight Center and the Neutral Buoyancy Laboratory (NBL) at Johnson Space Center. The giant pools simulated the microgravity environment of space and allowed him and others to practice repair and servicing techniques in orbit on a mock-up of the telescope, which was eventually renamed the Hubble Space Telescope. By the time Hubble deployed twelve years later, his work ensured that each of the five scientific instruments attached to it were either fully replaceable or serviceable by astronauts during spacewalks. Only the main wiring harness and the primary and secondary mirrors were not designed to be fixed while in space, which would become significant in subsequent years.

In 1979, NASA began testing the newly renamed Manned Maneuvering Unit. Manufactured by Martin Marietta, it snugly fit over an astronaut's pressure suit like a backpack and featured 24 propulsion nozzles fueled by two aluminum nitrogen gas tanks wrapped in Kevlar. The wearer controlled movement with small handles on the armrests that required minimal hand gestures to operate. It was specially constructed to operate in the extreme temperature fluctuations of space. Initially, the MMU was slated for use on the first Shuttle mission to allow the astronauts to inspect and repair any damaged thermal tiles. Due to the brevity of the mission, the crew opted not to use it during their two days in orbit. The following year, McCandless was detailed to the Astronaut Office On-Orbit Branch. In addition to his work on the MMU and servicing Hubble, he also oversees developments on the Inertial Upper Stage (IUS), an uncrewed booster rocket used to lift payloads to a higher orbit in space.

On February 3, 1984, McCandless, together with Commander Vance Brand, Pilot Robert L. "Hoot" Gibson, and Mission Specialists Robert L. Stewart and Ronald E. McNair, launched aboard the *Challenger* on the 11th shuttle mission, STS-41-B. Four days later, McCandless became the first human to ever fly untethered in space, using an MMU. The jet-powered backpack allowed him to travel 4.8 miles a second and venture over 100 yards away from the orbiter. The spacewalk lasted approximately 6 hours. Two months later, the crew of STS-41-C successfully retrieved, repaired, and redeployed the Solar Maximum Mission Satellite while donning MMUs. McCandless was instrumental in the development of the plan to fix the satellite's altitude-control system and white-light coronagraph/polarimeter while still in orbit, thanks to the Trunnion Pin Attachment Device (TPAD). This was the first time a satellite

repair was performed in space. The year concluded with McCandless being awarded patent number 4,483,639 for a connection system that simplified and eased the ways in which astronauts could transport and use tools in space without additional connectors. Called the "McTether," it worked easily with spacesuit-gloved hands and became a part of the standard tool kit on Shuttle missions.

McCandless made his final trip into space with STS-31 on April 24, 1990. Also on board the *Discovery* were Commander Loren Shriver, Pilot Charles Bolden, Jr., and Mission Specialists Steven Hawley and Kathryn Sullivan. The Hubble Space Telescope was deployed into a low-Earth orbit, forever changing how we see the universe. The telescope weighs over 24,000 lbs. and was the largest payload to date. This was documented by an IMAX Cargo Bay Camera (ICBC) and a hand-held IMAX camera. This footage was used in the IMAX films "Destiny in Space" (1994) and "Hubble 3D" (2010).

On August 31, 1990, Bruce retired from both the Navy and NASA. The very next day, he was on a plane to Munich, Germany, as a consultant for the Space Telescope Science Institute (STScI). He and eighteen other experts gathered to determine why the images from Hubble were blurry. The problem was determined to be the primary mirror, which was thought to be unreparable while in space. The Hubble Space Telescope Strategy Panel formulated a plan to fix the primary mirror's spherical aberration (which was later done successfully during 1993's STS-61 mission). In November of 1990, he accepted a position at Martin Marietta Astronautics Group (in 1995, they merged with the Lockheed Corporation to form Lockheed Martin). During his fifteen years there, he was the Chief Scientist in Advanced Launch Systems. He worked on the Orbital Space Plane, the Space Launch Initiative, the Space Transportation Architecture Study, the Orbiter Electric Auxiliary Power Unit, the Jupiter Icy Moons Orbiter (JIMO) and the Crew Exploration Vehicle (CEV). He retired from Lockheed on March 31, 2005, but was retained on a consulting basis.

Bruce McCandless II passed away in Los Angeles, California, on December 21, 2017, at the age of 80.

Bruce McCandless II: Awards and Honors

1953	Southern California Chemistry Prize
1974	Exceptional Service Medal, NASA
1974	Victor A. Prather Award, American Astronautical Society
1974	American Expeditionary Service Medal
1974, April 18	National Defense Service Medal
1984	Victor A. Prather Award, American Astronautical Society
1984, March 13	Jackson, Mississippi, honorary citizen
1984, September 24	American Society of Cinematographers, honorary member
1985, January 30	Superior Service Medal, Department of Defense
1985, May 10	Collier Trophy, the National Aeronautic Association
1985, October 4	The National Air and Space Museum Trophy
1985, October 8	Exceptional Engineering Achievement Award, NASA
1986	Spirit of St. Louis Medal, American Society of Mechanical Engineers
1987	Haley Space Flight Award
1988	Legion of Merit
1990	Space Flight Medal, NASA
1991	Exceptional Service Medal, NASA
2003, March 27	Three Certificates of Merit, Lockheed Martin's Intellectual Property Review Board

2005

U.S. Astronaut Hall of Fame induction

2012

Distinguished Graduate Award Medal, the United States Naval Academy.

Scope and Contents

This collection consists of approximately 30 cubic feet of papers, including reports, presentations, notes, office files, photographs and video/film collected by Bruce McCandless II. The papers show McCandless' myriad contributions to spaceflight (with 312 hours in space and the first person to make an untethered spacewalk), and space science at both NASA and Lockheed Martin Space Systems, focusing on his contributions to the Manned Maneuvering Unit (MMU) and inputs to the development of hardware and procedures for the Hubble Space Telescope and the Solar Maximum Repair Mission. Many of the documents are hand annotated.

Arrangement

This collection is composed of ten series:

Series 1: Personal Material

Series 2: Naval Career

Series 3: Education

Series 4: National Aeronautics and Space Administration (NASA)

Subseries 4.1 STS-41-B

Subseries 4.2: STS-31

Subseries 4.3: Manned Maneuvering Unit (MMU)

Subseries 4.4: Hubble Space Telescope

Subseries 4.5: Miscellaneous

Series 5: Post-NASA Career

Subseries 5.1: Space Telescope Science Institute (STScI)

Subseries 5.2: Martin Marietta/Lockheed Martin

Subseries 5.3: Speeches, Presentations and Appearances

Series 6: Awards and Publicity

Series 7: Miscellaneous

Series 8: Photographs, Slides and Negatives

Series 9: Oversize Materials

Series 10: Audiovisual Material

General

Below is a list of acronyms that most frequently appear frequently in McCandless' papers.

ACS - Advanced Camera for Surveys

AIAA - American Institute of Aeronautics and Astronautics

AMRV - Astronaut Maneuvering Research Vehicle
AMU - Astronaut Maneuvering Unit/M-509
ASMU - Automatically Stabilized Maneuvering Unit
CAPCOM - Capsule Communication
CCA - Communications Carrier Assembly
CCCD - Crew Compartment Configuration Drawing
CEV - Crew Exploration Vehicle
CFP - Conceptual Flight Profile
CIL - Critical Items List
CIR - Cargo Integration Review
DSO - Detailed Supplementary Objectives
DTO - Development Test Objective
EAPU - Electric Auxillary Power Unit
EMU - Extravehicular Mobility Unit
EVA - Extravehicular Activity
EVCS - Extravehicular Communications System
FAA - Federal Aviation Administration
FIAB - Flight Integration Assessment Baseline
FMEA - Failure Modes Effects Analysis
FOC - Faint Object Camera
FOP - Flight Operations Panel
FRD - Flight Requirements Document
FSS - Flight Support System/Structures
GAPC - Gas Autonomous Payload Controller
GEIA - Global Emissions Initiative
GFE - Government Furnished Equipment
HHMU - Hand-Held Maneuvering Unit
HRSDM - Hubble Robotic Servicing Deorbit Missions
HRVDM - Hubble Robotic Vehicle Deorbit Module
ICBC - IMAX Cargo Bay Camera
IMSS - In-Flight Medical Support System
IRN - Interface Revision Notice
IUS - Inertial Upper Stage
JIMO - Jupiter Icy Moons Orbiter
JSC - Johnson Space Center
JWST - James Webb Space Telescope
LDRI - Laser Dynamic Range Imager

LIDAR - Light Detection and Ranging
LIDS - Low Impact Docking Station
LON - Launch on Need
MDF - Manipulator Development Facility
MFR - Manipulator Foot Restraint
MLI - Multilayer Insulation
MMS - Multimission Modular Spacecraft
MMU - Manned Maneuvering Unit
MOMS - Modular Optoelectronic Multispectral Scanner
MSFC - Marshall Space Flight Center
MXER - Momentum Exchange/Electrodynamic Reboost
M&R - Maintenance and Repair or Refurbishment
NBS - Neutral Buoyancy Simulator
NSTS - National Space Transportation System
OFP - Operational Flight Profile
OOSS - On-Orbit Servicer System/Study
ORI - Orbital Replacement Instrument
ORU - Orbital Replacement Unit
ORUC - Orbital Replaceable Unit Carrier
OWG - Operations Working Group
OWS - Skylab Orbital Workshop
PDR - Preliminary Design Review
PFR - Portable Foot Restraint
PIP - Payload Integration Plan
POWG - Payload Operations Working Group
PRM - Primary Deployment Mechanism
PROMS - Programmable Read Only Memory
PRT - Platinum Resistor Thermometer
PRT - Power Ratchet Tool
PSIA - Pounds per Square Inch Absolute
RNS - Relative Navigation System
SADA - Solar Array Drive Arm
SAMS - Space Assembly, Maintenance and Servicing
SCAN - Selected Current Aerospace Notices
SCM - Soft Capture Mechanism
SDM - Secondary Deployment Mechanism
SM-4 - Servicing Mission Four

SMM - Solar Maximum Mission
SPAS - Shuttle Pallet Satellites
SRBTVC - Solid Rocket Booster Thrust Vector Control
SSEOP - Space Shuttle Earth Observations Project
SSME - Space Shuttle Main Engine
STIS - Space Telescope Imaging Spectrograph
STS - Space Transportation System
TAODS - Tethered Augmented Orbiter Deorbit System
TPAD - Trunnion Pin Attachment Device
TRDS - Tracking and Data Relay Satellite
TSS - Tethered Satellite System
USIA - United States Information Agency
VGS - Video Guidance Sensor
WETF - Weightless Environmental Training Facility
WF/PC - Wide Field Planetary Camera
WIF - Water Immersion Facilities

Names and Subject Terms

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

Subjects:

- Apollo Project
- Astronautics
- Hubble (Large) Space Telescope
- Manned space flight
- Military records -- 20th century -- United States
- Naval aviation
- Skylab Program
- Space Shuttle Program (U.S.)

Types of Materials:

- Black-and-white photographs
- Color photographs
- Conferences
- Correspondence
- Reports

Container Listing

Series 1: Personal Papers, 1960-2014 and undated

Box 1, Folder 1	1968 calendar
Box 1, Folder 2	1972 calendar
Box 1, Folder 3	1975 calendar
Box 1, Folder 4	1983, July calendar
Box 1, Folder 5	1983 calendar
Box 1, Folder 6	1984, May calendar
Box 1, Folder 7	1986, March calendar
Box 1, Folder 8	1986, June calendar
Box 1, Folder 9	1987, April calendar
Box 1, Folder 10	1987, July calendar
Box 1, Folder 11	1989, March calendar
Box 1, Folder 12	1990, January calendar
Box 1, Folder 13	Business cards and stationary
Box 1, Folder 14	Correspondence from Bernice McCandless, wife
Box 1, Folder 15	Correspondence from Bruce McCandless II
Box 1, Folder 16	Correspondence from Bruce McCandless III, son
Box 1, Folder 17	Correspondence from Sue McCandless, mother
Box 2, Folder 1	Correspondence from Victor Hasselblad, 1975
Box 2, Folder 2	Correspondence in German (untranslated)
Box 2, Folder 3	Correspondence to Bernice McCandless

Box 2, Folder 4	Correspondence with photographs
Box 2, Folder 5	Miscellaneous correspondence (1 of 4)
Box 2, Folder 6	Miscellaneous correspondence (2 of 4)
Box 2, Folder 7	Miscellaneous correspondence (3 of 4)
Box 3, Folder 1	Miscellaneous correspondence (4 of 4)
Box 3, Folder 2	Wedding invitation and program, August 6, 1960

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Series 2: Naval Career, 1954-1990 and undated

Box 3, Folder 3	Aircraft investigation report, March 25, 1986
Box 3, Folder 4	Aircrew training/evaluation records
Box 3, Folder 5	Aviation training
Box 3, Folder 6	Aviator's flight log book, March 4, 1971 - October 31, 1977
Box 3, Folder 7	Aviator's flight log book, November 14, 1977 - May 26, 1983
Box 3, Folder 8	Diamondback newsletter, July 10, 1963
Box 3, Folder 9	Materiel Professional Program, 1985
Box 3, Folder 10	Naval astronaut binder (1 of 4)
Box 4, Folder 1	Naval astronaut binder (2 of 4)
Box 4, Folder 2	Naval astronaut binder (3 of 4)
Box 4, Folder 3	Naval astronaut binder (4 of 4)
Box 4, Folder 4	Naval Aviator Certification, 1960
Box 4, Folder 5	Navy memos
Box 4, Folder 6	Naval referral letters for NASA application, 1965
Box 4, Folder 7	Navy talking points, 1989
Box 4, Folder 8	Officer biography sheet
Box 5, Folder 1	Personnel records (1 of 2)
Box 5, Folder 2	Personnel records (2 of 2)
Box 5, Folder 3	Radar Circuit Analysis, NAVAER 00-08T-79, September 1959
Box 5, Folder 4	United States Navy (USN)/United States Marine Corp (USMC) astronaut meeting, September 22-26, 1986
Box 6, Folder 1	United States Naval Academy (USNA) 25th Homecoming, 1983
Box 6, Folder 2	USNA Alumni Association

Box 6, Folder 3	USNA brochure
Box 6, Folder 4	USNA Class of 1958 questionnaire, 1982
Box 6, Folder 5	USNA graduation program, June 4, 1958
Box 6, Folder 6	USNA class roster, 1958
Box 6, Folder 7	US Navy Diving Manual, volume 2, NAVSEA 0994-LP-001-9020, October 1, 1987
Box 6, Folder 8	"US Navy in Space" draft, 1984
Box 6, Folder 9	USS Enterprise commissioning, November 25, 1961

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Series 3: Postgraduate Education, 1965-2003 and undated

Box 6, Folder 10	APP PHYS (Applied Physics) 237, Applied Quantum Mechanics, 1966 (1 of 2)
Box 6, Folder 11	APP PHYS 237, Applied Quantum Mechanics, 1966 (2 of 2)
Box 7, Folder 1	EE (Electrical Engineering) 308, Introduction to Linear Systems, 1965
Box 7, Folder 2	EE 309, Matrix Methods in Electrical Engineering, 1965
Box 7, Folder 3	Elements of Space and Reentry Mechanics
Box 7, Folder 4	GOVT (Government) 6731, Seminar in Public Administration, 1977 (1 of 2)
Box 7, Folder 5	GOVT 6731, Seminar in Public Administration, 1977 (2 of 2)
Box 8, Folder 1	MGT (Management) 5131, Innovation and Space Age Management, 1987
Box 8, Folder 2	MGT 5132, Organization Theory and Analysis, 1976 (1 of 3)
Box 8, Folder 3	MGT 5132, Organization Theory and Analysis, 1976 (2 of 3)
Box 8, Folder 4	MGT 5132, Organization Theory and Analysis, 1976 (3 of 3)
Box 9, Folder 1	MGT 5931, Problems in Management Theory of Complex Organizations, 1977 (1 of 4)
Box 9, Folder 2	MGT 5931, Problems in Management Theory of Complex Organizations, 1977 (2 of 4)
Box 9, Folder 3	MGT 5931, Problems in Management Theory of Complex Organizations, 1977 (3 of 4)
Box 9, Folder 4	MGT 5931, Problems in Management Theory of Complex Organizations, 1977 (4 of 4)
Box 9, Folder 5	PhD candidacy paperwork, July 1966
Box 9, Folder 6	Russian language course
Box 10, Folder 1	Space Nuclear Power and Propulsion Systems Technology. 2003 (1 of 2)
Box 10, Folder 2	Space Nuclear Power and Propulsion Systems Technology. 2003 (2 of 2)
Box 10, Folder 3	Stanford University acceptance letter, March 4, 1964

Box 10, Folder 4	Stanford University application letter, December 31, 1962
Box 10, Folder 5	Stanford University commencement, June 13, 1965
Box 10, Folder 6	Stanford University Master of Science diploma, 1965
Box 10, Folder 7	Stanford University paperwork
Box 10, Folder 8	UCLA (University of California, Los Angeles) course certificate, 1970

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Series 4: National Aeronautics and Space Administration (NASA)

Subseries 4.1: STS-41-B, 1983-1985 and undated

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Box 11, Folder 2	Air-to-Ground Transcript, February 4, 1984
Box 11, Folder 3	Air-to-Ground Transcript, February 5, 1984
Box 11, Folder 4	Air-to-Ground Transcript, February 6, 1984
Box 11, Folder 5	Air-to-Ground Transcript, February 7, 1984
Box 12, Folder 1	Air-to-Ground Transcript, February 8, 1984
Box 12, Folder 2	Air-to-Ground Transcript, February 9, 1984
Box 12, Folder 3	Air-to-Ground Transcript, February 10, 1984
Box 12, Folder 4	"Analysis of STS-41-B MFR Force Evaluation Test," McDonnell Douglas, March 1, 1985
Box 12, Folder 5	Cinema 360
Box 12, Folder 6	Crew briefing, November 3, 1983
Box 12, Folder 7	"Data Processing System, Post-Mission Report," March 19, 1984
Box 12, Folder 8	EVA (Extravehicular Activity) information, undated
Box 12, Folder 9	"Flight Requirements," December 9, 1983
Box 12, Folder 10	Flight software program notes, September 1990
Box 12, Folder 11	"McCandless MS-3" index cards
Box 12, Folder 12	Miscellaneous information, STS-41-B
Box 12, Folder 13	Note cards
Box 13, Folder 1	Personal Preference Kit (PPK) items
Box 13, Folder 2	"Post-Flight Homecoming Itinerary," October 9-14, 1984
Box 13, Folder 3	"Post-Flight Report, STS-41-B"

Box 13, Folder 4	"Stowage list," June 24, 1983
Box 13, Folder 5	"STS-11 EVA Walkthrough and Engineering Compatibility," July 1983
Box 13, Folder 6	STS-11 notebook, February 7 - December 20, 1983
Box 13, Folder 7	"STS-11 Sunrise Terminator Chart," August 1983
Box 13, Folder 8	"STS-41-B EVA Rules and Crew Debrief," 1984
Box 13, Folder 9	"STS-41-B Integrated Family Itineraries," January 1984
Box 13, Folder 10	"Television schedule," January 16, 1984
Box 13, Folder 11	Transcript of conference with Ronald Reagan

Subseries 4.2: STS-31, 1985-1990 and undated

Box 13, Folder 12	"Ammonium Perchlorate Manifest Options," June 14, 1988
Box 13, Folder 13	Badge
Box 13, Folder 14	Cargo Integration Review documents (1 of 3)
Box 13, Folder 15	Cargo Integration Review documents (2 of 3)
Box 14, Folder 1	Cargo Integration Review documents (3 of 3)
Box 14, Folder 2	"Crew Activities Overview Assessment," April 6, 1988
Box 14, Folder 3	Crew appearances
Box 14, Folder 4	"Crew Option List for Stowed Clothing," undated
Box 14, Folder 5	"Crew PAO Plan Review," January 30, 1990
Box 14, Folder 6	Crew visit to British Aerospace in Bristol, England, December 1988
Box 14, Folder 7	Crew visit to Space Telescope Institute, June 1989
Box 14, Folder 8	"Commit-to-Flight Assessment Baseline," October 26, 1989
Box 14, Folder 9	Critical items list
Box 14, Folder 10	"DSO 459, Otolith Tilt-Translation Reinterpretation," April 1989

Box 14, Folder 11	"EVA Flight Experiments," April 10, 1989
Box 14, Folder 12	Flight Integration Assessment Baseline documents
Box 14, Folder 13	Flight Operations Panel meeting memos
Box 14, Folder 14	Flight requirement documents (FRD)
Box 14, Folder 15	"Flight Rule Changes," April 2, 1990
Box 15, Folder 1	Flight Status Telecon, April 3, 1990
Box 15, Folder 2	Guest information for launch
Box 15, Folder 3	High altitude Earth photography
Box 15, Folder 4	IMAX Cargo Bay Camera (ICBC) (1 of 2)
Box 15, Folder 5	IMAX Cargo Bay Camera (ICBC) (2 of 2)
Box 15, Folder 6	Launch pre-party announcement
Box 15, Folder 7	Mass properties, undated
Box 15, Folder 8	"Medical Detailed Supplementary Objectives," May 11, 1990
Box 15, Folder 9	Minutes of the Flight Readiness Review (FRR), March 30, 1990
Box 15, Folder 10	Miscellaneous information about STS-31
Box 15, Folder 11	Mission chart
Box 15, Folder 12	"Mission Report: EVA Lessons Learned," September 1990
Box 15, Folder 13	Mission report items, August 2, 1990
Box 15, Folder 14	Mission timeline, STS-31
Box 16, Folder 1	Modular locker layout
Box 16, Folder 2	"NSTS Engineering Integration," 1989
Box 16, Folder 3	"Orbiter Quick Look Report," May 1, 1990
Box 16, Folder 4	Orbit Flight Techniques Panel meetings minutes, undated
Box 16, Folder 5	Payload handbook (2 copies)

Box 16, Folder 6	Payload Operations Working Group (POWG) meetings minutes, 1989
Box 16, Folder 7	Personal Preference Kit items
Box 16, Folder 8	"Preliminary Flight Requirements," September 1987
Box 16, Folder 9	"Preliminary General Outline for the STS-31 Flight Report," August 2, 1990
Box 16, Folder 10	Press conference notes
Box 16, Folder 11	Press kit, STS-31
Box 16, Folder 12	Protein Crystal Growth Experiment (1 of 2)
Box 16, Folder 13	Protein Crystal Growth Experiment (2 of 2)
Box 17, Folder 1	"Radiation Dosimetry Report," May 1990
Box 17, Folder 2	"Rationale for the Conduct of a Scheduled EVA on STS-31," April 19, 1989
Box 17, Folder 3	"Response to Payload Anomaly 041," May 18, 1990
Box 17, Folder 4	"Severe Weather Plan," 1985
Box 17, Folder 5	Shuttle stowage
Box 17, Folder 6	Space Science Student Involvement Program, 1990
Box 17, Folder 7	"STS-31 Mission Summary, Medical Operations Branch," May 1990
Box 17, Folder 8	Training schedule, STS-31
Box 17, Folder 9	"Transcript of STS-31 Crew Microcassette Tape on Earth Obs Exposures," May 1990

Subseries 4.3: Manned Maneuvering Unit (MMU), 1974-1991 and undated

Box 17, Folder 10	"A Helmet-Mounted Information Display for the MMU," September 1989
Box 17, Folder 11	Articles about the MMU
Box 17, Folder 12	Astronaut Maneuvering Unit (AMU) articles and memos
Box 17, Folder 13	Change/modification requests (1 of 2)
Box 18, Folder 1	Change/modification requests (2 of 2)

Box 18, Folder 2	Correspondence about photographing MMU training, 1983
Box 18, Folder 3	"Development Status Report, January-March 1985"
Box 18, Folder 4	Engineering Directorate documents
Box 18, Folder 5	"Flight Support System (FSS) of the MMU," October 1983
Box 18, Folder 6	"Hazard Analysis and Hazard Report Review," October 27, 1986
Box 18, Folder 7	"IMAX Cargo Bay Camera (ICBC) with the MMU," August 1990
Box 18, Folder 8	Manned Maneuvering Unit Operational Data Book, July 1985 (1 of 2)
Box 18, Folder 9	Manned Maneuvering Unit Operational Data Book, July 1985 (2 of 2)
Box 18, Folder 10	"Manned Maneuvering Unit Report: Safety Analysis," April 1980
Box 18, Folder 11	Martin Marietta interoffice memos (1 of 2)
Box 18, Folder 12	Martin Marietta interoffice memos (2 of 2)
Box 19, Folder 1	MMU booklet, Martin Marietta
Box 19, Folder 2	MMU data formats, 1977-1979
Box 19, Folder 3	MMU Definition Study, volume III: MMU Ancillary Support Equipment and Attachment Concepts, January 1975
Box 19, Folder 4	"MMU Development Status Report," February 1980
Box 19, Folder 5	"MMU Development Status Report," March 1980
Box 19, Folder 6	"MMU Development Status Report," April 1980
Box 20, Folder 1	"MMU Development Status Report," May 1980
Box 20, Folder 2	MMU Digital Control Electronics Unit (CEU), 1985 (1 of 3)
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Box 20, Folder 4	MMU Digital Control Electronics Unit (CEU), 1985 (3 of 3)
Box 20, Folder 5	MMU/Extravehicular Mobility Unit (EMU) data, 1976-1980
Box 21, Folder 1	"MMU/Extravehicular Mobility Unit (EMU) Interface Evaluation with the IMAX Camera System and Canex Target Assembly," March 1991

Box 21, Folder 2	MMU information from Hamilton Standard
Box 21, Folder 3	MMU/Martin Marietta contract documents, 1985-1988 (1 of 2)
Box 21, Folder 4	MMU/Martin Marietta contract documents, 1985-1988 (2 of 2)
Box 21, Folder 5	MMU Mission Definition Study, volume 1: MMU Applications Analysis and Performance Requirements, NAS9-13790, January 1975
Box 21, Folder 6	MMU Mission Definition Study, volume 2: Appendices to the MMU Applications Analysis, NAS9-13790, January 1975
Box 21, Folder 7	MMU/Neutral Buoyancy Simulator, 1981
Box 21, Folder 8	MMU presentation, July 20, 1981
Box 22, Folder 1	MMU Return to Flight meeting minutes and updates (1 of 2)
Box 22, Folder 2	MMU Return to Flight meeting minutes and updates (2 of 2)
Box 22, Folder 3	"MMU Simulations on the Space Operations Simulator"
Box 22, Folder 4	"MMU Support of Solar Maximum Mission (SMM) Refurbishment," March 30, 1981
Box 22, Folder 5	MMU technical directives
Box 22, Folder 6	"MMU User's Guide," July 1985
Box 22, Folder 7	"MMU Utilization in the Shuttle Era," 1980-1990, 1976
Box 22, Folder 8	MMU WIF test notes, February 1979
Box 22, Folder 9	"On-Orbit Performance of the Skylab Astronaut Maneuvering Research Vehicle," August 1, 1974
Box 22, Folder 10	"Optical Interface," undated
Box 22, Folder 11	"Orbiter Modifications in Support of MMU," 1979-1984
Box 22, Folder 12	"Orbiter Provisions for 2nd MMU," March 8, 1983
Box 22, Folder 13	Product support
Box 22, Folder 14	Program reviews
Box 23, Folder 1	"S.O.P. for Essex Neutral Buoyancy Simulator Manned Maneuvering Unit," March 23, 1982

Box 23, Folder 2	"S.O.W: MMU and FSS Shipping Containers," October 25, 1985
Box 23, Folder 3	Technical telecon, September 5, 1986
Box 23, Folder 4	"The Manned Maneuvering Unit: A Nice Flying Machine," Aerospace America, May 1985
Box 23, Folder 5	Thruster select logic tables, 1983

Subseries 4.4: Hubble Space Telescope (HST), 1979-2009 and undated

Box 23, Folder 6	Aperture door gear cover drawings and photographs, 1989
Box 23, Folder 7	"Certification Report of HST Portable Floodlight Assembly," ILC Space Systems, October 1988
Box 23, Folder 8	Change documents
Box 23, Folder 9	Engineering memos
Box 24, Folder 1	"EVA Equipment Evaluations," October 1986
Box 24, Folder 2	"EVA Support of the HST," May 30, 1989
Box 24, Folder 3	General memos (1 of 3)
Box 24, Folder 4	General memos (2 of 3)
Box 24, Folder 5	General memos (3 of 3)
Box 25, Folder 1	"HRSDM (Hubble Robotic Servicing Deorbit Missions) PDR Backup Charts," March 21-25, 2005
Box 25, Folder 2	"HRVDM (Hubble Robotic Vehicle Deorbit Module) Monthly Management Review," August 30, 2005
Box 25, Folder 3	"HST Conceptual Flight Profile (CFP)," June 30, 1987
Box 25, Folder 4	HST deployment illustrations, 1990
Box 25, Folder 5	HST-JWST (James Webb Space Telescope) Transition Plan Review Panel Meeting, July 24, 2003
Box 25, Folder 6	"HST Maintenance Mission Visual Aids Requirement Analysis," September 20, 1987

Box 25, Folder 7	"HST Maintenance Requirements," February 1989
Box 25, Folder 8	HST meeting minutes
Box 26, Folder 1	HST/Neutral Buoyancy Simulator (NBS) test reports
Box 26, Folder 2	"HST Mission Design Status," August 10, 1989
Box 26, Folder 3	"HST On-Orbit Maintenance Mission Space Support Equipment, Contract End Item Specifications," May 1989
Box 26, Folder 4	"HST Orbital Replacement Unit (ORU) Tool List Review," March 29, 1988
Box 26, Folder 5	"HST Phase III Safety Review," November 2, 1989
Box 26, Folder 6	HST photo index and document storage system documents
Box 26, Folder 7	"HST Post-SM-4 Scientific Panel Review," April 25, 2003
Box 26, Folder 8	"HST Project Maintenance and Refurbishment Mission Requirements Verification Plan," September 30, 1988
Box 26, Folder 9	"HST Project Transition Status Review," December 13, 1988
Box 26, Folder 10	"HST Review Committee Issues and EVA Peer Review," August 1993
Box 26, Folder 11	"HST Robotic Servicing Mission," April 6, 2004
Box 27, Folder 1	"HST Servicing Mission EVA Training Program," 1993
Box 27, Folder 2	"HST Servicing Mission Four EVA Timelines" and trip report to JSC, March 2009
Box 27, Folder 3	"HST Servicing Mission Readiness," January 18, 1990
Box 27, Folder 4	"HST Servicing of the Wide Field Planetary Camera (WF/PC)," August 30, 1990
Box 27, Folder 5	"HST Servicing Program: Approach/Strategy/Issues," December 12, 1988
Box 27, Folder 6	"HST SM-4 TIM on DM and FSS: Requirements and Interfaces," July 18, 2005
Box 27, Folder 7	HST Solar Array Carrier illustrations
Box 27, Folder 8	HST Strategy Panel meeting, October 18, 1990
Box 27, Folder 9	"HST Tool Status," December 14, 1988
Box 27, Folder 10	HST Tool PDR and photographs, 1986

Box 27, Folder 11	Hubble informational illustrations
Box 27, Folder 12	Hubble Servicing Mission Management meeting, July 31, 1989
Box 27, Folder 13	Hubble Space Telescope booklet, Lockheed Martin, 1986 (2 copies)
Box 28, Folder 1	"Hubble Space Telescope: ORU Characteristics, ST/MR-33," June 9, 1989
Box 28, Folder 2	ILC Space Systems memos about Hubble
Box 28, Folder 3	Lockheed Missiles and Space Company memos about Hubble
Box 28, Folder 4	Marshall Space Flight Center's Space Telescope Project organizational charts, 1984-1985
Box 28, Folder 5	"Maintenance and Refurbishment: Mission Early Assessment," March 24, 1988
Box 28, Folder 6	"Manipulator Development Facility (MDF) Evaluation of Space Telescope Berthing to Flight Support System (FSS)," 1980-1981
Box 28, Folder 7	"Mission Objectives," November 10, 1987
Box 28, Folder 8	"Mission Operations Directorate (MOD) Production Status," December 2, 1988
Box 28, Folder 9	"NASA Fact Sheet: Hubble Space Telescope," January 1989
Box 28, Folder 10	"Ninety-Day Satellite Salvage Study," November 2, 1992
Box 28, Folder 11	"On-Orbit Servicing Overview," November 4, 1988
Box 28, Folder 12	"Operational Flight Profile (OFP), Flight Operations Panel (FOP)," January 9, 1989
Box 28, Folder 13	"Orbital Maintenance Mission Grounding Analysis," August 9, 1989
Box 28, Folder 14	"Orbiter Crew Compartment PIP Annex 6, ST/MR-11," November 5, 1986
Box 28, Folder 15	"Orbital Replacement Unit /Orbital Replacement Unit Carrier (ORU/ORUC) Fit Check Plan," April 2, 1990
Box 28, Folder 16	Payload Operations Working Group (POWG): "Solar Array Pointing"
Box 28, Folder 17	"Post-Ascent Visual Inspection," November 3, 1988
Box 28, Folder 18	"Power Factor Controller, Brief no. MFS-23280," March 1979
Box 28, Folder 19	"Pre-Solicitation Release for the HST Prime Mission Contract," June 20, 1991

Box 28, Folder 20	Production of Reliable Flight-Crucial Software, NASA Conference Publication #2222, November 2-4, 1981
Box 28, Folder 21	Review Item Discrepancy memos
Box 29, Folder 1	Robotic Servicing Mission: Concept Review meeting, May 13-14, 2004
Box 29, Folder 2	"Shuttle Supported Satellite Servicing," June 1989
Box 29, Folder 3	"Solar Array Carrier Preliminary Design Review," March 6, 1989
Box 29, Folder 4	"Solar Array Carrier Preliminary Design Review Action Item Responses," April 26, 1989
Box 29, Folder 5	"Solar Array Carrier Preliminary Design Review Action Item Status," June 5, 1989
Box 29, Folder 6	Solar Array Deployment Operation Trade Study Meeting 1, October 28, 1986
Box 29, Folder 7	"Solar Array SDM Test Briefing," undated
Box 29, Folder 8	"Space Telescope: Background," August 18, 1980
Box 29, Folder 9	"Space Telescope Contingency Return Capability," February 2, 1981
Box 29, Folder 10	"Space Telescope EVA Considerations," March 16, 1981
Box 29, Folder 11	"Space Telescope On-Orbit Flight Techniques Status Report," December 14, 1981
Box 29, Folder 12	"Space Telescope Program: Acronyms and Abbreviations," February 20, 1981
Box 29, Folder 13	Space Telescope Scientific Instrument illustrations
Box 29, Folder 14	"STSA 2 Baseline Design Review," March 1988
Box 30, Folder 1	STSI HST press releases, 1995-1996
Box 30, Folder 2	The Hubble Space Telescope Experience booklet
Box 30, Folder 3	The Promise of the Hubble Space Telescope, 1988
Box 30, Folder 4	Third Space Telescope Integration meeting, March 6-8, 1979
Box 30, Folder 5	Tool cost estimate, 1986
Box 30, Folder 6	"Tool Review Team Report," July 13, 1993
Box 30, Folder 7	"Tool Stowage Boxes," April 19, 1988

Box 30, Folder 8 ["Visual Monitoring of the HST Solar Array Deployment," October 26, 1988](#)

Subseries 4.5: Miscellaneous, 1958-1999 and undated

Arrangement: This subseries begins with three pivotal documents in Bruce McCandless II's life: the newspaper article announcing NASA's search for new astronauts, paperwork from his NASA interviews and, finally, his selection letter from Director of Flight Crew Operations, Donald K. "Deke" Slayton. The remainder of this subseries is arranged alphabetically.

Box 30, Folder 9 [Newspaper posting about NASA's astronaut search, 1965](#)

Box 30, Folder 10 [NASA interviews, 1965-1966](#)

Box 30, Folder 11 [NASA selection letter from Donald K. "Deke" Slayton, March 31, 1966](#)

Box 30, Folder 12 ["10.2 PSIA Cabin Certification," 1987](#)

Box 30, Folder 13 [29th Annual Goddard Memorial Dinner Program, 1986](#)

Box 30, Folder 14 ["A General Solution to the Hidden-Line Problem" by David Hedgley, March 1982](#)

Box 30, Folder 15 ["Actions to Implement the Recommendations of the Presidential Commission on the Space Shuttle Challenger Accident," July 14, 1986](#)

Box 30, Folder 16 [Advanced EVA System Design Requirements Study, Mid-Term Briefing, June 25, 1985](#)

Box 30, Folder 17 [America's Spaceport: Kennedy Space Center booklet, undated](#)

Box 31, Folder 1 ["Analysis of Plume Impingement Effects During Orbiter Satellite Rendezvous," September 11, 1975](#)

Box 31, Folder 2 ["Analysis of Potential Alternatives to Reduce NASA's Cost of Human Access to Space," September 30, 1998](#)

Box 31, Folder 3 [Apogee, volume 2, number 6, November 1974](#)

Box 31, Folder 4 [Apollo 11 20th Anniversary Ceremony, July 1989](#)

Box 31, Folder 5 ["Apollo 11 Lunar Surface Exploration Map Data Package, Apollo Landing Site 2, Edition 1," June 1969](#)

Box 31, Folder 6 [Apollo 17 launch vehicle permit and information, 1972](#)

Box 31, Folder 7 [Apollo Survival Training in Iceland and Washington, July-August, 1967](#)

Box 31, Folder 8 [Appearance/presentation critique, 1984](#)

Box 31, Folder 9	Application for Johnson Space Center (JSC) Management Development Program, 1976
Box 31, Folder 10	"Applications Study of Electroadhesive Devices, NASA CR-1211," October 1968
Box 31, Folder 11	"Articles Authorized to be Carried in Manned Space Flight Missions," August 31, 1972
Box 31, Folder 12	Astronaut biographies, revised September 1972
Box 31, Folder 13	Astronaut flight statistics
Box 31, Folder 14	Astronaut geology field trip, June 8-11, 1970
Box 32, Folder 1	Astronaut Office Biweekly Activity Reports, 1988
Box 32, Folder 2	Astronaut Office Biweekly Activity Reports, 1989
Box 32, Folder 3	Astronaut Office Biweekly Activity Reports, 1990
Box 32, Folder 4	Astronaut Science Colloquium on Robotics, March 1, 1988
Box 32, Folder 5	Astronaut Standard Operating Procedures and financial disclosures
Box 32, Folder 6	Astronauts' Guide to Oceanographic Phenomena, JSC 22963, August 1988
Box 32, Folder 7	"Automation and Robotics," White Paper, 1984
Box 32, Folder 8	Bends/decompression sickness data and protocols, 1985
Box 32, Folder 9	Biographical sheet
Box 32, Folder 10	Catalog of Apollo Lunar Surface Geological Sampling Tools and Containers, March 1989
Box 32, Folder 11	Challenger/STS-51-L memorial program and notes, January 31, 1986
Box 33, Folder 1	Change documents
Box 33, Folder 2	Code of conduct memos and handbook, 1970-1978
Box 33, Folder 3	"Committee on Review of NASA's Bioastronautics Critical Path Roadmap (BCPR)," June 2004 (1 of 2)
Box 33, Folder 4	"Committee on Review of NASA's Bioastronautics Critical Path Roadmap (BCPR)," June 2004 (2 of 2)

Box 33, Folder 5	"Communications Carrier Assembly (CCA) Project," June 1984
Box 33, Folder 6	"Conceptual Study on an Orbital Inspection of the Thermal Protection System (TPS) on the External Tank," February 1981
Box 33, Folder 7	"Crew and Equipment Rescue System," November 7, 1986
Box 33, Folder 8	"Crew Size Report," May 2004
Box 33, Folder 9	"Crew Survival Systems for Space Shuttle Orbiter," July 5, 1999
Box 33, Folder 10	"Cryogenic Fluid Management Experiment," undated
Box 33, Folder 11	Custody of NASA items slips
Box 34, Folder 1	"Design Criteria for EVA Electrical Connectors," January 27, 1989
Box 34, Folder 2	"Design for On-Orbit Spacecraft Servicing," draft, February 1990
Box 34, Folder 3	Discovery's Mission to Earth, October 19, 1988
Box 34, Folder 4	"Electric Auxiliary Power Unit (EAPU)," 2000
Box 34, Folder 5	"Electric Charge on Apollo Command and Service Module in Lunar Environment," April 1967
Box 34, Folder 6	Electronic cuff checklist
Box 34, Folder 7	"EVA Development," ILC Dover Space Systems, 1988
Box 34, Folder 8	"EVA Feasibility Assessment," October 8, 1990
Box 34, Folder 9	EVA Flight Rules Review
Box 34, Folder 10	EVA notebook, August 3, 1982 - May 31, 1983
Box 35, Folder 1	"EVA Gloves: Final Report," April 1990
Box 35, Folder 2	EVA Orbit Flight Techniques Panel meetings, 1983
Box 35, Folder 3	"EVA Strike Force Proposal," undated
Box 35, Folder 4	"EVA Tool Display," undated
Box 35, Folder 5	"Expendable Launch Vehicle Support for the Space Station Freedom Program," December 4, 1991

Box 35, Folder 6	Exploration Atmospheres Workshop, Houston, Texas, September 27-29, 2005
Box 35, Folder 7	Extraterrestrial Intelligence Research Hearing, September 19-20, 1976
Box 35, Folder 8	"Extravehicular Applied/Induced Loads Experiment (EVAILE)," January 20, 1989
Box 35, Folder 9	"Failure Analysis Team Report re: TSS-IR Mission Anomaly," June 1996
Box 35, Folder 10	Family Escort Procedures at KSC Review, April 1986
Box 36, Folder 1	Final IMSS Log -- Skylab, January 29, 1973
Box 36, Folder 2	Fitness report by Christopher Kraft, March 12, 1976
Box 36, Folder 3	"Flywheel Energy Storage Systems," 1986-1997
Box 36, Folder 4	"Future Flight Capabilities" by John Mankins, April 27, 2004
Box 36, Folder 5	GEIA Vision Conference: NASA Forecast, August 2002
Box 36, Folder 6	"GFE Limited Cycle Time/Age Life Item Requirements," May 1985
Box 36, Folder 7	Helmet-mounted display, 1984-1985
Box 36, Folder 8	"HL-20 Lifting Body Analysis," July 24, 1991
Box 36, Folder 9	Houston Honors the Challenger Seven program (2 copies) and ticket, March 27, 1986
Box 36, Folder 10	"Human-Rating Requirements for Future Launch Systems," undated
Box 36, Folder 11	"Impact of Scramjet Cruise on X-24c Design," June 1976
Box 36, Folder 12	Information for STS-32 Launch Guests, September 1989
Box 36, Folder 13	Information on cold hands during EVA
Box 36, Folder 14	Inertial Upper Stage notebook, August 26, 1981-September 15, 1982
Box 36, Folder 15	"Interface Design Considerations for Serviceable Satellites," November 1989
Box 37, Folder 1	"ISS-SAT Special Purpose Dexterous Manipulator," September 27, 1994
Box 37, Folder 2	Japanese astronauts' itinerary for NASA visit, December 1987
Box 37, Folder 3	Japanese Space and the Marubeni Contract, 1992

Box 37, Folder 4	JSC/Chief of Naval Operations visit, March 14, 1987
Box 37, Folder 5	JSC Honor Awards Ceremony Program, December 14, 1973
Box 37, Folder 6	JSC strategic plan and notes, January 1992
Box 37, Folder 7	JSC Telephone Directory, January 1989
Box 37, Folder 8	JSC Telephone Directory, July 1990
Box 37, Folder 9	JSC Telephone Directory, June 1996
Box 37, Folder 10	"Jupiter Icy Moons Orbiter," April 22, 2003
Box 38, Folder 1	Kawasaki Heavy Industries, Ltd. partnership documents
Box 38, Folder 2	"Laser Dynamic Range Imager (LDRI)"
Box 38, Folder 3	"Lessons Learned from the Centaur Mod Experiences," October 1986
Box 38, Folder 4	"Long-Term Follow-Up of Skylab Bone Demineralization," 1979
Box 38, Folder 5	M&R updates
Box 38, Folder 6	"Man Rating Space Systems," September 1988
Box 38, Folder 7	Man-System Integration Standards, STD-3000, volume 1, March 1987 (1 of 3)
Box 38, Folder 8	Man-System Integration Standards, STD-3000, volume 1, March 1987 (2 of 3)
Box 38, Folder 9	Man-System Integration Standards, STD-3000, volume 1, March 1987 (3 of 3)
Box 39, Folder 1	"Manipulator Development Facility (MDF) General Description," October 3, 1988
Box 39, Folder 2	"Manipulator Foot Restraint," undated
Box 39, Folder 3	"Manned Transportation Systems Report," August 17, 1991
Box 39, Folder 4	"Manned Transportation System Study," November 1992
Box 39, Folder 5	"Materials Joining Tool, Technical Report AFAPL-TR-68-60," September 1968
Box 39, Folder 6	Memos about military astronauts (1 of 5)
Box 39, Folder 7	Memos about military astronauts (2 of 5)
Box 40, Folder 1	Memos about military astronauts (3 of 5)

Box 40, Folder 2	Memos about military astronauts (4 of 5)
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Box 40, Folder 4	Memos from 1969
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Box 40, Folder 6	Memos from 1974
Box 40, Folder 7	Memos from 1975
Box 40, Folder 8	Memos from 1976
Box 40, Folder 9	Memos from 1977
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Box 40, Folder 11	Memos from 1979
Box 40, Folder 12	Memos from 1980
Box 40, Folder 13	Memos from 1981
Box 41, Folder 1	Memos from 1982
Box 41, Folder 2	Memos from 1983
Box 41, Folder 3	Memos from 1984
Box 41, Folder 4	Memos from 1985
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Box 41, Folder 6	Memos from 1987
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Box 42, Folder 6	Memos, undated
Box 42, Folder 7	Memorial service for Michael Smith, February 4, 1986
Box 42, Folder 8	Memorial service for Neil A. Armstrong, August 31, 2012
Box 42, Folder 9	Memorial service for S. David Griggs, June 19, 1989
Box 42, Folder 10	Microgravity Materials Science Assessment Task Force, June 1987
Box 42, Folder 11	Mishap report, February 19, 1987
Box 42, Folder 12	Mission Overviews, 1985-1986
Box 42, Folder 13	Monthly progress report for the Power Ratchet Tool, December 6, 1983
Box 42, Folder 14	Moon landing anniversary publications, 1989
Box 42, Folder 15	"MOP-2 Spectacles for Space Flyers," August 21, 1990
Box 43, Folder 1	"Multi-Mission Modular Spacecraft/Flight Support System Safety Report," 1981
Box 43, Folder 2	"NASA 904 T-38A Jet Trainer Incident Investigation Committee Report," December 1, 1988
Box 43, Folder 3	NASA Activities, volume 16, number 10, October 1985
Box 43, Folder 4	NASA/AIAA/PSN International Conference on Tethers in Space, September 17-19, 1986
Box 43, Folder 5	NASA benefits, 1966-1975
Box 43, Folder 6	"NASA Conference Publication 2085, part 1," March 29-30, 1979
Box 43, Folder 7	"NASA Current News," May 14, 1990 (1 of 3)
Box 44, Folder 1	"NASA Current News," May 14, 1990 (2 of 3)
Box 44, Folder 2	"NASA Current News," May 14, 1990 (3 of 3)
Box 44, Folder 3	NASA educational publications
Box 44, Folder 4	NASA Facts
Box 44, Folder 5	NASA HQ Directory, Autumn/Winter, 1998-1999
Box 44, Folder 6	NASA newsletters

Box 44, Folder 7	NASA opportunity announcements, February 2002
Box 44, Folder 8	NASA SCAN (Selected Current Aerospace Notices) newsletters
Box 44, Folder 9	NASA selection article, Daily Leader Times, Kittaming, Pennsylvania, April 5, 1966
Box 44, Folder 10	NASA selection article, Hamilton Journal News, Hamilton, Ohio, April 5, 1966
Box 44, Folder 11	NASA Tech Briefs, Fall 1982
Box 44, Folder 12	"NASA: The Vision and the Reality" and notes, undated
Box 44, Folder 13	"National Space Transportation System (NSTS) Family Support Document," October 31, 1988
Box 44, Folder 14	"Naval Astronaut Manpower Authorizations," 1986
Box 44, Folder 15	Naval Space Command org chart, 1989
Box 44, Folder 16	Neutral Buoyancy Laboratory (NBL) brochure, 1990
Box 45, Folder 1	Notebook, 1985-1989
Box 45, Folder 2	"NSTS/SS EMU Commonality Study," June 1988
Box 45, Folder 3	"On-Orbit Servicing Experience," June 1990
Box 45, Folder 4	Operations Working Group meeting, August 14, 1985
Box 45, Folder 5	"Optical Data Link Component Study Report," January 1976
Box 45, Folder 6	"Orbital Equations of Interest to Relative Motion and Microgravity Experiments," November 18, 1985
Box 45, Folder 7	Orbiter Aero. Notebook, 1976-1982
Box 45, Folder 8	Orbiter bay diagram
Box 46, Folder 1	"Orbiter-EVA Work and Servicing Support Platform Concept"
Box 46, Folder 2	"Origins, 2003"
Box 46, Folder 3	"Payload Data Package Annex, JSC 14019," August 1979
Box 46, Folder 4	"Pines' Method for Circular and Elliptical Orbits, JSC 10835," January 8, 1976
Box 46, Folder 5	Platinum Resistor Thermometer notebook, October 21, 1981-March 28, 1986

Box 46, Folder 6	"Polynomial Guidance and Chase Guidance," October 17, 1975
Box 46, Folder 7	Portable Life Support and Space Suit Experience Manual, Hamilton Standard, September 1998 (1 of 2)
Box 46, Folder 8	Portable Life Support and Space Suit Experience Manual, Hamilton Standard, September 1998 (2 of 2)
Box 46, Folder 9	"Power Ratchet Tool Design Review," Fairchild Space Company, January 23, 1986
Box 46, Folder 10	"Power Ratchet Tool Guide," draft, March 1990
Box 46, Folder 11	"Power Ratchet Tool Report," March 1984
Box 47, Folder 1	"Program 631A, Volume XIII, Experiment D-16: Space Power Tool, Technical Report AFAPL-TR-67-61," June 1967
Box 47, Folder 2	"Proposed Flight Demonstration of a Remotely-Operated On-Orbit Servicing Aid," January 31, 1988
Box 47, Folder 3	"Proposed System to Replace Film Photos of Space Telescope with Electronic Video Imaging," August 19, 1987
Box 47, Folder 4	"Remote Sensing in Polarized Light," 1987
Box 47, Folder 5	Renewing Solar Science: The Solar Maximum Repair Mission, NASA EP-206, undated
Box 47, Folder 6	"Repair of Coronagraph/Polarimeter of the Solar Max Proposal," 1981
Box 47, Folder 7	"Report on Project Management in NASA," March 13, 2000
Box 47, Folder 8	Request for proposals
Box 47, Folder 9	"Results 101: How to Get Results, An Effective Presentation," August 10, 1978
Box 47, Folder 10	Retirement from NASA
Box 47, Folder 11	Review of NASA's Bioastronautics Critical Path Roadmap Meeting, August 2-3, 2004
Box 47, Folder 12	Review of NASA's Bioastronautics Critical Path Roadmap Meeting, June 9-10, 2004
Box 48, Folder 1	Robert "Hoot" Gibson's Pulitzer Prize nomination, 1985
Box 48, Folder 2	"Safety Policy and Requirements for Payloads Using the Space Transportation System (STS)," 1979-1982

Box 48, Folder 3	Satellite Servicing Workshop III, June 9-11, 1987
Box 48, Folder 4	Satellite Servicing Workshop IV, June 21-23, 1989, Volume III
Box 48, Folder 5	Satellite Servicing Workshop IV, June 21-23, 1989, Volume IV
Box 48, Folder 6	Sealed-Cell Nickel-Cadmium Battery Applications Manual, NASA Reference Publication 1052, December 1979
Box 48, Folder 7	Self-Reversing Power Ratchet Tool diagram and disclosure of invention, August 1982
Box 49, Folder 1	Self-Tethering Connection Tool patent information, 1981-1987
Box 49, Folder 2	Shuttle communications security, 1979-1982
Box 49, Folder 3	"Shuttle Flight Crew Position Paper" by Bruce McCandless II, 1976
Box 49, Folder 4	Shuttle mission stickers
Box 49, Folder 5	Shuttle Operational Data Book Changes, 1981-1982
Box 49, Folder 6	"Shuttle Pallet Satellites (SPAS) Experiment," 1981-1983
Box 49, Folder 7	Silver Snoopy Award Ceremony, May 26, 1988
Box 50, Folder 1	Skylab, CSM Systems Handbook, CSM 116-119, April 6, 1973
Box 50, Folder 2	"Skylab Daily Mission Report, Number 64," January 18, 1974
Box 50, Folder 3	"Skylab Daily Mission Report, Number 71," January 26, 1974
Box 50, Folder 4	Skylab history
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