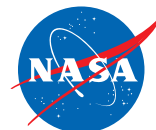


NEWS & NOTES

Volume 33, Number 1

First Quarter 2016

National Aeronautics and
Space Administration



FROM THE CHIEF HISTORIAN



During the first working week of this year I was in San Diego. No, I wasn't on vacation enjoying fine weather; in fact, there was a nasty El Niño storm that lasted for the four days I was in town. But the uncharacteristically wet weather didn't put a damper on my enthusiasm for the trip. I was there for the meeting of the History Technical Committee of the American Institute for Aeronautics and Astronautics (AIAA) at the annual SciTech Forum and Exposition. The History Technical Committee had one of the most robust sets of sessions that we've seen in a long time—largely due to the superlative efforts of committee member Kevin Burns. Burns served as the history track chair for SciTech this year, and his months of coaxing, cajoling, and organizing paid off handsomely. Of particular note were two extraordinary sessions about Boeing. This year, 2016, is the centennial of the founding of Boeing, and the company was extremely well represented—both on the speaker's podium and in the (overflowing) audience. I had the honor of being a last-minute substitute on the closing panel

continued on next page

LANGLEY RETIREE RECEIVES PRESIDENTIAL MEDAL OF FREEDOM

By Gail Langevin

On 24 November 2015, Katherine Coleman Goble Johnson received the nation's highest civilian award—the Presidential Medal of Freedom—from President Barack Obama. The citation reads in part, “Katherine G. Johnson is a pioneer in American space history. A NASA mathematician, Johnson's computations have influenced every major space program from Mercury through the Shuttle program.”

Katherine Coleman was born into a farming family in 1918 in White Sulphur Springs, West Virginia. Her parents believed strongly in the value of a good education. When their children completed the eighth grade—the highest grade offered at the school in White Sulphur Springs for African Americans—Johnson's mother and the children moved across the state to InSTITUTE, West Virginia. In InSTITUTE were a high school and West Virginia State College, both of which accepted African American students. During the school year, Johnson, her mother, and her siblings lived in InSTITUTE, while her father remained in White Sulphur Springs, working on the farm to support the family.

continued on page 3

IN THIS ISSUE:

- 1** From the Chief Historian
- 1** Langley Retiree Receives Presidential Medal of Freedom
- 5** News from Headquarters and the Centers
- 16** Other Aerospace History News
- 17** Recent Publications and Online Resources
- 23** Upcoming Events
- 24** Obituaries
- 27** Image in NASA History

NASA HISTORY PROGRAM OFFICE
OFFICE OF COMMUNICATIONS



From the Chief Historian (continued)

discussion about Boeing's history. Although having to fill in for the legendary Smithsonian curator Tom Crouch was intimidating, I did have the advantage of having some operational experience with Boeing products. (I flew the KC-135 during my Air Force career.) The panel turned out to be great fun, and I was especially delighted to see the enthusiasm with which Boeing management is embracing the company's history during this centennial year.

Another organization celebrating its centennial this year is *Aviation Week and Space Technology*. We were thrilled to have Editor-in-Chief Joe Anselmo join the panel on aerospace archives. (This panel was arranged by my friend and colleague from Armstrong Flight Research Center, Cam Martin.) Joe's talk on the archives at *Aviation Week* went far beyond your normal recitation about cubic feet of files, finding aids, and gigabits of data. He actually gave us a live preview of the new online archive of "every issue, every article, every ad" published by *Aviation Week* over the last century. The online archive became available to the public the next day, and it includes scanned, searchable PDFs of every magazine published by *Aviation Week* in the last century. While access to the written content is fascinating, the advertising and the covers of the magazine (especially the art deco-inspired cover art in the 1930s) drew the most oohs and ahhs from the crowd at the panel. The browsing interface (arranged by decade) was also a very popular feature. For 2016, access to the online archive is free thanks to sponsorship by Boeing. If you don't already have a subscription to *Aviation Week*, you will have to set up a login, but *after* that, you are free to wander. See <http://archive.aviationweek.com/>. This is a tremendous research tool for those of us interested in aerospace history. It is also (I'll warn you) an all-too-tempting way to spend your time browsing—you might want to set yourself a timer before you start. I had to.

There was a lot to do at SciTech in addition to attending panels. Two highlights stand out in particular. First, at the awards luncheon, NASA's own Dr. Alex MacDonald was presented with the History Manuscript Award for his doctoral dissertation entitled "The Long Space Age: An Economic Perspective on the History of American Space Exploration." (A book version of the dissertation is currently in work.) Second, despite having to battle flash flood waters the day before, the very energetic and hospitable folks at the San Diego Air and Space Museum hosted members of the History Technical Committee for a behind-the-scenes tour of the museum and archives. Special thanks to Katrina Pescador, Director of Library and Archives at the museum, for arranging the visit, and also for showing us the remarkable work that she and her team are doing with their image and film collection on Flickr and YouTube. You can check it out here: <http://sandiegoairandspace.org/research/project/digitizing-the-still-and-moving-image-collection>. This is another one of those links that should come with a "Danger: This Is Incredibly Distracting" warning.

In addition to all of these online distractions, I hope you will enjoy this quarter's issue of *News and Notes*. With this issue, we welcome Andres Almeida to our editorial team. I'm sure you'll enjoy what he, Yvette Smith, and our printing and design team from Media Fusion have to offer you this quarter.

Until next time, Godspeed,



William P. Barry
Chief Historian



Langley Retiree Receives Presidential Medal of Freedom (continued)

As a child, Johnson enjoyed learning and numbers. Her pursuit of these two activities eventually took her from segregated West Virginia to the White House via the National Advisory Committee for Aeronautics (NACA) and NASA.

Johnson's love of learning and her exceptional abilities enabled her to graduate from high school at the age of 15. After high school, she continued her education at West Virginia State College. Dr. William Claytor, a mathematics professor, took note of her ability in mathematics and encouraged her to major in the subject. She took all the math classes offered, and Dr. Claytor developed a course in analytical geometry for her. She graduated summa cum laude from West Virginia State College at the age of 18 with a bachelor of science degree in both mathematics and French.

After college, Johnson taught school until she met and married her husband, James Goble, and started a family. In 1940, Johnson was invited back to West Virginia State College for graduate study. When her husband became ill with cancer, she dropped out of graduate school and began teaching to support their three daughters. In 1952, while on a family trip to Newport News, Virginia, she learned that the NACA's Langley Memorial Aeronautical Laboratory was hiring women—including African American women—with mathematics degrees. The position offered was that of "computer"—a person who performed mathematical calculations.

Prior to the advent of electronic computers, computing was a profession. People known as computers worked through complex mathematical calculations for a variety of businesses and scientific efforts. At Langley, beginning in the mid-1930s, women with mathematics degrees were hired to perform the thousands of calculations that were needed to turn raw wind tunnel and research data into usable mathematical information. A computer's salary was more than that of a teacher, but less than that of a usually male



During a ceremony in the East Room of the White House in Washington, DC, on 24 November 2015, President Barack Obama presents former NASA mathematician Katherine Johnson with the Presidential Medal of Freedom as professional baseball player Willie Mays, right, looks on. (Photo credit: NASA/Bill Ingalls)

junior engineer. It was also thought at the time that women made excellent computers because they would be more accurate when performing repeated calculations. At Langley, women performed calculations using special mechanical calculators, usually manufactured by Friden, Inc.

In contrast to some other places of employment, women could work as computers at Langley even if they were married and had children. This aspect of working at Langley helped Johnson support her family as her husband's health deteriorated and he succumbed to cancer in 1956.

When she applied for the computer position in 1952, she was told that all the positions were filled. However,





Katherine Johnson is shown at her desk around the time that she calculated the trajectory for Alan Shepard's flight and checked the calculations for John Glenn's flight. The globelike object on her desk is a celestial training device to aid in celestial navigation. (Photo credit: NASA)

when positions were available in 1953, she was hired. Although Langley was a federal laboratory, it followed the segregation laws of Virginia in its early years. Therefore, Johnson was assigned to a computing pool composed of African American women, known as the West Area Computers. Raw data were brought to the computer pool supervisor, who assigned the work to individual computers. Work was assigned the same way for the separate group of white computers. Some tunnels and research groups had their own pools of computers.

Johnson soon moved out of the West Area Computers and was assigned to the Flight Mechanics Branch

in the Aero-Space Mechanics Division, supporting both aeronautics and spaceflight research. When the NACA became NASA, Johnson was reclassified as an aerospace technologist. In 1959, she married Lieutenant Colonel James Johnson, a Korean War veteran to whom her minister introduced her. After becoming Mrs. Johnson, she continued her remarkable career. She asked to join the branch meetings during which current research was discussed. These meetings were usually only attended by engineers, so at first her request was refused. She persisted and was eventually allowed to attend the meetings.

Her abilities were recognized by the group of engineers that she supported. So accurate was her work and so highly rated were her abilities that she was asked to calculate the trajectory for Alan Shepard's 1961 Mercury flight—the first flight for an American into space. John Glenn's 1962 Mercury flight was the first orbital spaceflight for an American and the first to be calculated by an electronic computer. Glenn asked for Johnson to check the computer's calculations, just to be sure. Her other notable calculations included those for the flight of Apollo 11 and navigational charts for astronauts.

Unusually for the time, Johnson appears as coauthor for a number of technical notes and papers published in the NASA technical report system. She is the second author on NASA TN D-233, "The Determination of Azimuth Angle at Burnout for Placing a Satellite over a Selected Earth Position," published in 1960.

In the 1970s, Langley was reorganized, and Johnson worked in the Flight Mechanics Branch of the Flight Dynamics and Control Division. In 1982,

“
SO ACCURATE WAS HER WORK AND SO HIGHLY RATED WERE HER ABILITIES THAT SHE WAS ASKED TO CALCULATE THE TRAJECTORY FOR ALAN SHEPARD'S 1961 MERCURY FLIGHT—THE FIRST FLIGHT FOR AN AMERICAN INTO SPACE.
 ”



she moved to the Spacecraft Controls Branch in the Flight Dynamics and Control Division. In 1986, Johnson retired from NASA after a 33-year career.

During her retirement, Johnson supported activities and events to encourage young people to pursue science, technology, engineering, and mathematics in school and as a career. She appeared with former astronaut and Associate Administrator for Education Leland Melvin at NASA events to reach out to the next generation of explorers.

Johnson received several group awards and recognitions during her NACA and NASA career. Recognition of her outstanding accomplishments continues.

In May 2015, NASA Langley broke ground for a new 40,000-square-foot Computational Research Facility. In January 2016, this facility was named after Katherine Johnson.

The *Charleston* [West Virginia] *Gazette-Mail* named Katherine Johnson its West Virginian of Year on 26 December 2015.

Johnson, her daughters, and her grandchildren traveled to the White House for the ceremony, in which President Barack Obama presented the medal to Johnson personally—a well-deserved honor for an extraordinary person.

NEWS FROM HEADQUARTERS AND THE CENTERS

NASA HEADQUARTERS

Washington, DC

History Program Office

By Bill Barry

This year will be a busy one for the NASA History Program Office. In addition to adjusting to the new communication processes established by the NASA Communications Coordinating Council (which I discussed in this article last quarter), this spring we are implementing a new online system to manage the history publications process. Steve Garber has led the charge in working with a commercial vendor to customize their off-the-shelf project-management software for our purposes. The changeover is likely to be a bumpy path as we work out the details. However, the ultimate result will bring us into the 21st century in terms of how we plan and manage our publication work.

Nonetheless, you should expect to see a continuing flow of new publications from the History Program this spring. The long-delayed *Historical Studies in the*

Societal Impact of Spaceflight, edited by Steve Dick, should be available as this newsletter arrives in your hands (or on your screen). Later this spring, we will release volume 2 of *Walking to Olympus: An EVA Chronology, 1997–2011*, by Julie Ta and Robert Treviño. This is a continuation of the summary of spacewalks begun in volume 1 in 1997. Also in the near-term pipeline is *Making the Invisible Visible: A History of the Spitzer Infrared Telescope Facility, 1971–2003*, by Renee Rottner and Christine Beckman. We've got a great lineup of works to follow later this year. So, despite the turbulence in our processes that I expect as we transition to our new publication-management software, there will be no shortage of great new NASA history publications for you to read this year.

We are also currently working hard on the annual NASA History Program Review, coming up from 10 to 11 May. This year, I'm delighted that this annual meeting of all of those involved in NASA history and archival matters will be held at Goddard Space Flight Center in Maryland. Our colleagues at Goddard initiated their archival program last fall. Our Chief Archivist, Jane Odom, did an outstanding job helping



Holly McIntyre-Dewitt get the archival effort off to a running start while Jane was on detail to Goddard. The willingness of McIntyre-Dewitt (and her bosses) to host the rest of the Agency's historians and archivists is a testament to the great progress she has made already. Our own Nadine Andreassen will be working closely with our neighbors at Goddard to pull all of the logistical details of the meeting together this spring.

Our intern this semester is Anthony Buonomo, a senior at Georgetown University. Like Betsy Reimer last fall, Buonomo is our sole intern this semester, but he is still making a huge impact on our social media effort, as well as other things. Interestingly, Buonomo is a math major with a minor in Chinese. This may not be the typical background for our interns, but his unusual skill set comes with excellent writing skills. Writing skills are always the great discriminator in our intern selections, and this focus has served us well. So if you are an aspiring NASA history intern—sharpen those writing skills.

Historical Reference Collection (HRC)

By Jane H. Odom

In the Headquarters Archives, the staff continues to stay busy with reference requests and with the processing (arrangement and description) of collections. During the past several months, we hosted Headquarters staff as well as two National Air and Space Museum (NASM) fellows (one from Colombia, the other from the United Kingdom) and researchers from NASM, Princeton University, Syracuse University, Georgetown University, the Massachusetts Institute of Technology (MIT), American University, the University of Wisconsin at Milwaukee, the Planetary Society, Mains Associates, History Associates, Foresight Science and Technology, and Jacobs University (in Germany).

Now available to researchers is a 2-cubic-foot collection of Headquarters Office of Education Files, 2003–13, that contains reports from NASA Education Institute professional development workshops and focus groups, announcements of opportunities, papers, agendas, and correspondence. Also documented in this collection are collaborative efforts with the Challenger Center; Marshall Space Flight Center (MSFC), in developing Southeastern rocketry; the Education Review Team; the Columbia Memorial Space Learning Center; the Sally Ride Imaginary Lines Science Festivals; and the Jamestown, Virginia, 400th anniversary team.

A preservation initiative is in full swing—a project to re-folder and re-box deteriorating materials in the HRC. Recently completed sections in the reference collection include the files of former NASA Administrator T. Keith Glennan and the Robert Sherrod Apollo History Collection.

Jane Odom is continuing to work closely with Langley Research Center (LaRC) officials in preparation for their upcoming building (and archive) renovation and future history/archive staffing plans. In December, Odom completed her Goddard Space Flight Center (GSFC) detail of nearly four months, during which she mentored the new archivist, Holly McIntyre-Dewitt, by transferring institutional knowledge. Additionally, she and the GSFC archivist met with a variety of Center officials to build support for the new program and introduce themselves.

If you are interested in visiting the Headquarters History Office to conduct research, please contact us at 202-358-0384 or at <http://history.nasa.gov/contact.html> to schedule an appointment. To search our electronic documents collection, please see <https://historydms.bq.nasa.gov/>.



AMES RESEARCH CENTER (ARC)

Moffett Field, California

By Glenn Bugos and Jack Boyd

Glenn Bugos delivered a talk on “NASA Virtual Institutes as an Emerging Organizational Form” at the American Institute of Aeronautics and Astronautics (AIAA) Space 2015 conference on 1 September 2015 in Pasadena. The paper, coauthored with Jack Boyd, was published by the AIAA as paper 2015-4407. Work continues on a longer version, exploring how several institutes at NASA have evolved to take their current shape. Since 1998, three NASA virtual institutes have operated at Ames: the NASA Astrobiology Institute (NAI), the Solar System Exploration Research Virtual Institute (SSERVI), and the NASA Aeronautics Research Institute (NARI). Each has proven effective in developing new communities of science and engineering and in generating and validating knowledge useful in planning NASA missions. To explore how the form of the virtual institutes can be scaled and transferred to other parts of NASA, we are also defining the general traits of a virtual institute. These include a NASA orientation, geographically and institutionally dispersed teams, multidisciplinary and methodologically open-minded research, cutting-edge collaboration technology and human factors, a focus on the next generation of researchers, and competition leading to cooperation among the teams.

At the request of Bruce Pittman of the NASA Space Portal, Bugos gave a presentation on how the NACA supported entrepreneurial aviation and space for a panel titled “NACA & NASA: Learning for the Past, Creating the Future” at the NewSpace 2015 conference in San Jose.

The U.S. Army and NASA celebrated the 50th anniversary of their joint research agreement for fundamental research on rotorcraft aerodynamics. The first Army-NASA colocated laboratory was located at NASA Ames in 1965, and five years later, colocated laboratories appeared at the Lewis (now Glenn) and Langley Research Centers. On 6 November 2015 at

“

SINCE 1998, THREE NASA VIRTUAL INSTITUTES HAVE OPERATED AT AMES.... EACH HAS PROVEN EFFECTIVE IN DEVELOPING NEW COMMUNITIES OF SCIENCE AND ENGINEERING AND IN GENERATING AND VALIDATING KNOWLEDGE USEFUL IN PLANNING NASA MISSIONS. ”

NASA Headquarters, Jaiwon Shin, NASA Associate Administrator for the Aeronautics Research Mission Directorate, exchanged mementos and remarks with Mary Miller, U.S. Army Deputy Assistant Secretary for Research and Technology. This collaboration has driven most advances over the past five decades in rotorcraft engineering, and representatives from the major helicopter manufacturers spoke about those accomplishments. Barry Lakinsmith, director of the Aeroflightdynamics Directorate of the Army’s Aviation and Missile Research, Development and Engineering Center, located at Ames, organized the event, and it was followed by a local celebration of Directorate staff at Ames on 9 December. By an odd luck of timing, we found and migrated videotape of speeches given on the occasion of the 20th anniversary celebration of the Army-NASA laboratory, recorded by Richard Kurkowski, to digital format, which served as a great resource for these 50th anniversary events. Ames and Army engineers, led by John Davis, prepared various historical materials for the events, and they are continuing their work to produce a historical monograph.

Encouraged by NASA Headquarters to better track our historic assets, Ames is formalizing its artifacts and loan program. Led by Kelly James and Eric Kristich in our logistics division, the many people at Ames who care for historic items are joining to define divisions of labor and best practices. First up is work on historic aircraft on loan to museums.





On 19 August, throughout the country, Americans enthralled with air flight celebrated National Aviation Day. NASA celebrated this year by encouraging people to take photographs of themselves spreading their wings (fingers upright like a winglet) at airports around the country and to remember that NASA is with you when you fly. We celebrate that day because it is the birthday of Orville Wright, the first person to fly an aircraft. Wright happens to share that birthday with NASA Administrator Charlie Bolden and with Jack Boyd. Wright was a member of the NACA Main Committee when Boyd joined Ames in 1947. This 19 August was Boyd's 90th birthday, and helping him celebrate were hundreds of Ames staff, many of his distinguished friends, and most of our hungriest interns. The Ames Exchange hosted a special happy hour for the grand reopening of the SpaceBar café in our conference center. Pictured here are Susan Long, administrative assistant in the Ames headquarters (standing, left), Jack Boyd, and Ames Center Director Eugene Tu (right). Seated is Jack's granddaughter from Finland, Leena Oijala. (Photo credit: NASA Ames/Dominic Hart)

Keith Venter, the Ames Historic Preservation Officer, was awarded a NASA Exceptional Achievement Medal “for outstanding, innovative approaches to operations management supporting NASA’s commitment to preserving our Nation’s historic treasures,” specifically for implementing a historic properties procedure to enable the leasing of Moffett Field to other entities.

We wish a happy retirement to Daniel T. Pappas, librarian at Ames since 1974. For almost three decades, prior to the establishment of the NASA Ames History Office in 2003, Pappas served as the history point of contact for our Center. In addition to serving as a superb technical librarian for Center staff, Pappas maintained a reference archive for the Center in the

vault of our main library that served as the nucleus for our current historical reference collection. He welcomed many historians working on topics relevant to Ames and was always a great help in tracking down obscure historical documentation.

We lost two longtime Ames employees who had always been a big help to our History Office. Vernon J. Rossow joined the NACA at Ames in 1949, following graduation from the University of Michigan and service in the U.S. Navy. He was awarded a National Research Council Fellowship to study at the Swiss Federal Institute of Technology in Zurich, and he finished his doctorate in aerodynamics upon his return to Ames. A research interest in the prediction and



measurement of vortices on wings eventually led to a major contribution to aircraft safety with the publication of “Lift-Generated Vortex Wakes of Subsonic Transport Aircraft” (*Progress in Aeronautical Sciences*, 1999), as well as a second career as an expert on the formation of tornados and waterspouts. He retired in 2005 but continued to serve as an Ames Associate until last year, patiently answering questions about the history of aeronautics research at Ames. Among the extensive family mourning his loss is his son-in-law, Terry Holst, who worked for more than three decades at Ames in computational fluid dynamics.

Stanley F. Schmidt started at Ames in 1946, working in the full-scale flight division. He then earned his doctorate in electrical engineering from Stanford University and became an expert on instrumentation, flight simulation, and analog computing. In 1959, he made one of the major breakthroughs in the history of Ames and of modern aerospace. Called the Kalman-Schmidt Filter, or the Extended Kalman Filter, it was the first practical application of the Kalman filter and quickly proved crucial to midcourse navigation and guidance in the Apollo missions. He left Ames in 1961 to explore further applications of his methods, which today are embedded in all modern navigation systems, though he always stayed close to Ames. Among the family mourning his loss is his son Gregory, who has worked at Ames for three decades and now serves as deputy director of the Solar System Exploration Research Virtual Institute.

Reference Collection

By April Gage and Danielle Lopez

In addition to providing reference information services and working on long-term audiovisual digitization and collections-processing projects, archivists April Gage and Danielle Lopez were busy last quarter with end-of-year activities such as processing materials in the backlog accumulated in storage areas, deaccessioning, decluttering, deep cleaning, and preparing for El Niño. The archivists preserved, described, and added approximately 6 cubic feet of Ames-related

documents, artwork, and objects from seven different acquisitions to the Archives Reference and Artifacts collections. They separated or deaccessioned nearly 7 cubic feet of material, mainly comprising publications and surplus photographs, and transferred them to appropriate information repositories and directorates at Ames. In anticipation of expected heavy precipitation accompanying El Niño conditions, archives collection storage areas were shored up. The building’s roof was resurfaced, new latches were attached to all the windows to reduce the potential for water intrusion, and artifact cases were elevated several inches

“
**IN ANTICIPATION OF EXPECTED
 HEAVY PRECIPITATION
 ACCOMPANYING EL NIÑO
 CONDITIONS, ARCHIVES
 COLLECTION STORAGE AREAS
 WERE SHORED UP.**
 ”

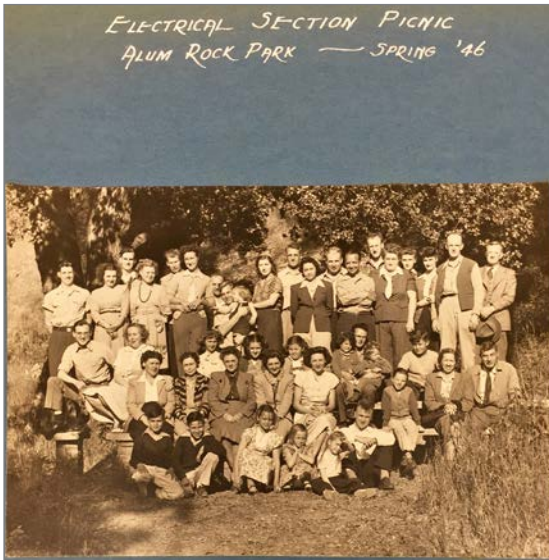
off the floor in anticipation of possible flooding. The archivists also came to the assistance of another archive at Ames that experienced water intrusion in two records storage rooms during heavy rains. In response to the collection emergency, Lopez and Gage rolled up their sleeves and led an effort to dry, stabilize, and move over 100 cubic feet of historical material.

A recent acquisition of particular note is a charming oversized scrapbook created by the NACA Electrical Section at Ames. Seeming more like a family album than a workplace record, these pages provide an intimate view into the character of the NACA Electrical Section of yesteryear, showing the employees’ humor, camaraderie, and pride in their work. The bulk of the content, which spans from 1941 to 1950, includes portraits of personnel and captures their social activities and work. The first section, entitled “The Folks,” contains several pages of snapshots of the individual

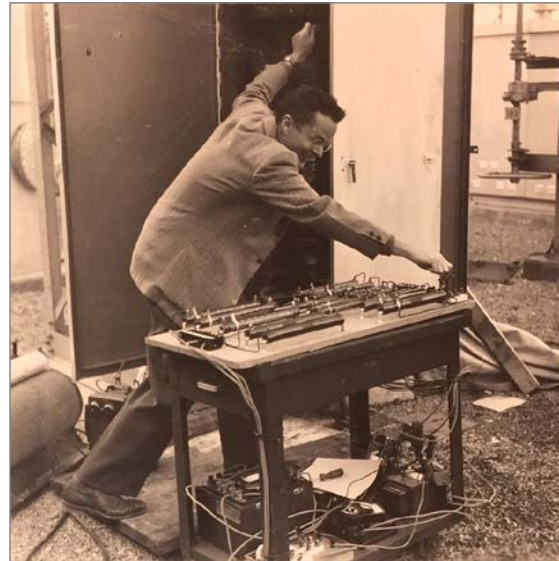




Employees enjoy perusing the scrapbook at a spring barbecue in 1948. (Photo credit: NACA)



A group photo of Electrical Section workers and their families at a picnic in the spring of 1946. (Photo credit: NACA)



This gentleman appears to be switching on a test apparatus with dramatic aplomb. The caption in the scrapbook reads, "DANGEROUS Work." (Photo credit: NACA)

men and women who worked in the section, along with the date they were hired. Next, "The Social Whirl" features the section workers and their families enjoying festive holiday and retirement parties, annual picnics, barbecues, dinners, and other activities such as fishing trips and beach outings. Here you can see workers and their families relaxing and clearly enjoying themselves. "At Work" presents snapshots of work scenes in offices and shops, with humorous commentary, as well as newspaper clippings showcasing accomplishments. "Odds and Ends" contains photographs of the section's softball team at play and more newspaper clippings. "The End" features the posterior of someone working on an electrical panel—pun intended, of course. Final pages appended after "The End" mainly feature the section workers at scattered social events from 1958 to 1974, after the NACA transitioned to NASA. Thanks are due to retired section member Douglas Denham, who safeguarded the scrapbook over the years and passed it along to Senior Advisor to History Jack Boyd just before he retired.



GLENN RESEARCH CENTER (GRC)

Cleveland, Ohio

By Anne Mills

The 75th anniversary of the groundbreaking of the NACA's Aircraft Engine Research Laboratory—what we know today as NASA Glenn Research Center—occurred on 23 January. Rooted in its original goal, “to improve the state of aircraft engines,” the Center has grown and evolved, developing a portfolio of research areas that touch all of NASA's major missions. During the yearlong celebration, the history office at Glenn will have plenty of opportunities to enlighten employees and the public on our rich heritage and how it connects to our current work.

Perhaps the most anticipated part of the celebration will be the release of the updated history of the Center, *Bringing the Future Within Reach: 75 Years of NASA Glenn Research Center*, by Center archivist Bob Arrighi. Three years in the making, this book of more than 300 pages is an update and expansion of *Engines and Innovations*, which Virginia Dawson wrote for the 50th anniversary. In addition to covering the accomplishments of the last 75 years, the book highlights the Center's vast image collection in telling the story. A book of this magnitude was an ambitious undertaking, and we offer Bob Arrighi big congratulations on this accomplishment!

The first official event of the anniversary festivities was a groundbreaking re-creation on 25 January. Employees, local elected officials, and the media were invited to kick off the celebration with some historic reflections, congratulatory messages from Administrator Bolden and John Glenn, a re-creation of our iconic groundbreaking photo, and, of course, birthday cake.

Additional events for the year include a retrospective art and photography exhibit on display at the main concourse of the Cleveland Hopkins International Airport. The exhibit is scheduled to open this spring and run through the time of the Republican National Convention—an exciting opportunity for us to be



This image from 23 January 1941 shows the groundbreaking for the NACA's Aircraft Engine Research Laboratory—known today as the Glenn Research Center. (Photo credit: NACA)

showcased during some heavy traffic at the airport. Open houses at both Lewis Field in Cleveland and Plum Brook Station in Sandusky are planned for early summer. Fall will bring a retiree reunion and the induction of our second class of honorees to the NASA Glenn Hall of Fame.

JOHNSON SPACE CENTER (JSC)

Houston, Texas

By Rebecca Wright

Users of the JSC History Portal will find a comprehensive Web page with links to all of the released oral history transcripts. Prior to this new portal, there were two ways to access the transcripts: a user could search for a name within separate project pages accessible through drop-down lists or search on a single page listing all of the participants separated by project. Either way, the interview transcripts were separated by



oral history project name. Now, the new page, http://www.jsc.nasa.gov/history/oral_histories/participants_full.htm, provides a hyperlinked alphabetical list of all oral history participants with released transcripts, a brief description for each, and the associated oral history project name (with a link to that project page). Sandra Johnson, the JSC History Production Coordinator, redesigned the oral history project information to create an easy-to-access finding aid for users. She also maintained the existing accessibility venues for continuity. Along with this enhancement, users will find 20 transcripts from the International Space Station Program Oral History Project, conducted this past summer. Interviews were conducted with significant contributors to the ISS Program, including former program manager Mike Suffredini, several ISS astronauts, scientists, doctors, and engineers. Visit the ISS site at http://www.jsc.nasa.gov/history/oral_histories/iss.htm. Other significant transcripts posted to the JSC History Portal include those from former Johnson Space Center Director Jefferson Howell, former NASA Administrator Sean O’Keefe, and legendary spaceflight pioneer General Thomas Stafford.

JSC historian Jennifer Ross-Nazzal provided research support and documentation to the Systems Engineering Office, Kennedy Space Center, for a NASA Engineering and Safety Center study entitled “Recurring Themes from Human Spaceflight Mishaps During Flight Tests and Early Operations.” The study will include an analysis of the various causes and factors contributing to the Apollo 1, Soyuz 1, Skylab 1, Ares-1X, and other serious mishaps. She also provided a presentation on the history of the Center for an Agency-wide meeting of the NASA Counterintelligence/Counterterrorism Division of the Office of Protective Services.

During the past 50 years, Saint Paul the Apostle Catholic Church, located across from JSC, has been the spiritual home of 35 astronauts. While on their journeys above Earth, many brought specific items with them that were later presented as gifts to the congregation in appreciation for their support while the astronauts were on orbit. Now others have the



NASA astronauts gathered recently for a dedication of the Delta Room, which houses the space memorabilia collection at St. Paul the Apostle Catholic Church, located in Nassau Bay across from Johnson Space Center. The items in the collection are gifts from some of the 35 astronauts who have been members of the congregation, including Apollo pioneers Bill Anders and Gene Cernan. Present for the event were (left to right) Carl Walz, Karol J. “Bo” Bobko, Greg Johnson, Pierre Thuot, Mark Vande Hei, Mike Good, Nicole Stott, Nancy Currie, Mike Fincke, and (not pictured) Mike Massimino. Also pictured is the Reverend Wencil Pavlovsky (front), pastor of St. Paul the Apostle Catholic Church. (Photo courtesy of Rick Banke)

opportunity to learn of this history when visiting a room created to visually share some of the stories and images that have uniquely connected this church to those who have traveled among the stars. And, while in the facility, they will enjoy viewing images from the Hubble Space Telescope, artfully cast as the church’s stained-glass windows.

The Delta Room project started as parishioners began thinking about how best to preserve and protect the American flag that was carried into space by STS-6 Pilot Karol J. “Bo” Bobko. After its return, the flag subsequently stood in the sanctuary during every Shuttle mission—a span of 28 years and 129 missions. As volunteers found various items stored throughout the facility, a collection began to form and additional information gathered to certify the gifts as “flown items.” Helping to establish the historical relevance were Rebecca Wright and Rebecca Hackler Taylor of the JSC History Office. Taylor, who earned a master of science degree in museum studies from the University of Glasgow, also volunteered to work with the church to design and arrange the display; in addition, she created a protocol to correctly preserve the items.



“

DURING THE PAST 50 YEARS, SAINT PAUL THE APOSTLE CATHOLIC CHURCH, LOCATED ACROSS FROM JSC, HAS BEEN THE SPIRITUAL HOME OF 35 ASTRONAUTS.

”

Along with the American flag flown on STS-6, the Delta Room features unique pieces, messages, and images from many pioneers of spaceflight who were also founding members of Saint Paul. They include Bill Anders, who took the iconic photograph of Earth from space on 24 December 1968, while aboard Apollo 8, NASA's first mission around the Moon. Others are Apollo astronauts Jim McDivitt, Gene Cernan, Dick Gordon, Jack Swigert, and Stuart Roosa; and Skylab 2 crewmember Joe Kerwin. Of the 11 Apollo missions, Saint Paul's had a parishioner on 7 flights, and on 2 of them a commander—McDivitt on Apollo 9 and Cernan on Apollo 17. Cernan was the last person on the Moon.

St. Paul the Apostle Catholic Church was established in June 1964, soon after hundreds of people began moving to be near the new Manned Spacecraft Center (now JSC). For the past half-century, the connection between the parish and the American space program has thrived. At one time, an estimated 50 percent of the congregation had direct ties to NASA or the related companies that support human spaceflight missions.

In August 2009, the parish moved into a new sanctuary that blended Catholic tradition with the parish's roots within the space industry. The facility combines art and architecture, with several stained-glass windows portraying images taken by the Hubble Space Telescope. These windows were created using a special process so that they accurately depict pictures of nebulas as the natural light pours through the panes.

Today, St. Paul the Apostle Catholic Church continues its connection with the space center—many parishioners are responsible for the day-to-day operations of the International Space Station, which has supported a continual human presence on an orbiting laboratory for more than 15 years. Others follow in the heritage of developing the programs for tomorrow's generations or support the programs currently under way. In keeping with tradition, there are also those who choose to travel beyond our planet and live among the stars.

MARSHALL SPACE FLIGHT CENTER (MSFC)

Huntsville, Alabama

By Brian Odom

The past few months have been incredibly busy in the Marshall History Office, with archival processing, historical research, outreach, and reference activity. Much of the focus has been on the digitization of archival collections, including more than 600 speeches of former Marshall Center Director Dr. Wernher von Braun. A special thanks to NASA Headquarters archivists Jane Odom and Colin Fries for providing more than 275 speeches to be added to the collection. Many other speeches were acquired during a trip to the National Archives in Atlanta, Georgia. The goal of this digitization project is to make these speeches and other documentary evidence available to the public on the Marshall History Web site.

The call for papers has also gone out for the NASA in the “Long” Civil Rights Movement Symposium. The event will be held 16–17 March 2017 at the University of Alabama Huntsville (UAH) and invites scholars and graduate students from across academic disciplines to submit research on NASA's role in this transformative period in American history. The goal of the symposium is to stimulate new research focusing on NASA's impact upon and experience during the civil rights movement, particularly that which relates



to issues of race, class, and gender. Anyone interested in submitting a proposal can find more information on the MSFC history Web site at <https://www.nasa.gov/centers/marshall/history/call-for-papers-nasa-in-the-long-civil-rights-movement-symposium-university-of-alabama.html>.

“
**MIKE HAS BEEN AN
 EXCEPTIONAL MENTOR,
 SHARING FREELY HIS
 YEARS OF KNOWLEDGE.**”

by NASA Chief Historian Dr. William Barry. He has been an exceptional mentor, sharing freely his years of knowledge. His leadership, subject matter expertise, and, most notably, wry sense of humor will certainly be missed around the office. Congratulations, Mike!

An oral history project has also been developed at Marshall centering on the theme of NASA and the civil rights movement. Interviewees so far have included former Alabama Governor Albert P. Brewer, former Kennedy Space Center Deputy Director James L. Jennings, and retired Marshall Computation Laboratory mathematician Billie Robertson. These interviews will be transcribed and added to the MSFC history Web site that will accompany the March 2017 symposium.

At the annual meeting of the Society of Alabama Archivists (SALA), Brian gave a presentation entitled “Between Wallace and Webb: Archiving NASA in the Civil Rights Era.” This presentation highlighted activities at Marshall during the early 1960s related to the Equal Employment Opportunity and student cooperative programs as well as the relationship between Dr. Wernher von Braun and Historically Black Colleges and Universities across the South, including institutions in Alabama such as Alabama A&M University, Oakwood University, and Miles College.

Congratulations to Marshall Historian Mike Wright, who retired in January. Wright has occupied the position of Marshall Historian for 30 years, a period during which he almost singlehandedly rebuilt the office and reference collection from the ground up. His experience and expertise have been invaluable in mentoring new employees, preserving the Marshall historical record, building a strong reputation for the program, and demonstrating what it means to be a public historian. Wright’s work was recognized this past year when he was awarded the 2015 Annual History Award

STENNIS SPACE CENTER (SSC)

Stennis Space Center, Mississippi

By Daphne Alford

Two consecutive years brought notable anniversaries in the history of the John C. Stennis Space Center. In 2015, we highlighted 50 years at NASA’s Mississippi Test Facility (MTF), in which 1965 was termed “The Year To Get Ready.” Now, in 2016, we will reflect on two anniversaries: 50 years since 1966 was deemed the “Moment of Truth” at MTF and 55 years since NASA announced that it would establish a national rocket engine test site in Hancock County, Mississippi, in October 1961.

Construction of the \$260 million rocket testing facility hit its peak during 1965. MTF began operations on 17 October 1965, when the first rocket ever to arrive at MTF completed its 17-day journey from California to Hancock County, Mississippi. Designated S-II-T, the rocket was an all-systems test version of the S-II second stage of the Saturn V space exploration vehicle. The million-pound-thrust, liquid-hydrogen-fueled booster was used in MTF’s first mission of developmental testing.

That same year, the employee population at MTF peaked at 6,000 persons, with at least half associated with the construction of facilities and installation of complex instrumentation. Toward the end of 1965, as MTF’s “permanent” operating family began to knit together, there were 3,000 persons working for NASA



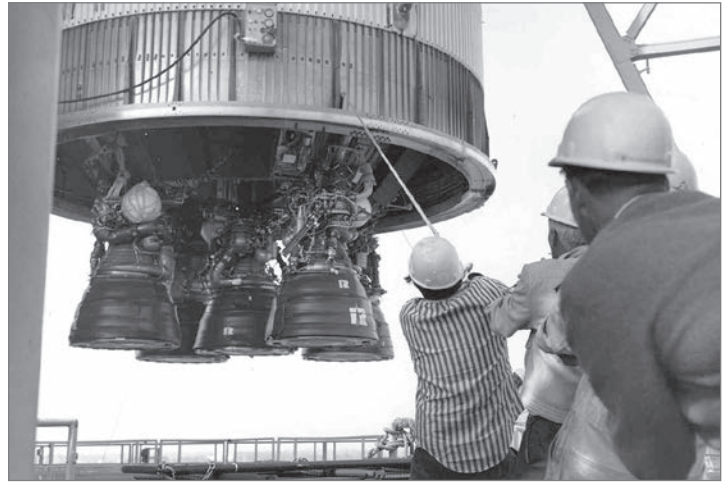
at MTF, which had overall management responsibility for the site. General Electric Company was the prime support contractor. Testing stages of the Saturn V were conducted by North American Aviation, Inc., for the S-II rocket, and by the Boeing Company for the S-1C booster.

It was announced on 6 May 1965 that Jackson M. Balch, Marshall Space Flight Center's Assistant Deputy (Technical) Director, would serve in dual capacities as MTF manager and head of the newly formed site activation task force. Balch arrived and began his new assignment the following day.

At the close of 1965, MTF had almost completed its transition from a cypress swamp and piney-wood forest to a modern city. By the end of the year, most of its permanent buildings were completed and occupied by the team that would operate the site. The first S-II test stand was nearly completed, with only a few minor elements remaining before testing. The unique 7.5-mile humanmade canal system was finished and had already begun serving as a waterway for rocket, propellant, and material transportation.

Fifty years ago, developmental testing of the S-II and testing of the first S-II flight stages were major accomplishments as part of the Saturn V space exploration vehicle. At the beginning of 1966, major construction projects—the S-II Vertical Checkout and Storage Building, the huge Components Service Facility, a second S-II test stand, and the 407-foot-tall S-1C dual test tower—were under way, to be completed during this year. The highly complex propellant systems and instrumentation, which conducted static firings and gathered valuable data from the boosters, were being readied and checked out for the 1966 firings.

The historic first static firing of the Saturn V's second-stage prototype, S-II-T, occurred 50 years ago on 23 April 1966. The S-II-T performed well on its first run; the A-2 Test Stand and supporting facilities demonstrated their readiness. Mississippi officially entered the Space Age.



Workers at the Mississippi Test Facility hoist the S-II onto the A-2 Test Stand in 1965. (Photo credit: NASA)



The first static firing of the Saturn V's second stage, S-II-T, took place on 23 April 1966 at the then-Mississippi Test Facility and had a test duration of 18 seconds. (Photo credit: NASA)



OTHER AEROSPACE HISTORY NEWS

ANNOUNCING THE 2016–17 ARTHUR MOLELLA DISTINGUISHED FELLOWSHIP

The Lemelson Center for the Study of Invention and Innovation is pleased to announce the creation of the Arthur Molella Distinguished Fellowship at the Smithsonian Institution's National Museum of American History (NMAH). The fellowship will go to an experienced author or senior scholar from the history of technology; science and technology studies;

business history; museum studies; science, technology, engineering, arts, and mathematics (STEAM) education; or an allied field. The Molella Distinguished Fellow may use the funds as a sabbatical supplement, for several short-duration visits, for a single residency focused on research and writing, or for a series of lectures leading to a major publication. The applications may cover a broad spectrum of research topics in the history of technology, invention, and innovation. However, strong preference in the selection of the

Arthur Molella Distinguished Fellow will be given to projects whose topics align with one (or more) of the Lemelson Center's strategic research and programmatic areas, including 1) the role of place in invention and innovation, 2) the making and training of inventors and innovators, 3) innovation in sports, 4) the role of risk and failure in invention and innovation, or 5) projects that illuminate inventors from diverse backgrounds or any inventions and technologies associated with groups (e.g., women, minorities, disabled people, or LGBT individuals) that are traditionally underrepresented in the historical record.

The stipend is \$35,000, and fellows may begin their residencies on or after 1 June 2016 through 31 May 2017.

To apply, visit <http://invention.si.edu/arthur-molella-distinguished-fellowship>. Applications are due 31 March 2016. For more information, please contact the fellowship coordinator, Eric S. Hintz, at hintze@si.edu or 202-633-3734.



Pilot Jerrie Cobb poses next to a mock-up of the Mercury capsule. Cobb and 12 other women participated in a training program developed by William Lovelace, the man who originally helped to develop the medical tests for NASA's Mercury Program in the early 1960s. The training was conducted at Lovelace's facilities and was never a NASA program. Learn more: <http://www.nasa.gov/topics/history/features/flats.html> (Photo credit: NASA)



RECENT PUBLICATIONS AND ONLINE RESOURCES

COMMERCIALY PUBLISHED WORKS

By Chris Gamble

NASA Hubble Space Telescope—1990 Onwards (Including All Upgrades), by David Baker (Haynes Publishing, July 2015). The Hubble Space Telescope (HST), which celebrated 25 years of successful operation in April 2015, is an international venture primarily between the United States and Europe. This manual, illustrated with a wealth of technical illustrations and stunning imagery taken from Hubble itself, takes an in-depth look at the origins of the HST; its design, development, manufacture and assembly; how it operates; and what it has accomplished, as well as the unique “human-tended” design philosophy for launch and servicing using the Space Shuttle.¹

America’s Leap into Space: My Time at JPL and the First Explorer Satellites, by Henry L. Richter (FriesenPress, August 2015). After the shock of watching Russia’s Sputnik become the world’s first artificial satellite, America’s infant space program hurried to launch one of its own. In just 90 days, Dr. Henry Richter and his colleagues at the Jet Propulsion Laboratory (JPL) developed and launched the nation’s response. Through innovation, teamwork, and tenacity, these pioneering scientists and engineers began America’s exploration of space, which continues to determine our place in the cosmos. Richter’s memories and extensive research shed a light on the earliest days of the Space Age. It is a fascinating story that is equal parts memoir and insider history of one of the world’s most dynamic and revolutionary periods.

The Mystery of the Seven Spheres: How Homo Sapiens Will Conquer Space, by Giovanni F. Bignami (Springer, June 2015). Bignami takes the reader on a journey

through the “seven spheres,” from our own planet to neighboring stars. He offers a gripping account of the evolution of *Homo sapiens* to the stage where our species is developing capabilities, in the form of new energy propulsion systems, that will enable us to conquer space. The reader will learn how we first expanded our activities to reach beyond our planet to the Moon and how nuclear energy, nuclear fusion, and matter-antimatter annihilation will enable us to extend our exploration. After Mars and Jupiter, we shall finally reach the nearest stars, which we now know are surrounded by numerous planets, some of which may be habitable.

The Twenty-First Century Commercial Space Imperative, by Anthony Young (Springer, June 2015). As this book indicates, commercial space business opportunities are beginning to take off, and the field is ripe for early entry by science, technology, engineering, and mathematics (STEM) students. An impressive expansion across existing markets and developing new ones awaits, with multiple private companies competing in the payload launch-services sector. NASA now relies on commercial partners to supply cargo and crew spacecraft and services to and from the International Space Station. The sizes of satellites are diminishing and their capabilities expanding, while the cost of reaching orbit is decreasing. Suborbital space tourism holds the potential of new industries and jobs.

New Frontiers in Space Propulsion, edited by Takaaki Musha (Nova Science Publishers, Inc., December 2015). Reaching the outer rim of the solar system in a relatively short period of time is impossible utilizing existing rocket technology. Crewed interplanetary and interstellar travel is dependent upon developing new propulsion physics. In this book, the science behind ideal methods of space propulsion (such as warp drive and gravity control) are examined to show connections between facts, anomalies, and visions. Scientists currently use accepted physical paradigms to speculate

¹ The final Space Shuttle servicing mission to Hubble occurred in May 2009. The Shuttle Program ended in July 2011 with STS-135—the final flight of Shuttle Atlantis.



and hypothesize forms of physics that will aid in future developments. In this case, that development is advanced methods of space propulsion.

Microgravity and Vision Impairments in Astronauts, by Erik Seedhouse (Springer, October 2015). Recent missions on board the International Space Station have revealed previously unreported physiological consequences of long-duration spaceflight, particularly in eyesight. In this book, Seedhouse reviews the existing theories on what causes this degeneration and how long it lasts.

European Space Policy: European Integration and the Final Frontier, edited by Thomas Hörber and Paul Stephenson (Routledge, October 2015). This book explores advances in European space policy and their significance for European integration. Using a “framing” methodology, it addresses central questions in European studies in order to form an interdisciplinary bridge between current research in space policy and contemporary European political studies. It assesses the interests of European Union (EU) institutions in space and how these institutions perceive space policy. Furthermore, it demonstrates that space is a crosscutting policy domain affecting a diverse range of EU policy fields—such as security, transport, and migration—and underpinning the 21st-century European and global economies.

The Drake Equation: Estimating the Prevalence of Extraterrestrial Life Through the Ages, edited by Douglas A. Vakoch and Matthew F. Dowd (Cambridge University Press, August 2015). In this book, leading scientists and historians explore the Drake Equation, which guides modern astrobiology’s search for life beyond Earth. First used in 1961 as the organizing framework for a conference in Green Bank, West Virginia, it uses seven factors to estimate the number of extraterrestrial civilizations in our galaxy. Using the equation primarily as a heuristic device, this text examines the astronomical, biological, and cultural factors that determine the abundance or rarity of life

beyond Earth and provides a thematic history of the search for extraterrestrial life.

Moons of the Solar System: From Giant Ganymede to Dainty Dactyl, by James A. Hall III (Springer, September 2015). This book captures the complex world of planetary moons, which are more diverse than Earth’s sole satellite, and new missions continue to find more of these planetary satellites. Why do Mercury and Venus have no moons? Earth’s Moon, of course, is covered in the book. Then we move outward to the moons of Mars, and on to many of the more notable asteroid moons, and finally to a list of less notable ones. All the major moons of the gas-giant planets are covered in great detail, while the lesser-known satellites of these worlds are also touched on. Readers will learn of the remarkable trans-Neptunian Objects—Pluto, Eris, Sedna, and Quaoar—including many of those that have been given scant attention in other literature.

Commercial Space Exploration: Ethics, Policy and Governance, edited by Jai Galliot (Ashgate Publishing Co., new edition, September 2015). With the possibility of commercial space travel on the horizon, there are a number of significant practical and moral challenges. This volume provides the first comprehensive and unifying analysis concerning the rise of private space exploration, with a view toward developing policy that may influence real-world decision making. The plethora of questions demanding serious attention—privatization and commercialization, the impact on the environment, risk assessment, responsibility, and governance—are directly addressed.

Earth and Mars: A Reflection, by Stephen E. Strom and Bradford A. Smith (University of Arizona Press, 2nd edition, October 2015). *Earth and Mars* is a fusion of art and science, a blend of images and essays celebrating the successful creation of our life-sustaining planet and the beauty and mystery of Mars. Through images of terrestrial landscapes and photographs selected from recent NASA and European Space Agency missions to



Mars, *Earth and Mars* reveals the profound beauty resulting from the action of volcanism, wind, and water. The accompanying text provides a context for appreciating the role of these elemental forces in shaping the surfaces of each planet, as well as the divergent evolutionary paths that led to an Earth that is teeming with life and a Mars that is seemingly lifeless.

Sally Ride: A Photobiography of America's Pioneering Woman in Space, by Tam O'Shaughnessy (Roaring Brook Press, October 2015). This book is an intimate journey from Sally Ride's formative years to her final moments. This vivid photobiography, written by Sally's life, writing, and business partner, Tam O'Shaughnessy, offers an intimate and revealing glimpse into the life and mind of the famously private, book-loving, tennis-playing physicist who made history.

The Impact of Discovering Life Beyond Earth, edited by Steven J. Dick (Cambridge University Press, December 2015). In this volume, distinguished philosophers, theologians, anthropologists, historians, and scientists discuss the big questions about how the discovery of extraterrestrial life, whether intelligent or microbial, would impact society. Their remarkable and often surprising findings challenge our foundational concepts of what the discovery of alien life may hold for humankind.

Frontiers for the American Century: Outer Space, Antarctica, and Cold War Nationalism, by James Spiller (Palgrave Macmillan, October 2015). This book compares the U.S. space and Antarctic programs during the Cold War. It examines the reciprocal influence of federal science and technology and of American internationalism, and it details how powerful interests and public opinion leaders used culturally salient terms, particularly the nationalist motif of the frontier, to promote these strategic initiatives. By accounting for the varying fate of this frontier motif in the final years of the Cold War, this study explains why proponents of the U.S. Antarctic Program came to focus on global

environmental stewardship while advocates of spaceflight once again urged America to pioneer the space frontier.

Enhancing Hubble's Vision: Service Missions That Expanded Our View of the Universe, by David J. Shayler and David M. Harland (Springer-Praxis, November 2015). This book tells the story of the four missions to maintain Hubble's successful operation. Between 1997 and 2009, astronauts repaired, serviced, and upgraded the telescope's instruments. The book draws on first-hand interviews with those closely involved in the missions. The spacewalking skills and experiences gained from maintaining and upgrading Hubble had direct application to the construction of the International Space Station and help with its maintenance.

Coloring the Universe: An Insider's Look at Making Spectacular Images of Space, by Travis Rector, Kimberly Arcand, and Megan Watzke (University of Alaska Press, November 2015). This book describes how giant telescopes work, what scientists learn with them, and how they are used to make color images. It also discusses how otherwise invisible rays, such as radio waves, infrared light, x rays, and gamma rays, are turned into recognizable colors. The book is filled with fantastic images taken in faraway pockets of the universe. Informative and beautiful, the book gives space fans of all levels an insider's look at how scientists bring deep space into brilliant focus.

Human Spaceflight: From Mars to the Stars, by Louis Friedman (University of Arizona Press, 2nd edition, November 2015). Of all the possible destinations in space, Mars is the most likely for humans to reach. According to the author, it may be the only destination outside the Moon to ever see human footprints. But far from diminishing our future in space, the book lays out a provocative future for human space travel. The author believes that human space exploration will continue well into the future but that space travel by humans will stop at Mars. Instead, nanotechnology, space sails, robotics, biomolecular engineering, and



artificial intelligence will provide the vehicles of the future for an exciting evolution not just of space travel but of humankind. The author writes that once we accept Mars as the only viable destination for humans, our space program on planet Earth can become more exciting and more relevant.

A Guide to Hubble Space Telescope Objects: Their Selection, Location, and Significance, by James Chen and Adam Chen (Springer, July 2015). This book is a guide to connecting the view above with the history of recent scientific discoveries from the Hubble Space Telescope. Each selected photo is shown with a sky map and a photograph or drawing to illustrate where to find it and how it should appear from a backyard telescope. Here is the casual observer's chance to locate deep space objects visually and appreciate the historic Hubble photos in comparison to what is visible from a backyard telescope. Additionally, the reader is given a historical perspective on the work of Edwin Hubble to ponder while locating and viewing the deep space objects whose discovery changed astronomy forever.

Aurora 7—The Mercury Spaceflight of M. Scott Carpenter, by Colin Burgess (Springer-Praxis, September 2015). Following up on Colin Burgess's other books on the Mercury crewed missions, this continues the history of NASA's nascent spaceflight program. Each Mercury flight forms a key part of the organization's early years. The story of Aurora 7 is retold using in-depth research that fully contextualizes the project and reveals new aspects of the early days of space exploration. After successfully launching suborbital Mercury missions as well as the first orbital spaceflight in Friendship 7, NASA continued with Aurora 7, flown by Malcolm Scott Carpenter, which landed 260 miles from the recovery vessel, the USS Intrepid, after a series of technical issues. This would be Carpenter's only spaceflight.

Interkosmos—The Eastern Bloc's Early Space Program, by Colin Burgess and Bert Vis (Springer-Praxis, November 2015). Interkosmos, which was formed in 1967, was a highly publicized Russian space program that rapidly became a significant propaganda tool for the Soviet

Union. Billed as an international "research-cosmonaut" imperative, it was also a high-profile means of displaying solidarity with the nine participating Eastern Bloc countries. Those countries contributed pilots who were trained in Moscow for weeklong "guest" missions on orbiting Salyut stations.

Go, Flight!: The Unsung Heroes of Mission Control, 1965–1992, by Rick Houston (University of Nebraska Press, December 2015). At first glance, it looks like just another auditorium in just another government building. But among the talented men (and later women) who worked in Mission Control, the room located on the third floor of Building 30—at what is now Johnson Space Center—would become known by many as "The Cathedral." These members of the space program were the brightest of their generations, making split-second decisions that determined the success or failure of a mission. The flight controllers, each supported by a staff of specialists, were the most visible part of the operation, running the missions, talking to the heavens, troubleshooting issues on board, and, ultimately, attempting to bring everyone safely back home. None of NASA's storied accomplishments would have been possible without these people. Interviews with dozens of individuals who worked in the historic third-floor Mission Control room bring the compelling stories to life.

The Other Space Race: Eisenhower and the Quest for Aerospace Security, by Nicholas Michael Sambaluk (Naval Institute Press, December 2015). This book is a unique look at the early U.S. space program and how it both shaped and was shaped by politics during the Cold War. Eisenhower's space policy was purely practical, creating a strong deterrent against the use of nuclear arms against the United States. With the Soviet launch of Sputnik in 1957, the political climate changed, and space travel became part of the United States' national discourse. Sambaluk explores what followed, including the scuttling of the "Dyna-Soar" program and the transition from Eisenhower's space policy to that of John F. Kennedy.



A Passion for Space, by Marianne J. Dyson (Springer-Praxis, December 2015). The author recounts a time when women were making inroads into spaceflight control, a male-dominated profession. The story begins with Apollo 11 and follows the challenges of pursuing a science career as a woman in the 1970s and 1980s. Dyson relates the first five Space Shuttle flights from the personal perspective of an insider.

Lunar and Planetary Cartography in Russia, by Vladislav Shevchenko and Zhanna Rodionova (Springer, November 2015). This book is the first to document in depth the history of lunar and planetary cartography in Russia. *Lunar and Planetary Cartography in Russia* provides detailed information on the compilation of a diverse range of maps and will be of interest to all lunar and planetary cartographers.

SpaceX's Dragon: America's Next Generation Spacecraft, by Erik Seedhouse (Springer-Praxis, December 2015). This book describes Dragon V2, a futuristic vehicle that not only provides a means for NASA to transport its astronauts to the orbiting outpost but also advances SpaceX's core objective of reusability. A direct descendant of Dragon, Dragon V2 can be retrieved, refurbished, and relaunched. It is a spacecraft with the potential to completely revolutionize the economics of an industry in which equipment costing hundreds of millions of dollars is routinely discarded after a single use. This book describes the extraordinary feats of engineering and human achievement that have placed this revolutionary spacecraft at the forefront of the launch industry and positioned it as the precursor for ultimately transporting humans to Mars.

A Design for a Reusable Water-Based Spacecraft Known as the Spacecoach, by Brian McConnell and Alexander Tolley (Springer, September 2015). Based on components already in existence, this manual details a reference design for an interplanetary spacecraft that is simple, durable, fully reusable, and composed mostly of water. Using such an accessible material leads to a spacecraft architecture that is radically simpler, safer, and cheaper than conventional capsule-based designs.

If developed, the potential affordability of the design will substantially open all of the inner solar system to human exploration.

Cosmonauts: Birth of a Space Age, edited by Douglas Millard (Scala Arts Publishers, Inc., October 2015). This book accompanies a landmark exhibition at the Science Museum in London. The exhibition is a major collaboration with Russia's State Museum Exhibition Centre ROSIZO; Moscow Memorial Museum of Cosmonautics; and Federal Space Agency, Roscosmos. It offers a once-in-a-lifetime opportunity to see objects that have never before left Russia, including rocket engines that launched the Space Age; actual craft that carried humans into space; and the spacesuits, equipment, and personal items of the few who flew, alongside powerful artworks that articulated Russia's longing for space.

Infinity Beckoned—Adventuring Through the Inner Solar System, 1969–1989, by Jay Gallentine (University of Nebraska Press, January 2016). The book illuminates a critical period of space history when humans dared an expansive leap into the inner solar system. With an irreverent and engaging style, the author conveys the trials and triumphs of the people on the ground who conceived and engineered the missions that put robotic spacecraft on the heavenly bodies nearest our own. Based on numerous interviews, Gallentine delivers a rich variety of stories involving the men and women, American and Russian, responsible for such groundbreaking endeavors as the Mars Viking missions of the 1970s and the Soviet Venera flights to Venus in the 1980s.

Mars via the Moon—The Next Giant Leap, by Erik Seedhouse (Springer-Praxis, November 2015). This book makes a strong case for returning to the Moon as the next logical and vital step in space exploration. Momentum is building for a return to the Moon. The United States' partners on the International Space Station are in favor of returning to the lunar surface, as are India and China. The goal may be Mars, but the political, funding, technological, and medical



infeasibility of such an objective means the next logical step is a return to the Moon.

The Moon's Largest Craters and Basins: Images and Topographic Maps from LRO, GRAIL, and Kaguya, by Charles J. Byrne (Springer, November 2015). This book combines the latest comprehensive imagery, topography, and gravity data from all three recent Moon missions: Kaguya, the Lunar Reconnaissance Orbiter (LRO), and the Gravity Recovery and Interior Laboratory (GRAIL). These major polar-orbit surveys are presented here in compact form for the convenience of amateur and practical astronomers concerned with the Moon.

From Fishing Hamlet to Red Planet: India's Space Journey, by the Indian Space Research Organization (ISRO) (HarperCollins India, January 2016). On 21 November 1963, the first rocket took off from Thumba, a fishing hamlet near Thiruvananthapuram, announcing the birth of India's space program. The rocket, the payload, the radar, the computer, and the helicopter—all that was required for the launch—came from outside the country. Fifty years later, on 5 November 2013, when ISRO launched its Mars Orbiter Mission (MOM) from the Satish Dhawan Space Centre, Sriharikota, all of the components had been indigenously manufactured. This book tracks the agency's journey through articles, interviews, and reminiscences.

The 2001 File: Harry Lange and the Design of the Landmark Science Fiction Film, by Christopher Frayling (Reel Art Press, December 2015). This book is a previously unseen look behind the scenes at the making of *2001: A Space Odyssey*, that most legendary of science fiction classics. It is an in-depth examination of the complete, largely unpublished archive of art director Harry Lange's designs, concepts, roughs, and photographs—both those rejected and those chosen. The book is about the process as well as the finished product. It examines how Lange's experience with NASA fed into the innovations of the film. It reveals how the design team was obsessed with things

that actually might work. The book illustrates several innovations that were science fiction in the 1960s but have since become science fact, including a “newspad” designed by IBM, which bears an uncanny resemblance to today's iPad. The remarkable designs for *2001* created a credible vision of the future.

Flight: The Evolution of Aviation, by Stephen Woolford and Carl Warner (Andre Deutsch, reissue edition, August 2015). From the early aircraft of pioneers such as the Wright brothers, Alcock and Brown, and Louis Blériot to the complex technology of military jets, the book conveys the experiences of those early pioneers and the skill and imagination of those who have sought to continually push the limits of what can be achieved.

Racing the Moon's Shadow with Concorde 001, by Pierre Léna (Springer, December 2015). On the summer morning of 30 June 1973, the Sun rose on the Canary Islands as an eclipse began. Astronomers on the ground enjoyed 7 short minutes of total eclipse to study the solar corona—too short for Pierre Léna and the seven scientists who boarded the Concorde 001 prototype, an extraordinary plane that would become the first commercial supersonic aircraft. With André Turcat as chief pilot and a crew of five, the aircraft remained in the lunar shadow for 74 minutes, a record time of scientific observations that allowed for exceptional measurements and has not yet been beaten. Science, technology, aviation, and history combine in the story of a unique human adventure aboard a legendary aircraft.

Valentina Tereshkova, the First Lady of Space: In Her Own Words, by Valentina Tereshkova (spacebusiness.com, October 2015). Valentina Tereshkova was the first woman to travel into space, spending almost three days piloting Vostok 6 in 1963. Orbiting Earth 48 times, she logged more flight time than the combined times of all American astronauts who had flown before that date. She became an inspiration to millions of women and was designated a “Hero of the Soviet Union.”



UPCOMING EVENTS

The annual American Astronautical Society Robert H. Goddard Memorial Symposium will be held **1–10 March 2016** in Greenbelt, Maryland. Visit <http://www.astronautical.org/goddard> for details.

The joint meeting of the National Council on Public History and the Society for History in the Federal Government will be held **16–19 March 2016** in Baltimore, Maryland. Visit <http://www.ncph.org/conference/2016-annual-meeting> for details.

The International Astronautical Federation's Spring Meetings will be held **22–24 March 2016** in Paris, France. Visit <http://www.iafastro.org/events/iaf-spring-meetings/spring-meetings-2016> for details.

The annual meeting of the Organization of American Historians will be held **7–10 April 2016** in Providence, Rhode Island. Visit <http://www.oah.org/meetings-events/2016> for details.

National History Day will be held **12–16 June 2016** in College Park, Maryland. Volunteer judging will take place 13 June. Visit <http://www.nhd.org/contest-affiliates/annual-theme> for details.

The annual American Institute of Aeronautics and Astronautics Aviation and Aeronautics Forum and Exposition (AIAA Aviation) will be held **13–17 June 2016** in Washington, DC. Visit <http://www.aiaa-aviation.org> for details.

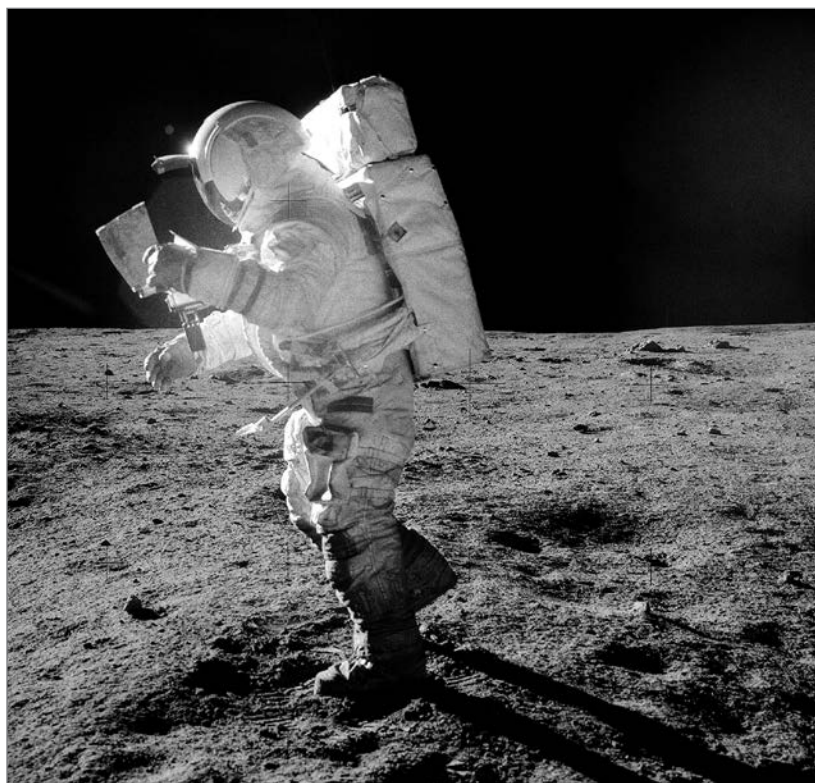
The annual meeting of the Society for the History of Technology will be held **22–26 June 2016** in Singapore. Visit <http://www.shot2016.org> for details.

The annual meeting of the Society for Historians of American Foreign Relations will be held **23–25 June 2016** in San Diego, California. Visit <https://www.shafjr.org/conferences/annual/2016-annual-meeting> for details.

The annual Experimental Aircraft Association (EAA) AirVenture air show will be held **25–31 July** in Oshkosh, Wisconsin. Visit <http://www.eaa.org/en/airventure> for details.

The annual meeting of the Society for American Archivists will be held **31 July–6 August** in Atlanta. Visit <http://www2.archivists.org> for more information.

The AIAA Space 2016 Forum will be held **12–15 September** in Long Beach, California. Visit http://www.aiaa-space.org/?_ga=1.125201610.1342047455.1453994154 for details.



Edgar Mitchell moves across the lunar surface as he looks over a traverse map during exploration of Fra Mauro. Lunar dust can be seen clinging to the boots and legs of the space suit. (Photo credit: NASA/Alan Shepard)

OBITUARIES



Apollo 14 Lunar Module pilot Edgar Mitchell is shown here in his official portrait. (Photo credit: NASA)

APOLLO 14 ASTRONAUT EDGAR MITCHELL DIES AT AGE 85

Edgar D. Mitchell, Apollo 14 astronaut and the sixth person to walk on the Moon, passed away on 4 February, on the eve of the 45th anniversary of the Apollo 14 lunar landing. After piloting Lunar Module Antares to a soft landing in the Moon's Fra Mauro highlands, he and Alan Shepard spent 33 hours on the lunar surface and collected 94 pounds of lunar rock and soil—the largest sample to that date.

Mitchell was born 17 September 1930 in Hereford, Texas, but considered Artesia, New Mexico, his hometown. He graduated with a bachelor of science

degree in industrial management from Carnegie Mellon University in 1952, a bachelor of science degree in aeronautics from the United States Naval Postgraduate School in 1961, and a doctorate in aeronautics and astronautics from the Massachusetts Institute of Technology in 1964. In 1966, NASA selected Mitchell as an astronaut, and he served as a supporting crewmember for Apollo 9 and as backup Lunar Module pilot for Apollo 10. His work in the Lunar Module simulator at Johnson Space Center during Apollo 13 helped develop procedures that would safely bring home the crew of the crippled spacecraft.

Mitchell retired from NASA and the Navy to found the Institute of Noetic Sciences in 1973, an organization that sponsors research on

the nature of consciousness. He also cofounded the Association of Space Explorers, an educational organization formed in 1984 for all who share the experience of space travel.

In a 1997 interview with NASA's oral history program, Mitchell reflected on his mission to the Moon, his first and only spaceflight:

To me, that (spaceflight) was the culmination of my being, and what can I learn from this? What is it we are learning? That's important, because I think what we're trying to do is discover ourselves and our place in the cosmos, and we don't know. We're still looking for that.



REMEMBERING HYPERSONIC RESEARCH PIONEER KEN ILIFF

Hypersonic researcher Kenneth W. Iliff died on 4 January 2016, at the age of 75. A recipient of the 1976 Exceptional Scientific Achievement Award, NASA's scientific honor, Iliff is remembered as a pioneer in formulating and perfecting modern methods of aircraft parameter identification and estimation.

Iliff began his NASA career in 1962 at the Flight Research Center (now Armstrong Flight Research Center), studying the handling qualities of the X-15 hypersonic research aircraft. For over 30 years, Iliff worked on nearly every type of aircraft at Armstrong, including the XB-70 and HL-10 lifting-body aircraft. He also studied computer simulations of Space Shuttle

reentry and landing and was a significant contributor to an aerodynamic data book for the Space Shuttle—a compilation of aerodynamic data from wind tunnels used in predicting the Shuttle's flight characteristics. In 1994, Iliff became Armstrong's chief scientist and held that position until he retired in 2002. By then, he had authored over 100 papers.

Iliff's methodology on flight estimation is used by virtually all flight-test organizations worldwide. He was the recipient of numerous awards and honors, including the 1989 Society of Flight Test Engineers Kelly Johnson Award for his contributions to the field of flight testing and flight research. In addition, he was a fellow of the American Institute of Aeronautics and Astronautics (AIAA) and was inducted into the National Hall of Fame for Persons with Disabilities.



For four decades, Ken Iliff worked on revolutionary aircraft and spacecraft, including the X-29 forward swept-wing aircraft behind him. (Photo credit: NASA)



Ken Iliff, center, was part of Armstrong Flight Research Center's lifting-body aircraft study group with Alphonso Stewart, left, and Dale Reed, right. (Photo credit: NASA)

REMEMBERING FORMER EXPENDABLE LAUNCH VEHICLE DIRECTOR JOHN J. NEILON

John J. Neilon, former expendable rocket launch director at NASA's Kennedy Space Center, died 17 January 2016 in Cocoa Beach, Florida. He was 88. Born in Lawrence, Massachusetts, Neilon served in the U.S. Army during World War II and earned a bachelor's degree in mathematics from St. Anselm's College in Manchester, New Hampshire.

Neilon began his career supporting the space program in 1957, as head of the Data Processing Section of the Vanguard launch team at the Naval Research

Laboratory in Washington, DC. Two years later, he transferred to Cape Canaveral, Florida, to work as a radar and processing specialist for Project Vanguard, one of the nation's first Earth-orbiting satellite programs. Following his time with Vanguard, Neilon took on the role of official interface with the Eastern Test Range. During launches and major tests, Neilon was stationed inside the blockhouse at Launch Complex 17, where he provided real-time coordination with range officers regarding weather and launch permissions.

After his time with Vanguard, Neilon joined Goddard Space Flight Center's launch team at Cape Canaveral as part of the group that launched many of the fledgling space program's highly successful satellites, including Echo, Telstar, and Tiros. As deputy launch director for the 1962 launch of Telstar 1, he was surprised that it went well on the first attempt. "We were pretty excited when it worked," Neilon noted. "Today you expect things to work. Back then, we 'hoped' it would work."

In 1970, Neilon was named director for Unmanned Launch Operations, a program with a portfolio of over 60 missions involving Delta, Atlas-Centaur, and Titan-Centaur launch vehicles. Under Neilon's direction, some of NASA's most notable planetary missions were launched, including Pioneers 10 and 11, which continue to zip out of the solar system after encounters with Jupiter and Saturn, and the two Viking Mars landers. He also served as the Director of Payload Operations for the Space Shuttle Program from 1976 until his retirement in 1986.

Neilon was the recipient of several significant awards, including NASA's Distinguished Service Medal in 1976. He also received the Outstanding Leadership Medal in 1975, the Exceptional Service Medal in 1971, and the Navy's Outstanding Performance Award in 1959.



As director of NASA's Unmanned Launch Operations, John J. Neilon served as launch director for the Mariner 9 mission, which gathered images that cover the Mars globe he is holding in this 1995 photograph. (Photo credit: NASA)



IMAGE IN NASA HISTORY

Langley researcher Elton W. Miller looks at the Sperry M-1 Messenger, the first full-scale airplane to be tested at Langley's Propeller Research Tunnel. The Messenger's diminutive size and use of inexpensive materials made it ideal for maintaining communications between U.S. Army battlefield units.

The Lawrence Sperry Aircraft Company produced approximately 50 Messengers for the Army, and the National Advisory Committee for Aeronautics used the one photographed here for pioneering aerodynamic research programs from 1923 to 1929. (Photo credit: NACA)



NASA HEADQUARTERS HISTORY PROGRAM OFFICE STAFF CONTACT INFORMATION:

| | |
|--|---|
| William Barry Chief Historian | <i>bill.barry@nasa.gov</i> 202-358-0383 |
| Nadine Andreassen Program Support Specialist | <i>nadine.j.andreassen@nasa.gov</i> 202-358-0087 |
| Colin Fries Archivist | <i>cfries@mail.hq.nasa.gov</i> 202-358-0388 |
| Stephen Garber Historian | <i>stephen.j.garber@nasa.gov</i> 202-358-0385 |

| | |
|--------------------------------------|--|
| Jane Odom Chief Archivist | <i>jane.h.odom@nasa.gov</i> 202-358-0386 |
| Yvette Smith Editor | <i>yvette.smith-1@nasa.gov</i> 202-358-5196 |
| Elizabeth Suckow Archivist | <i>elizabeth.suckow-1@nasa.gov</i> 202-358-0375 |
| Anthony Buonomo Intern | <i>anthony.r.buonomo@nasa.gov</i> 202-358-0680 |



CREATED AND PRODUCED BY:

Andres Almeida and Yvette Smith, Newsletter Editors

Lisa Jirousek, Editor

Michele Ostovar, Graphic Designer

Chris Duncan, Printing Specialist

Trenita Williams, Mail Coordinator

Carl Paul, Distribution

JOIN THE NASA HISTORY PROGRAM OFFICE ONLINE ON OUR SOCIAL NETWORKS!



Get short, timely messages and stay updated on a wide variety of topics by following [@NASAhistory](https://twitter.com/NASAhistory) on Twitter.



Learn the history of NASA's exploration of the universe and its many discoveries about our home planet by liking the Facebook page at

<https://www.facebook.com/NASAHistoryOffice>.



Find our collection of great images from NASA history at NASA on the Commons on Flickr:

<https://www.flickr.com/photos/nasacommons>.



National Aeronautics and Space Administration

NASA Headquarters

300 E Street SW

Washington, DC 20546

www.nasa.gov