



From the Chief Historian



While the talk of the town here in Washington this year has been about budget cuts and sequestration leading to shrinking government services, the NASA History Program has been focused on expanding services and access. Not that I mean to make light of the budget turmoil and the impacts it has throughout NASA and the government (including the History Program); however, we are looking at the need to reconsider the old ways of doing business as an opportunity. Fortunately for us all, new technologies have opened up new opportunities.

Our book production is a prime example of how we've been able to expand the reach of our efforts while trimming costs. When hard copies were the only way to get our books and monographs to you, we had to print enough to meet the demand. Nearly 20 years ago, we started making our "books" available on the history.nasa.gov Web site—at first in HTML format and later as PDFs. This meant that even when printed supplies ran out, you could find the content of our books right on your computer screen. In the last three years, NASA has surfed onto the wave of e-books and it has been an amazing ride. While we've needed to decrease our print run on new books to around 2,000 copies, the numbers of copies reaching the public have actually exploded. In part, this is because we can distribute e-books for free (find them at <http://www.nasa.gov/ebooks>) and also because it is now so simple to find them and load them onto an e-reader. The statistics are eye-popping. In 2012, we had 8 history e-books available, and 694,523 copies were downloaded from the NASA e-book portal.

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NASA's First A: Aeronautics from 1958 to 2008

By Robert G. Ferguson

NASA's First A: Aeronautics from 1958–2008 (SP-2013-4412) is expected to be published by summer 2013. Please look for new book announcements online at <http://history.nasa.gov/what.html> or through the history e-mail listserv (by simply e-mailing the word "subscribe" with no quotation marks to history-request@hq.nasa.gov).

What a rare and overwhelming opportunity it is to write about the last half century of aeronautics research at NASA. Many years ago, when I was an intern at the National Air and Space Museum's restoration facility, I would spend my lunch break exploring the attic of the Nation's Attic. It was all there—buildings stuffed wall-to-wall with many of history's most extraordinary and exotic aircraft, all of them waiting to see the light of day. There were more treasures there than I had time to discover. Likewise, for a historian of technology, the story of NASA's aeronautics is a priceless trove.

The most accessible part of this history has always been the flight hardware—and not without reason. An X-15 is more interesting to gaze at than, say, a report on the effects of hypersonic aerodynamic heating. It is tempting to let NASA's hardware roll by like a kind of highlight reel of twentieth-century aviation R&D. What I have sought to do instead is

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On average, our e-books are reaching around 40 times the number of readers that our hard copies ever could—and at a lower cost (especially to our readers).

You also may have noticed that we are continuing to expand our presence on social media. Our successful Twitter feed (@NASAHistory) led to our presence on iTunes U (NASA History Program Office). Earlier this year, we also realized that we were missing an important audience on Facebook—so now you will find us there as well (NASA History). We've also begun a collaboration with the NASA Headquarters Web team (the folks that bring us [nasa.gov](http://www.nasa.gov)) to bridge the gap between that site and our long-standing [history.nasa.gov](http://www.history.nasa.gov) Web site. In fact, you will now find the latest news and information from the History Program at <http://www.nasa.gov/history>. When you want to do some serious research on NASA history, just navigate your way to [history.nasa.gov](http://www.history.nasa.gov) like you always have. I'll see you online. Until then...

Godspeed,



William P. Barry
Chief Historian

NASA's First A: Aeronautics from 1958 to 2008 (continued)

constantly readjust the book's angle and focal point, weaving together broad political and economic trends, laboratory practice and experimental methodology, and the nuts and bolts of individual research projects (flight hardware or otherwise).

Perhaps the most pressing question that the book asks is how the conduct of research has changed over the last 50 years. Part of the answer lies in the growth of new methodologies. Research teams at different Centers acted in what might be called an entrepreneurial fashion to develop new techniques that both complemented and vied with traditional methods. Another part of the answer is found in the political and administrative trends that have replaced local managerial control over research with centralized programming. One of the more compelling lessons from this history is that scientific and technological insights routinely defied administrative attempts to bring R&D to heel. Discovery and innovation are capricious.

Like aeronautics at NASA, the book cannot escape dealing with the space side of the Agency. While it was the National Advisory Committee for Aeronautics (NACA) that formed the institutional core for the creation of NASA in 1958, the space program quickly overshadowed aeronautics. Similarly, what was supposed to be a safe harbor for conducting basic research (aeronautics included) gave way to the pressures and managerial systems of the human space program. This is not a simple story of decline, however. The NACA's leaders saw the writing on the wall and aggressively sought to add space exploration to their charge. Pursuing space was a logical step for many of the NACA's researchers, but it was also a matter of survival. Further, there were salutary effects on the original Centers, not the least of which was a deliberate strategy of diversifying and seeking competitive advantages with respect to the other Centers. When you share a budget with the human space program, you do not take your support for granted.

One of the features of aeronautical research after World War II has been the integration of new fields of expertise, along with increasing specialization within existing fields—a broadening and deepening that occurred across government laboratories and industry. Where the NACA's pre-World War II research was strongly tied to traditional areas of aeronautical research—wind tunnels especially—the postwar trend has been thoroughly multidisciplinary. Further, research programs often relied on collaborative efforts with outside partners, including the Federal Aviation Administration, the military, and industry. This history has kept me on my toes; Navier-Stokes equations one day, air traffic control the next. I am especially thankful to the many researchers and historians who have taken time to plumb these various narratives. I am also acutely aware of the many strands of research that did not make it into the book. Truly, this was something that kept me awake at night and pains me still. Like the storage buildings at the Smithsonian, NASA has no shortage of history waiting to see the light of day.

In two years, we will be marking one century since the founding of the National Advisory Committee for Aeronautics. It will be a curious anniversary. I will be watching to see whether and how NASA identifies itself with its predecessor Agency, a kind of litmus test for measuring the Agency's regard for the First A. I hope it is a time to reflect on the achievements of the NACA and NASA, as well as the evolution of federally funded aeronautical research through 100 years.

News from Headquarters and the Centers

NASA Headquarters

History Program Office

By Bill Barry

While there was quite a bit of turbulence in Washington this spring, the History Program continued almost all of its usual activities—though often with an eye to increased efficiency. One of those efficiencies is our expanded use of social media to highlight the great work we are doing now and to reacquaint the public with the work the program has done over the last 54 years. With the success of our Twitter account (@NASAhistory) and our iTunes U site (NASA History Program Office), we decided to expand our social media presence to Facebook (NASA History) in March. We are using our efforts on all of these platforms to try to bring NASA history to life on a daily basis and to encourage those with an interest to look more deeply into our historical resources that are now available online and in print.

Our extensive social media outreach would not be possible without the dedicated efforts of our interns. This spring, Kelly Victor-French and Michelle Dailey (both from Georgetown University) astounded us with their creativity by writing interesting material and finding attention-grabbing pictures. By the time you read this, Kelly and Michelle will have completed their internships here and we'll have welcomed a new pair of interns for the summer. The summer internship selection

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News from Headquarters and the Centers (continued)

is always highly competitive, but it was particularly challenging this year, with more than 40 qualified applicants. Joining us in June will be Drew Simpson and Cody Knipfer. Drew is a doctoral candidate in history at Carnegie Mellon University who is writing a dissertation titled “Making the Medical Metropolis: Academic Medical Centers and Urban Change in Pittsburgh and Houston, 1945–2010.” Cody is a sophomore at McDaniel College in Westminster, Maryland. His major is political science/international relations with a minor in history.

At the start of the year, we noticed that 2013 is the 50th anniversary of the publication of the first book in the NASA history series. *Project Mercury: A Chronology* by James Grimwood was published in 1963 as NASA SP-4001. We also noticed, while we were auditing our stock of back titles in the warehouse, that we had more copies of many of those books than we needed. (For collectors: we did not have any copies of *Project Mercury: A Chronology* in the warehouse. That one is truly out of print.) With the enthusiastic help of Rick Spencer at the NASA Headquarters Library, we decided to make a limited-time offer of free copies of the books that we no longer need. You can find the current list of all the books that are available at <http://www.hq.nasa.gov/office/hqlibrary/ic/lic2.htm>. If you visit the NASA Headquarters Information Center (located in the Headquarters Library), you can pick up the free books (one copy per person) and take them with you. The Information Center will also ship the books to you at the cost of \$3 per title.

One of the downsides of the budget turbulence this year for the History Program is that it locks in our inability to meet with our professional colleagues at conferences. Since the History Program moved to the Office of Communication three years ago, the budget for travel to professional conferences has been extremely limited. Under the travel and conference restrictions imposed in spring 2013, traveling to international conferences is prohibited and traveling to domestic conferences is limited to mission essential activities. As a result, we are increasingly looking to participate in local events and trying to find ways to stay engaged with our respective professional societies that do not require travel. We expect that this situation will continue to make it more difficult to promote the community of aerospace history scholars, to identify promising scholars who might write future NASA-commissioned history projects, and to promote our activities and publications among a key audience. But we remain committed to achieving these objectives through other means—and, frankly, this is part of the reason for our increased attention to social media.

Despite the budget challenges, our ongoing publication efforts are thriving. Oddly enough, while cuts to the printing budget have forced us to reduce the print run of our books, free e-book and PDF versions of our publications have wildly expanded the reach of each work. For example, while we were only able to print 2,000 copies of *Psychology of Space Exploration* in late 2011, visitors downloaded 153,155 copies of the e-book version from the NASA e-book portal in 2012. While the reach of our works has expanded, we have also been working toward a more manageable breadth of projects so as to ensure better quality control and thereby speed up production times. While this is being written, we have 21 books and monographs in various stages of the production process. This is a substantial decrease from a few years ago, but it is also a much more manageable workload. As we nudge new books and monographs out the door this year, we expect that we will backfill them with new projects so as to stay at about 20 active projects. Among the books we expect

to publish this year is the long-awaited third volume in our Societal Impact series. This one is a series of case studies of the societal impact of spaceflight. We also have a monograph on the management of the Spitzer Space Telescope project and a number of other projects in this year's pipeline. Most of this year's printing projects have been a long time in coming, but the budget-induced focus on essentials is helping us to improve our processes. We hope you will be happy with the results.

Historical Reference Collection

By Jane Odom

In the Headquarters Archives, the staff has begun preparing for an upcoming renovation as part of a broader "green" building renovation by the property owner. We are being told that it will occur early next year, but check this space and our Web site for periodic updates. It will impact our operations greatly as nearly everything in the office will have to be packed and stored for six to eight months. Chief Archivist Jane Odom made a recent trip to the National Air and Space Museum Archives at Udvar Hazy to tour the



Jane Odom and Mark Kahn with Space Shuttle Discovery.

archives, discuss moving an archive with her counterparts, and gather lessons learned. Marilyn Graskowiak, Archives director, and Mark Kahn, senior archivist, were very generous with their time and provided a great deal of useful information.

Reference services at Headquarters continue unabated. During the last quarter, we hosted an average of a dozen people per month who came in person to conduct research. The majority of our reference requests arrive by e-mail. We had research visits by current NASA Headquarters staff and retirees; individuals from the Goddard Space Flight Center, the National Air and Space Museum, the Naval Research Laboratory, Ohio University, Boston University, Virginia Tech, Duke University, and Ohio University; and foreign nationals from the University of Toronto, the University of Western Australia, and the International Christian University in Tokyo.

A number of archival processing projects are either under way or have been completed recently that researchers will find of interest. The processing (arrangement, description, and preservation) of several collections is complete. One is a large collection of audiovisual and textual sources used for the *Spinoff* publication; the other is a Space Shuttle collection, dated 1969–87, of NASA–Department of Defense correspondence and Memorandums of Understanding, as well as material on the use of Vandenberg Air Force Base for possible launches. Work is ongoing on a collection of life sciences material from the 1980s and 1990s.

The review of boxes on loan from the Federal Records Center continues, with material being added to the Historical Reference Collection weekly. The collection

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News from Headquarters and the Centers (continued)

currently under review documents the interaction between NASA and Congress on Space Station Freedom and the International Space Station, 1987–99.

Nearly 300 additional press kits for missions that were conducted by satellites and probes have recently been digitized or located online and then made available for research use in a growing collection online at <https://mira.hq.nasa.gov/history/>. Efforts are under way to gather press conference transcripts and congressional testimony to include on this site in the future.

Ames Research Center (ARC)

By Glenn Bugos

Hangar One is again in the news. The General Services Administration announced that, on behalf of NASA, it is preparing a request for proposals from entities interested in leasing Moffett Federal Airfield that would focus on “the rehabilitation and adaptive reuse of historic Hangar One.” Anticipating much-increased interest on Hangar One, the Ames History Office has helped with major updates to the Ames historic preservation Web site. New content includes an interactive history of Moffett Field with a photographic timeline and oral history videos, as well as three-dimensional images of Hangar One, the USS Macon, and a P-3 Orion (available online at <http://historicproperties.arc.nasa.gov/hangar1cd/>).

In history news around the Center, Roger Ashbaugh has been preparing a Web site cataloguing the illustrations and paintings that Ames commissioned over the years, with an eye toward exploring their artistic value. Beverly Girten of the Strategic Management and Analysis Division prepared a broad-ranging presentation on the history and context of NASA’s vision and mission statements. Dolores Beasley has made the many awards and recognitions won by Ames’s people over the years more visible around the Center. Ken Mort, a long-time employee of the National Full Scale Aerodynamics Complex, has been working on a history of the facility—the world’s largest wind tunnel. And, April Gage completed a review of the Archives Reference Collection (AFS1070.8A) and a major update of the finding aid.

Dryden Flight Research Center (DFRC)

By Christian Gelzer

Peter Merlin’s draft manuscript for *A New Twist in Flight Research: The F-18 Active Aeroelastic Wing Project*, which describes a joint NASA-USAF-Boeing effort to explore the feasibility of using advanced aeroelastic design and control law software to improve aircraft maneuverability, is nearly through the export-control review process and is awaiting Air Force concurrence. Once this review is complete, the manuscript will be ready for final edits and layout. Merlin’s last book, *Crash Course: Lessons Learned from Accidents Involving Remotely Piloted and Autonomous Aircraft* (NASA SP-2013-600), was released on 19 March. *Crash Course* is a companion to *Breaking the Mishap Chain* (NASA SP-2011-594). Merlin gave a briefing, which was drawn from material in both volumes, at the Dryden Flight Research Center’s Safety Day 2013. He was invited to give a presentation based on material from *Crash Course* at the Aerospace Medical Association’s annual scientific meeting, but travel approval is pending due to the recent budget crisis. Another briefing, scheduled for the Naval Test Wing–Atlantic at the Naval Air Station Patuxent River, Maryland, was cancelled when the Navy indefinitely

postponed their planned safety stand-down and other training activities. Merlin is currently working on his latest manuscript, *Unlimited Horizons: Design*.

Glenn Research Center (GRC)

By Anne Mills

Archivist Bob Arrighi has completed an impressive processing of the archive's Centaur Upper Stage Rocket materials. A 90-page finding aid covering more than 600 documents—many of which are available digitally—was created as a result. The materials cover the period from the initial development at Marshall in 1960 through the last Lewis-managed launch in 1997. The collection is primarily arranged by the different Centaur vehicle models. There are substantial sections dealing with the development of Centaur, its later commercialization, and the Shuttle/Centaur program. The finding aid includes a brief history of the Centaur program at the Center, from the transfer of its development from Marshall in 1962 through the management of all Centaur launches until 1997. Also included is an index of all Centaur launches, including the vehicle number, the date of launch, the payload, and the launch vehicle.

This November, GRC will mark the 50th anniversary of the first successful Centaur launch. The processing of the collection and finding aid will be invaluable as we anticipate an increase in reference and research.

Johnson Space Center (JSC)

JSC History Office Reaches Major Milestone

By Rebecca Wright

JSC began its oral history project in 1996, and from that action stemmed an ongoing effort to capture first-hand experiences from individuals who have made key contributions to NASA's history and to achieving the space Agency's goals. The JSC History Office reached a major milestone this month by completing its 1,000th oral history interview.

During the past 17 years, the JSC History team has continued the efforts for the Center's project, while facilitating additional oral history projects for the NASA Headquarters History Office and other areas. These efforts produced over 1,600 hours of audio recordings, and the following paragraphs share examples of the data that cover a wide range of topics. Projects include

- recollections from 12 scientists who significantly contributed to the launch and evolution of the Earth System Science Program, which were gathered during the program's twentieth year;
- a Tacit Knowledge Capture Project with major Agency-wide Space Shuttle Program (SSP) decision-makers commissioned by the JSC Chief Knowledge Officer and the Space Shuttle Program Manager; and
- experiences from women who have contributed to the success of the Agency, as well as reflections from female aviation pioneers.

As part of the Space Shuttle Transition and Retirement Program, the team conducted oral history sessions with people who were instrumental during the Space

News from Headquarters and the Centers (continued)

Shuttle Program. The interviews reflect details of critical program decisions, information on management tools and processes, and lessons learned from areas of expertise ranging from design and development to testing and operations of the vehicle's major components (orbiter, main engines, solid rocket boosters, and external tank). The NASA JSC Historic Preservation Officer also requested that the team conduct oral history interviews with employees supporting the Solid Rocket Booster Recovery Ships and Shuttle Carrier Aircraft (both JSC assets), as well as those with significant knowledge about the JSC facilities primarily used during the Shuttle Program.

The NASA Headquarters History Office provided support for numerous projects to collect experiences from a variety of subjects, ranging from those who worked at the four NACA facilities before 1958 to the six NASA employees who assisted the Chilean government in 2010 when 33 miners were trapped 2,300 feet below Earth's surface. Also, Headquarters and JSC supported a "real-time" project conducted during the weeks immediately following the Columbia accident (2003) to gather information about the recovery efforts in East Texas and Louisiana.

Two of the oral history projects became the basis for publications. The first book, *Shuttle-Mir: The United States and Russia Share History's Highest Stage*, extensively utilized the transcripts from participants in the Shuttle-Mir interviews. Printed in 2001, the history details the first major Russian-American partnership after the fall of the Soviet Union, combining the American Space Shuttle's ready access to space with Russia's long-term address in orbit, the country's space station Mir. The second book, *NASA at 50: Interviews with NASA's Senior Leadership*, was recently released by the Headquarters History Office and contains reflections from top decision-makers as the Agency completed its first 50 years.

The transcripts from the projects are posted on the JSC history portal (<http://www.jsc.nasa.gov/history>), a single source for all online JSC history resources. Approximately 800 transcripts provide details of procedures, processes, methodologies, rationale, and background of operations, design, and development. Prior to the interview, extensive research about the person and the projects, programs, and areas where the person worked is gathered to form questions specifically designed to extract details. Excerpts from the oral history sessions have been used in numerous books, publications, magazine articles, documentaries, and other television and radio programs, including on C-SPAN and the BBC.

The JSC history team is continuing with its ongoing Center oral history project and is editing materials for a



The JSC History team conducted its 1,000th oral history interview for NASA in April with Duane Ross (shown here). A longtime JSC employee and manager of the Astronaut Selection Office, Ross was instrumental in the organization of the oral history project and has been its senior advisor since its implementation in 1996.

future publication featuring words from the oral history collection. For a new project, the team is also conducting interviews for a Commercial Orbital Transportation Services (COTS) Program history and with former NASA Administrators and Agency leaders.

The transcripts from the interviews are accessible online via the JSC history portal at <http://www.jsc.nasa.gov/history>.

Marshall Space Flight Center (MSFC)

Brian Odom Joins MSFC History Team

By Mike Wright

Brian Odom has joined the history function at the Marshall Space Flight Center in Huntsville, Alabama. He is serving as a history archivist employed by Analytical Services Inc. in the Office of Strategic Analysis and Communications at the Marshall Center.

Brian is originally from the small town of Uriah, Alabama, approximately one hour north of Mobile. Brian attended the University of Alabama in Tuscaloosa, where he received master's degrees in both history and library and information science. In the past, he has worked near Birmingham, Alabama, as a reference librarian at Pelham Public Library, where he coordinated both adult and youth outreach and programming, and as an adjunct instructor of history at Jefferson State Community College, where he taught courses in both American and European civilization.

His academic interests include seventeenth- and eighteenth-century European history, colonial America, constitutional law, and political theory. Brian has also written numerous reviews and articles for various professional journals and magazines in addition to serving on the editorial board at the *Washington Independent Review of Books*.

Stennis Space Center (SSC)

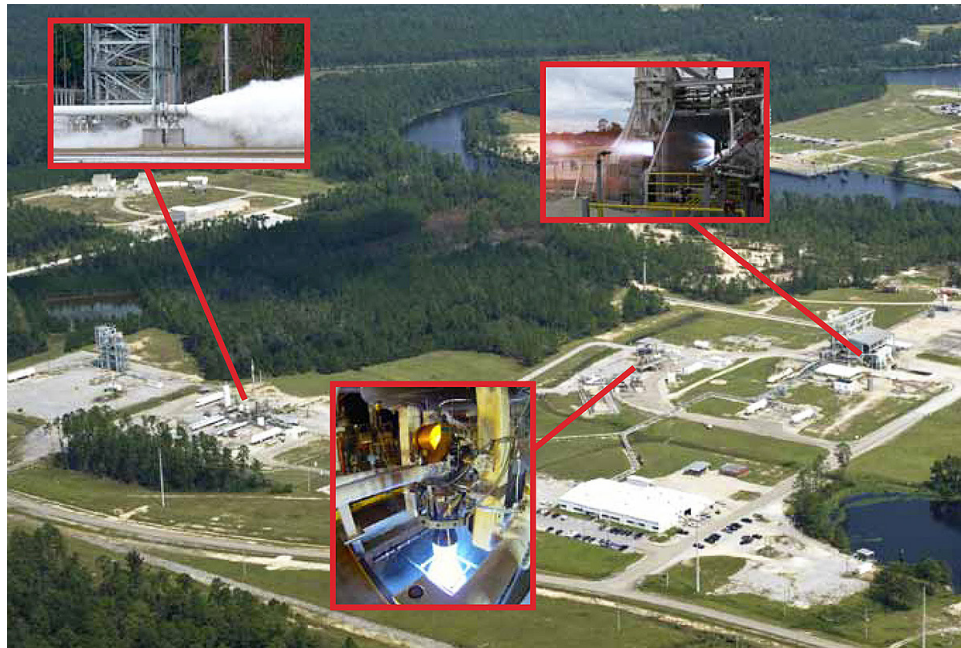
By NASA External Affairs, Stennis Space Center

Think of a working beehive or active anthill and one will have an apt description of the E Test Complex at NASA's John C. Stennis Space Center one week last November.

Twenty-seven tests were conducted during a three-day period during the week of 5 November 2012 on three different rocket engines/components and on three E Complex test stands. These included tests on the three stands during a 24-hour period over 2 days and during a 9-hour-plus period on a single day. Test managers characterized the convergence of tests as historic.

"The E Test Complex is NASA's most capable and flexible set of rocket propulsion test facilities, able to meet customer needs from small thrusters, to full-scale turbomachinery and thrust chambers, to full-scale engine systems," explained Randy Galloway, director of the Engineering and Test Directorate at Stennis. "Our NASA/Test Operations Contract team at the E Complex has done many astounding things over the past several years, and this latest accomplishment of running a hot-fire test on each stand in the same week is yet another one to add to their list."

News from Headquarters and the Centers (continued)



The week of 5 November 2012 was a historic week for NASA when tests on all three stands in the E Test Complex at Stennis Space Center were completed. Inset images show the types of tests conducted on the E-1 Test Stand (right), the E-2 Test Stand (left), and the E-3 Test Stand (center). The E-1 photo is from an early October test and is provided courtesy of Blue Origin. Other photos are from tests conducted during the week.

The Stennis team conducted the following tests:

- Four tests over two days on the Blue Origin engine thrust chamber on the E-1 Test Stand. The component will be used on the BE-3 100,000–pound force liquid oxygen, liquid hydrogen engine to power Blue’s Reusable Booster System, which is now in development. The company is one of several commercial organizations that have partnered with NASA through the Agency’s Commercial Crew Development Program to develop a commercial crew space transportation capability.
- Five tests over two days on a modified chemical steam generator (CSG) on the E-2 Test Stand. A series of 27 CSG units will be used on the A-3 Test Stand that is under construction at Stennis. The recent tests provided critical data on the effectiveness of the unit modifications.
- Eighteen tests over two days on the liquid oxygen, liquid methane Project Morpheus engine on the E-3 Test Stand. The engine will be used on a NASA prototype lander, which could one day evolve to carry cargo safely to the Moon, asteroids, or Mars.

“The fact that such a feat is even possible is a great testimonial to our facilities and the team that operates and maintains them,” Galloway continued. “Our customers, NASA or industry, know that our E Complex team will do whatever it takes to meet their testing needs.”

What it took that week was a high level of coordination and planning to meet the work-crew and logistical challenges posed by three active test stands. The

flexibility of the E Complex team was critical in meeting those challenges, said Jeff Lott, E-1 test director. “This is a real credit to the crews,” he said. “Our folks are fairly young but are a very talented and flexible team.”

Stennis’s chief of test operations, Maury Vander, agreed. “During a week like we just had, individuals were asked to do above and beyond the typical expectations of their job,” he said. “However, they do that all of the time. They adjust as needed to meet test requirements. They make it happen.”

They do so by meeting the logistics challenge of coordinating tests so conflicts do not arise, ensuring test propellants are available when needed, and simply being in the right place at the right time. Since a test on one stand affects the ability to work on another, team members must understand where they should and should not be throughout the day.

“This team is just great at handling all of that,” Vander said.

E-2/E-3 test director Craig Chandler agreed, adding that meeting the challenge makes the job exciting. “This is not something just anybody can do,” he said. “Meeting test challenges, especially in a week like the one we just had, provide a real sense of achievement and accomplishment.”

The NASA Seal and Insignia, Part 1

By Joseph R. Chambers, NASA Langley Research Center (Retired)

Background

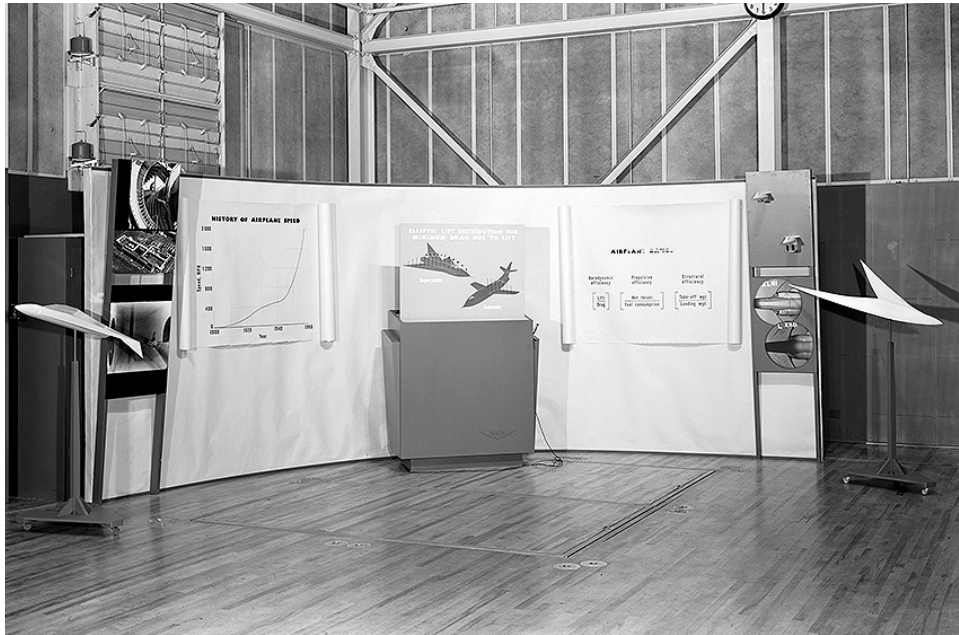
The official NASA seal and the less formal NASA “meatball” insignia are among the most recognized emblems in the world. The logos, which include symbols representing the space and aeronautics missions of NASA, became official in 1959 after graphic design work was influenced by activities at three NASA Centers: the Lewis Research Center at Cleveland, Ohio; the Langley Research Center at Hampton, Virginia; and the Ames Research Center at Moffett Field, California.

James J. Modarelli, head of the Research Reports Division at the NASA Lewis Research Center (now the NASA Glenn Research Center), was the chief designer of the seal and meatball.



James A. Modarelli (right) of the NASA Lewis Research Center presents an incentive award in 1964.

The NASA Seal and Insignia, Part 1 (continued)



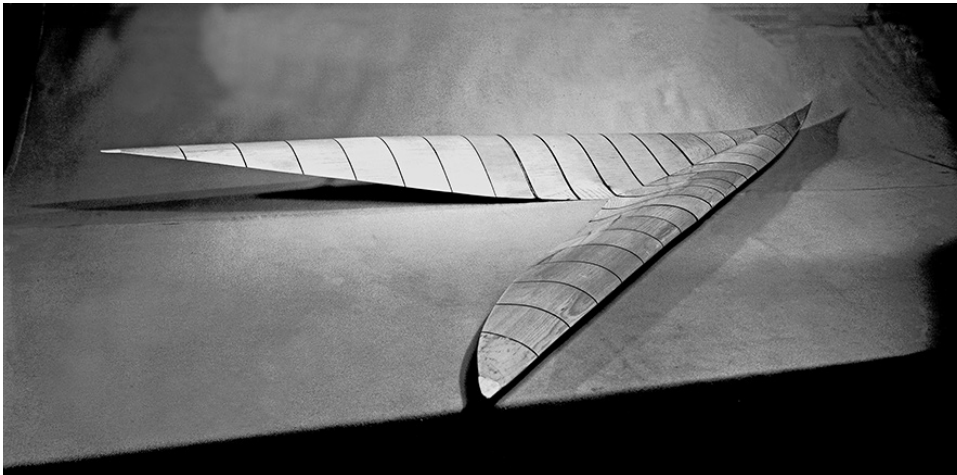
View of the 1958 Triennial Inspection display on supersonic aerodynamics that was viewed by Jim Modarelli in the Ames Unitary Plan Wind Tunnel High Bay. The large display model of a twisted and cambered supersonic wing configuration at the right side of the picture impressed Modarelli.

The Vision Begins

In July 1958, Jim Modarelli attended the Triennial Inspection of the National Advisory Committee for Aeronautics (NACA) Ames Aeronautical Laboratory, during which facilities and research efforts that were under way at Ames were highlighted and discussed for invited guests in the scientific community. At the time, the annual NACA inspections rotated between Ames, Langley, and Lewis every three years.

During the meeting, Modarelli participated in a tour consisting of nine stops for presentations on topical research activities. At the Ames Unitary Plan Wind Tunnel, he viewed a wind-tunnel model of a radical supersonic airplane designed for flight at Mach 3.0. Featuring a cambered and twisted arrow wing with an upturned nose, the model deeply impressed Modarelli. Within a few months, he also learned that NACA research was being conducted on similar wing shapes at Langley. The efforts at Ames and Langley were stimulated by the pioneering efforts of the brilliant NACA/NASA scientist R. T. Jones in his quest for aircraft efficiency at supersonic speeds. The leader of research at Ames was Elliott D. Katzen, and Clinton E. Brown led the work at Langley. After discussions with both groups, Modarelli later stylized the radical features of the arrow-wing configuration in his evolution of the NASA seal design; the wing would also ultimately become an element of the NASA insignia.¹

1. James A. Modarelli, interview by Mark A. Chambers, 1 July 1992; J. C. South, Jr., "Meatball Logo Based on Wind Tunnel Model," *The Researcher News*, in-house newsletter, NASA Langley Research Center, 14 August 1992: 2.



A three-quarter rear view of a wooden Langley display model showing the radical twist and camber of a supersonic arrow-wing design. Note the cobra-like raised nose at the upper right and the cambered, drooped trailing edges of the 75° swept wing at the left. (NASA Langley 1958-L00502)

The NASA Seal

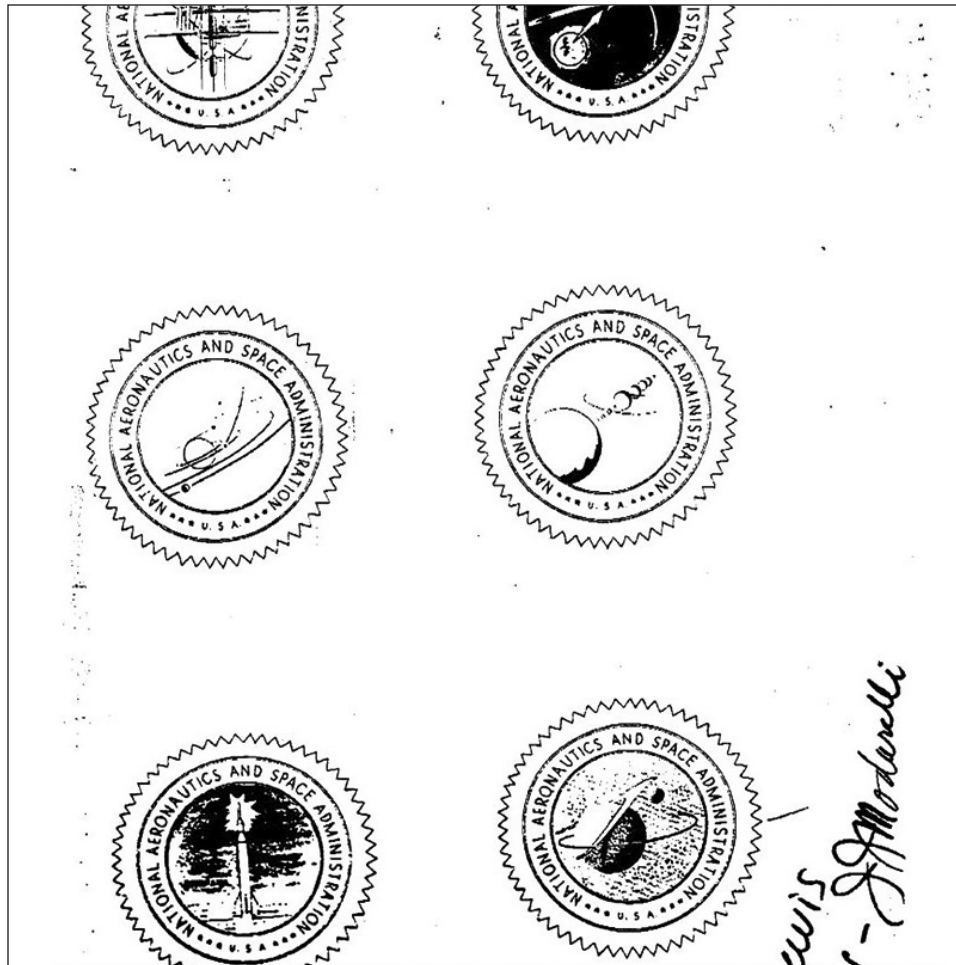
Officially, the conception of the NASA seal and insignia began in mid-September 1958 when John Victory, then the executive secretary of the NACA, sent letters to the Ames, Langley, and Lewis NACA Laboratories soliciting suggestions for an “insignia” for the new NASA organization.² In addition to the Center responses, an ad hoc committee of staff members at the NACA Headquarters was invited to submit candidate designs for the seal. A few weeks later, NASA absorbed the personnel, facilities, and research activities of the NACA at the close of business on 30 September.

Jim Modarelli was well prepared for the design competition. He had already selected the twisted and cambered arrow-wing concept, which he saw at Ames earlier in the year, as a component of the seal, and he had discussed a competing seal design with Harry J. DeVoto, head of the Ames Graphics and Exhibits Branch. The Ames design included the traditional circular shape required for all government seals, featuring an outer circle enclosing the words “NATIONAL AERONAUTICS AND SPACE ADMINISTRATION” and an inner circle. Inside the inner circle was a blue field with several star shapes, a globe representing Earth in the center of the blue field, and the path of a single orbiting body circling the globe. Modarelli adapted the DeVoto design for the Lewis submittal by adding the advanced supersonic wing, and by modifying the globe and orbiting body.³ Members of the illustration section of the Research Reports Division at Lewis worked on candidate designs for the seal under the direction of Modarelli; however, his personal design received most of the attention. After the candidates from the Centers and Headquarters had been submitted to NASA’s first Administrator, Dr. T. Keith Glennan, for final selection of a seal, several of Glennan’s staff met with him in December 1958 to decide the winner. After considerable discussion

2. “Staff Invited to Submit Designs for NASA Insignia,” *The Orbit*, in-house newsletter, NASA Lewis Research Center, 30 September 1958: 1. In reality, the invitation was to design candidates for the NASA seal. No such invitation occurred for the NASA insignia.

3. Archives of NASA Headquarters History Program Office, Records 4540, 4542, 4543, and 1496.

The NASA Seal and Insignia, Part 1 (continued)



Sketches of the six competing designs for the NASA seal. The winning design submitted by James Modarelli and his Lewis team is at the lower right.

over the six designs, Glennan declared that they were “wasting time,” and he personally chose the seal design submitted by Modarelli.

The Path to Presidential Approval

Acquiring presidential approval for the NASA seal involved a four-step process, as mandated for all government agencies. First, the Heraldic Branch of the Army Office of the Quartermaster General (now the Army Institute of Heraldry) had to be contacted for review and assistance in the design of the seal as well as other stages of the process. In addition to analysis and recommendations for the proposed graphics, the Heraldic Branch would prepare plaster reproductions of the proposed seal and complete other tasks as required.

After the seal design was finalized to the satisfaction of NASA and the Heraldic Branch, the Commission of the Fine Arts reviewed the artistic merits of the seal. In 1921, President Warren Harding had delegated this responsibility to the Commission.

Following approval by the Commission, the process required the Administrator of NASA to approve the design and submit a formal request to the Bureau of Budget for presidential approval. When all of this was complete, a Presidential executive order would be signed, officially establishing the seal.

In January 1959, a month after Administrator Glennan had selected the Modarelli seal design, NASA requested the Heraldic Branch to initiate the review process, including a presentation to the Commission of Fine Arts.⁴ The Modarelli design survived the Army review with only minor changes in color shades.

The next step in the approval process for the new seal was not totally complimentary. When the Quartermaster Corps sent the design to the Commission of Fine Arts a month later, the Commission members responded by “reluctantly” approving the design, commenting, “This design is primarily a pictorial conception and is very reminiscent of designs appearing in current commercial advertising.” It also specified that the letters “U.S.A.” at the bottom of the name band be enlarged to the size of the other letters and that the stars in the name band be deleted.⁵ NASA accepted these changes.



Sketch on left shows corrected July version of the NASA seal. Note the revised wing shape and enlargement of the stars. Compare to final version on the right.



A black-and-white copy of the proposed NASA seal originally sent to the Army Heraldic Branch for review in January 1959. Major changes were subsequently made before Dr. Glennan approved the final seal in August.

After the design was submitted to the Corps and the Commission, news of the proposed seal was sent to the NASA Centers for the first time for information and comments. When the design details for the seal reached Langley, Clint Brown took one look and remarked, “They have drawn the wing upside down!”⁶ When word of the mistake reached NASA Headquarters in late March, the work by the Heraldic Branch was suspended while Modarelli fixed this and made other corrections to

4. Robert J. Lacklen, NASA Director of Personnel, letter to Lt. Gen. J. F. Collins, Deputy Chief of Staff for Personnel, Office of Secretary for the Army, 23 January 1959, Files of the Army Institute of Heraldry.

5. L. R. Wilson, Secretary of the Commission of the Fine Arts, letter to Lt. Col. James S. Cook, Jr. Chief, Heraldic Branch of the Army Office of the Quartermaster General, 25 February 1959, Files of the Army Institute of Heraldry.

6. Jack Crenshaw, interview by author, 1 February 2013.

The NASA Seal and Insignia, Part 1 (continued)

the graphic. In addition to flipping it right-side-up, the sweep angle of the wing was increased and the stars within the field were made larger. These revisions to the Modarelli design were completed in late July.

Dr. Glennan approved the final design for the seal in August 1959, and President Dwight D. Eisenhower signed Executive Order 10849 establishing the seal on 27 November 1959. The seal was amended early in the Kennedy administration when some slight color changes were instituted under Executive Order 10942, 22 May 1961.

The next newsletter will continue this story and discuss the history of NASA's insignias, which included the "meatball" and the NASA logotype ("worm").

Other Aerospace History News

National Air and Space Museum (NASM)

Submitted by Mike Neufeld

Margaret Weitekamp and David DeVorkin, both in the Space History Division, recently published a children's book, *Pluto's Secret: An Icy World's Tale of Discovery*, which was illustrated by the Museum's Early Childhood Program manager, Diane Kidd. Through whimsical artwork and entertaining dialogue, *Pluto's Secret* explains the true story of the planet. Providing a history of the small, icy world from its discovery and naming to its recent reclassification, this book presents a fascinating look at how scientists organize and classify the objects in our solar system as they gain new insights into how it works and what types of things exist within it. *School Library Journal* called the book "fun reading" that "deftly imparts scientific knowledge about deep space investigation, the process of change due to new data, and the cooperative effort of astronomers to formalize such changes on a global level." The book includes a glossary and bibliography.

Roger Launius, Space History Division, has edited *Exploring the Solar System: The History and Science of Planetary Exploration* (New York: Palgrave Macmillan, 2013; Palgrave Studies in the History of Science and Technology). From the beginning of the Space Age, the United States, which was soon followed by other nations, began an impressive effort to learn about the planets of the solar system. The data collected and analyzed by scientists have revolutionized the process of understanding our celestial neighbors. These efforts also captured the imagination of people from all backgrounds like nothing else except the Apollo lunar missions. Through a succession of specially commissioned, broadly analytical essays on major aspects of the history of robotic planetary exploration, this book opens new vistas in the understanding of the development of planetary science in the Space Age. Further information is available online at <http://us.macmillan.com/exploringthesolarsystem/RogerDLaunius>.

Roger Launius has been appointed a member of the National Academies of Science "Human Spaceflight: Public and Stakeholder Opinions Panel" that will provide information to the Human Spaceflight Committee, which is undertaking a study to "review the long-term goals, core capabilities, and direction of the U.S.

human spaceflight program and make recommendations to enable a sustainable U.S. human spaceflight program.” This panel is charged with analyzing “public and stakeholder input to better understand the motivations, goals, and possible evolution of human spaceflight.” More information is available online at <http://www8.nationalacademies.org/cp/projectview.aspx?key=49532>. Committee membership information is available online at <http://www8.nationalacademies.org/cp/CommitteeView.aspx?key=49532>. The first meeting of this panel took place on 5 April 2013.

A team from the Space History, Exhibits Design, and other divisions of NASM, plus the Museum’s Center for Earth and Planetary Studies, is working on a new Mercury-Gemini-Apollo gallery for the Museum. The current one, Apollo to the Moon, is an original exhibit from the opening of the Mall building in July 1976, albeit slightly modified over the years. It has great artifacts—a spacesuit from Apollo 11, a lunar rover, a Saturn V F-1 engine—but lacks explanatory content and is much in need of modernization. In planning the new gallery, the team has started from a blank slate: the existing gallery will be emptied of artifacts and demolished, perhaps in 2014/15, and the space entirely renewed. The new exhibition, preliminarily titled, *We Choose to Go to the Moon*, could open in 2017 if fundraising goes well.

Space History curator Valerie Neal spoke at the “Session on Space and International Cooperation” at the Eighth Annual Ilan Ramon International Space Conference in Israel in late January. The occasion marked the 10th anniversary of the STS-107 Space Shuttle Columbia mission. Ramon and the crew perished when Columbia disintegrated during reentry on 1 February 2003. The conference also featured NASA Administrator Charles Bolden; heads of the European, Canadian, and Russian space agencies; astronauts John Grunsfeld, Susan Helms, and Randy Bresnik; and other representatives from space operations and industry around the world. Valerie is the fourth NASM speaker invited to this conference; Roger Launius, Mike Neufeld, and Martin Collins have addressed the meeting in previous years.

Workshop Report: The Sonic Dimension of Outer Space, 1940–1980

By **Katja Rippert**, Freie Universität Berlin (katja.rippert@fu-berlin.de)

Voices whistling from deep space, a dull, drumming rhythm, recurring high beeps—this “extraterrestrial” music of the fictional alien race called Krell belongs to the first exclusively electronic soundtrack, recorded for *Forbidden Planet* (1956), one of the most iconic Hollywood science fiction movies. Released one year before the Sputnik launch, it took a prominent place in the popularization and imagination of outer space during the early Space Age.

The close relationship between moving pictures, electronic music, and outer space in postwar culture became apparent during the workshop, “Sounds of Space.” While ambient space sounds took participants on sonic adventures, their

Workshop Report: The Sonic Dimension of Outer Space, 1940–1980 (continued)

analysis proved to be a challenging expedition into an academic field that was previously largely uncharted, despite the recently much-debated “acoustic turn.” Why do certain sounds evoke images of the universe even though humans cannot experience sound in outer space due to the absence of sound waves in a vacuum? The variety of sounds explored—ranging from different music genres, environmental sounds, human voices, and sound effects to sonified data—reflected the complexity of the subject. Three questions were at the core of this enterprise: first, what sonic forms and material encompassed imagined sounds of space? Second, what role did technology and actual space exploration play in developing such sounds? And third, how were these sounds of space embedded in the history of postwar astroculture?

Organized by William R. Macauley and the Emmy Noether Research Group, “The Future in the Stars: European Astroculture and Extraterrestrial Life in the Twentieth Century” workshop gathered more than two dozen scholars at Freie Universität Berlin in late November 2012. It set out to investigate how outer space was sonically imagined between the late 1940s and 1980. Alexander C. T. Geppert (Berlin) explained the main objective as broadening academic work on astroculture—which was previously focused on visual aspects—into another sensorial dimension. In his introduction, William R. Macauley (Berlin) argued that postwar sonic ventures into space extended from the end of the Second World War, when new technologies such as radio astronomy fueled sonic space fiction prior to successful spaceflights, until the end of “Golden Age” planetary exploration in 1980.

Keynote speaker James Wierzbicki (Sydney) suggested four analytical space sound categories—signals, technology, planets, and space travel—that influenced twentieth-century music. Following Arnold Schönberg’s first atonal piece, “String Quartet No. 2” (1908), space music in the 1960s and 1970s expressed a notion of timelessness and weightlessness by breaking with traditional Western tonal music based on harmony and measured rhythm. French music theorist and composer Pierre Schaeffer endorsed this critical stance on conventional music structure in the 1940s. Tatjana Böhme-Mehner (Leipzig) described his radio play, “La Coquille à Planètes” (1944), as a crucial step in radiophonic art. To sonically depict space travel, Schaeffer experimented with recordings of “concrete” sounds from nature. Johan Stenström’s (Lund) detailed account of electronic music in the Swedish opera “Aniara” (1959), a rare example of an avant-garde opera set exclusively in space, revealed a fascination with similar concrete sounds. Both “futuristic” works aimed to modernize their genre.

Artists on the other side of the Iron Curtain drew upon progressive developments in electronic music. Konstantin Kaminskij (Konstanz) analyzed the function of the planet Venus’s voice in the film *Planet of Storms* (USSR, 1962). The singing Venus illustrated how sound changed the appearance of objects. Similarly, giving museum spaces and their objects a “voice” could enrich visitors’ experiences in contemporary exhibitions, Tim Boon (London) argued. Incorporating an ambient music score into his presentation, Boon explained how spaces could embody sound—and thus transform historical thinking.

In recent years, cultural historians have embraced a focus on sound and listening practices. Such analysis of auditive cultures proved fruitful in Trevor Pinch’s (Ithaca, New York) examination of the role that 1960s and 1970s electronic

synthesizers played in the emergence of “spacey” sounds. Rather than celebrating advances into outer space, hippie culture embarked on a retreat into inner worlds to the rhythm of psychedelic synthesizer music. The exploration of inner and outer space constituted an integral element of the movement’s rationale.

Synthesizers seem to have influenced both the development and popularization of superstring theory in the 1970s, as Axel Volmar (Siegen) proposed. The theory claiming the synthesis of all elements via strings offered a modern version of the “harmony of the spheres,” a concept tracing back to Pythagoras’s organization of the cosmos in mathematical equations. Bringing the first day to a close, Eliad Wagner’s (Berlin) stimulating synthesizer performance passionately rejected the interpretation of the universe as a harmonic cosmos and instead evoked images of chaos, disorder, and unpredictable encounters in space.

The workshop’s second day started with a focus on popular music. Michael M. Lupro (Portland, Oregon) asked whether the exploration of space affected labor relations as depicted in David Bowie’s “Ground Control” (1969) and Elton John’s “Rocket Man” (1972). Critics of capitalist labor conditions did not halt at earthly borders, but rather denounced the vast expenses allocated to space exploration over societal needs. Cathleen Lewis (Washington, DC) demonstrated how the musicians Bulat Okudzhava (USSR/Russia, 1924–1997) and Gil Scott-Heron (USA, 1949–2011) used irony as an effective artistic tool to articulate political concerns and raise critical public awareness in their songs.

While the competitive edge driving the two major space powers receded in the 1980s, cosmic visions, as represented in sound culture, changed into different directions. Pawel Frelik (Lublin) familiarized the audience with three contemporary musical subgenres and their sonic universe: Space Ambient, Dark Ambient, and Space Black Metal.

Initiatives to sonify space were not limited to the spheres of art but extended into scientific research. Alexandra Supper (Maastricht) clarified how sonification of planets in astrophysics disclosed the thin line between art and science as well as deception and authenticity. The power of audible data to increase belief in science bolstered Search for Extraterrestrial Intelligence (SETI) practitioners to discover extraterrestrial communication. But, Klara Anna Capova (Durham) showed, their claims met persistent silence from space.

So we cannot hear aliens—but what if they hear us? Provoking such questions, Stefan Helmreich (Cambridge, Massachusetts) dug further into the field of communication by proposing another category: sounds as alien ears might apprehend them. Based on the “Scrambles of the Earth” music project, an alleged alien remix of the phonograph records that was launched on Voyager spacecraft in 1977, Helmreich’s talk qualified the meaning of sound and models of audition.

Uncertainties about meanings that are attached to sounds of space reconnected with the initial paradox of the workshop’s theme. The absence of genuine sonic material has not stopped humans from imagining sounds that are inspired by the universe. On the contrary, the scarcity of sonic experiences fueled fantasy and spurred the multiplicity of sounds that are associated with outer space. Perhaps the emergence of a common sonic language of space, which is required to communicate on all sensorial levels about the witnessed changes, was a cultural response to the absence of a factual repertoire. In postwar culture, new

Workshop Report: The Sonic Dimension of Outer Space, 1940–1980 (continued)

technologies promised to have a decisive impact on future society, evoking curiosity and giving room to imagine their unknown potential. The exploration of outer space went hand-in-hand with a boost in electronic music and science fiction cinema. These media could create and alter space and time, presenting knowledge and ideas of the universe and allowing an escape into other worlds. New, unconventional musical elements, which are rooted in atonal music, developed into the central ingredients of sonic space fiction.

The workshop demonstrated the significance of sound and music in the exploration and perception of outer space during the postwar period. Participants agreed that the historical evolution of sounds of space; their roots in social, economic, and political change; and their place within the history of music would be worthwhile topics for future ventures. Another would be the complex interplay between visual and sonic representations of space. “Sounds of Space,” an event both highly successful and innovative, finished with a question mark, echoing the last sounds of Eliad Wagner’s synthesizer performance on the first day: rhythm was not discernible until the very end, when a short sequence of beats faded into an accelerating sound seemingly rising into the air—like the inflection of a voice at the end of a statement expressing an impetus for further insight.

Visit <http://www.geschkult.fu-berlin.de/astrofuturism> for additional details about the “Sounds of Space” conference panels and presentations.

Recent Publications and Online Resources

NASA Publications

The Headquarters Historical Reference Collection has five newly digitized Neil Armstrong transcripts available online at <http://history.nasa.gov/oralhistory/ohcatalog.htm>.

The NASA History Program Office iTunes U site contains free multimedia downloads of important moments, activities, and figures in NASA history. New items include Russian Lunar Exploration program and Landsat program materials. Search for “NASA History Program Office” in iTunes or use the following link: <http://go.nasa.gov/ROuL7D>.

Commercially Published Works

Compiled by Chris Gamble

On Orbit and Beyond—Psychological Perspectives on Human Spaceflight, edited by Douglas A. Vakoch (Springer, December 2012). As we stand poised on the verge of a new era of spaceflight, we must rethink every element, including the human dimension. This book explores some of the contributions of psychology to yesterday’s great space race, today’s orbiter and International Space Station missions, and tomorrow’s journeys beyond Earth’s orbit. As astronauts travel to asteroids or establish a permanent colony on the Moon, with the eventual goal of

reaching Mars, the duration of expeditions will increase markedly, as will the psychosocial stresses. The book provides an analysis of these and other challenges facing future space explorers, while also presenting new empirical research on topics ranging from simulation studies of commercial spaceflights to the psychological benefits of viewing Earth from space. **Note:** This is an expanded and updated version of *Psychology of Space Exploration: Contemporary Research in Historical Perspective* (NASA SP-2011-4411), edited by Douglas A. Vakoch.

Exploring the Solar System: The History and Science of Planetary Exploration, edited by Roger D. Launius (Palgrave Macmillan, January 2013). From the beginning of the Space Age, the United States, followed soon by other nations, began an impressive effort to learn about the planets of the solar system. The data collected and analyzed by scientists have revolutionized humanity's understanding of our celestial neighbors. These efforts also captured the imagination of people from all backgrounds like nothing else except the Apollo lunar missions. Through a succession of analytical essays on major aspects of the history of robotic planetary exploration, this book opens new vistas in the understanding of the development of planetary science in the Space Age. **Note:** This book was supported by a NASA Science Mission Directorate grant managed through the NASA History Program.

Pulling G: Human Responses to High and Low Gravity, by Erik Seedhouse (Springer-Praxis, September 2012). This book gives a unique insight into how G-forces affect people working in the high- and low-G environments. It examines the risks of high and low acceleration and explains the physiology of surviving in these environments. The history of G-related research is described, together with current and future development of methods to cope with the effects of increased and reduced G.

Chinese Space Policy: A Study in Domestic and International Politics, by Roger Handberg and Li Zhen (Routledge, September 2012). This volume explains the beginnings and expansion of China's space program, analyzing how China is now able to hold such ambitions and how the interaction between technology, politics, and economics has influenced the Chinese space program.

The Visioneers: How a Group of Elite Scientists Pursued Space Colonies, Nanotechnologies, and a Limitless Future, by W. Patrick McCray (Princeton University Press, November 2012). *The Visioneers* reveals how innovative scientists like Gerard O'Neill and Eric Drexler imagined a utopian future built by their technologies. Ideas such as space colonies and nanotechnologies grew wildly popular in popular culture, however, and the scientists struggled to continue their exploratory work as it became labeled as "fringe" and "pseudoscientific." These "visioneers" appeared ahead of their time in appealing to the public imagination and government advisory groups to gain support for their research.

Handbook of Satellite Applications, edited by Joseph N. Pelton, Scott Madry, and Sergio Camacho-Lara (Springer, November 2012). Experts from around the world collaborated to produce this comprehensive, authoritative, and clearly illustrated reference guide to the fast growing, multibillion-dollar field of satellite applications and space communications. This handbook, done under the auspices of the International Space University based in France, not only addresses system technologies but also examines market dynamics, technical standards, and regulatory constraints.

Recent Publications and Online Resources (continued)

Geostationary and Polar-Orbiting Weather Satellites: Background and Assessments, edited by Judd Kamisch and Simon F. Jenkins (Nova Science Publishers, Inc., December 2012). This book provides an overview of the Joint Polar Satellite System and the Geostationary Operational Environmental Satellite-R programs, which are meant to replace current operational satellites. Both are considered critical to the United States' ability to maintain the continuity of data required for weather forecasting.

Reusable Booster System: Review and Assessment, by Committee for the Reusable Booster System: Review and Assessment, Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences and National Research Council (National Academies Press, December 2012). On 15 June 2011, the Air Force Space Command established a new vision, mission, and set of goals to ensure continued U.S. dominance in space and cyberspace mission areas. Subsequently, and in coordination with the Air Force Research Laboratory, the Space and Missile Systems Center, and the 14th and 24th Air Forces, the Air Force Space Command identified four long-term science and technology (S&T) challenges critical to meeting these goals. One of these challenges is to provide full-spectrum launch capability at dramatically lower cost, and a reusable booster system (RBS) has been proposed as an approach to meet this challenge. The Air Force Space Command asked the Aeronautics and Space Engineering Board of the National Research Council to conduct an independent review and assessment of the RBS concept prior to considering a continuation of RBS-related activities within the Air Force Research Laboratory portfolio and before initiating a more extensive RBS development program.

The Clementine Atlas of the Moon, by Ben Bussey and Paul D. Spudis (Cambridge University Press, revised, updated edition, December 2012). The highly successful Clementine mission gave scientists their first global look at the Moon. Based on information gathered from this mission combined with data from recent missions, this unique atlas contains 144 maps covering the entire lunar surface, along with color plates showing the Moon's composition and physical properties. This edition has been fully revised and extended to cover the armada of new missions that have launched since 2004. With one of the most complete and up-to-date lunar nomenclature databases, this is an indispensable reference for planetary and space scientists, amateur astronomers, and lunar enthusiasts.

Mars Science Laboratory, edited by John Grotzinger, Ashwin Vasavada, and Christopher Russell (Springer, December 2012). The Mars Science Laboratory is the latest and most advanced NASA mission to explore the surface of Mars. The Curiosity rover landed in Gale Crater in October 2012 and continues to explore this region, assessing conditions on the surface that might be hospitable to life and paving the way for later and even more sophisticated exploration of the surface. This book describes the mission, its exploration and scientific objectives, and studies leading to the design of the mission and the instruments that accomplish the objectives of the mission.

Spacewalker: My Journey in Space and Faith as NASA's Record-Setting Frequent Flyer, by Jerry L. Ross and John Norberg (Purdue University Press, January 2013). Jerry Ross's autobiography tells the story of how he came to journey into space and became the most-launched astronaut in history, as well as a NASA veteran whose career spanned the entire U.S. Space Shuttle program. From his childhood

in rural Indiana through his education at Purdue University and a career in the U.S. Air Force, Ross charted a path to NASA after overcoming many setbacks—from failing to qualify for Air Force pilot training because of “bad” eyesight to an initial failure to be selected into the astronaut program.

Mankind Beyond Earth: The History, Science, and Future of Human Space Exploration, by Claude A. Piantadosi (Columbia University Press, January 2013). Seeking to reenergize Americans’ passion for the space program, reemphasize the value of the Moon, and revitalize the importance of people in the final frontier, Claude A. Piantadosi presents a rich history of American space exploration and its extraordinary achievements, emphasizing the importance of continuing human and robotic space missions to American and human interests, and anticipating the many adventures that still await us in the unfolding universe. Remaining cognizant of space exploration’s practical and financial obstacles, Piantadosi nevertheless challenges us to revitalize our leadership in space and reap its vast scientific bounty.

Making Starships and Stargates: The Science of Interstellar Transport and Absurdly Benign Wormholes, by James F. Woodward (Springer-Praxis, January 2013). The book is divided into three parts. The first discusses the theories of relativity needed to understand the possible propulsion techniques. The second addresses experimental investigations into the feasibility of the predicted effects; that is, do the effects exist, and can they be applied to propulsion? The third part of the book—and the most speculative—examines the questions: What physics is needed if we are to make wormholes and warp drives? Is such physics plausible? And how might we go about actually building such devices?

Mapping Archaeological Landscapes from Space, by Douglas Comer and Michael J. Harrower (Springer, January 2013). This book offers a concise overview of air- and spaceborne imagery and related geospatial technologies tailored to the needs of archaeologists. Targeted to the needs of researchers and heritage managers as well as graduate and advanced undergraduate students, this volume conveys a basic technological sense of what is currently possible and, hopefully, will inspire new pioneering applications.

Lunar Module LM 10 thru LM 14 Vehicle Familiarization Manual, by Grumman and NASA (Periscope Film LLC, January 2013). Originally created for NASA in 1969 by prime contractor Grumman, this Lunar Module Vehicle Familiarization Manual was mandatory reading for Apollo astronauts, contractors, and NASA support staff. This version of the manual describes the so-called Extended Lunar Modules (ELM) designed for the “J” class missions: Apollo 15–17 and the never-flown Apollo 18 and 19. The ELM came about as part of NASA’s efforts to enhance the scientific study of the Moon and its geology. To do that, longer surface stays would be needed. To make it possible, LM 10 to LM 14 received various modifications intended to increase their payloads and allow them to return larger samples to Earth.

Johnson Space Center: The First 50 Years (Images of Aviation series), by Laura Bruns and Mike Litchfield (Arcadia Publishing, February 2013). NASA’s Johnson Space Center in Houston, Texas, has been the home of human spaceflight operations since its inception in 1961. Its iconic Mission Control Center (MCC) controlled the first U.S. human spaceflight in 1965. From the MCC, engineers also helped place humans on another celestial body for the first time, operated

Recent Publications and Online Resources (continued)

135 Space Shuttle missions, and expanded human spaceflight to an international endeavor. Housed on more than 1,600 acres south of downtown Houston, the Center is the curator for the precious samples returned from the Moon, was the base for training of astronauts, and is the developer of innovative engineering to support future exploration deep into the solar system and world-class technical research on Earth.

Technological Innovation and Prize Incentives: The Google Lunar X Prize and Other Aerospace Competitions, by Luciano Kay (Edward Elgar Publishing, February 2013). In this in-depth study, the author focuses on three recent cases of prize competitions in the aerospace industry: the Google Lunar X Prize, the Ansari X Prize, and the Northrop Grumman Lunar Lander Challenge. Using a combination of real-time and historical analysis based on interviews, workplace visits, and questionnaire and document data analysis, the author examines the particular dynamics of the prize phenomenon and offers a comprehensive discussion of the potential of prizes to induce innovation.

Red Rover: Inside the Story of Robotic Space Exploration, from Genesis to the Curiosity Rover, by Roger Wiens (Basic Books, March 2013). In this book, geochemist and planetary scientist Roger Wiens, who built the ChemCam instrument on the Curiosity rover—the main tool for measuring Mars’s past habitability—tells the unlikely story of how this sophisticated robotic rover came to be. Facing tight deadlines, slim budgets, and the ever-present threat of shutdown, Wiens’s team managed to overcome seemingly intractable engineering and political problems to get their robot successfully off the ground.

Eisenhower’s Sputnik Moment—The Race for Space and World Prestige, by Yanek Mieczkowski (Cornell University Press, March 2013). In this book, the author examines the early history of America’s space program, reassessing Dwight D. Eisenhower’s leadership. He details how Eisenhower approved breakthrough satellites, supported a new civilian space agency, signed a landmark science education law, and fostered improved relations with scientists. These feats made Eisenhower’s post-Sputnik years not the flop that critics alleged, but a time of remarkable progress, even as he endured the setbacks of recession, medical illness, and a humiliating first U.S. attempt to launch a satellite.

The History Program Office gives sincere thanks to volunteer Chris Gamble, who compiles this section for us every quarter. Please note that the descriptions have been derived by Chris from promotional material and do not represent an endorsement by NASA.

Upcoming Meetings

The 222nd meeting for the American Astronomical Society will be held **2–6 June 2013** in Indianapolis, Indiana. Visit <http://aas.org/meetings> for details.

The annual conference for the Special Libraries Association will be held **9–11 June 2013** in San Diego, California. Visit <http://www.sla.org/attend/sla-annual-conference/> for details.

The annual conference for the American Libraries Association will be held **27 June–2 July 2013** in Chicago, Illinois. Visit <http://ala13.ala.org> for details.

The 76th annual meeting for the Society of American Archivists will be held **11–17 August 2013** in New Orleans, Louisiana. Visit <http://www2.archivists.org/conference> for details.

The 64th International Astronautical Congress will be held **23–27 September 2013** in Beijing, China. Visit <http://www.iac2013.org/> for details.

The Society for Social Studies of Science will hold its annual meeting **9–12 October 2013** in San Diego, California. Visit <http://www.4sonline.org/meeting> for details.

The annual meeting of the Oral History Association will be held **9–13 October 2013** in Oklahoma City, Oklahoma. Visit <http://www.oralhistory.org/annual-meeting/> for details.

The Society for the History of Technology will hold its annual meeting **10–13 October 2013** in Portland, Maine. Visit http://www.historyoftechnology.org/annual_meeting.html for details.

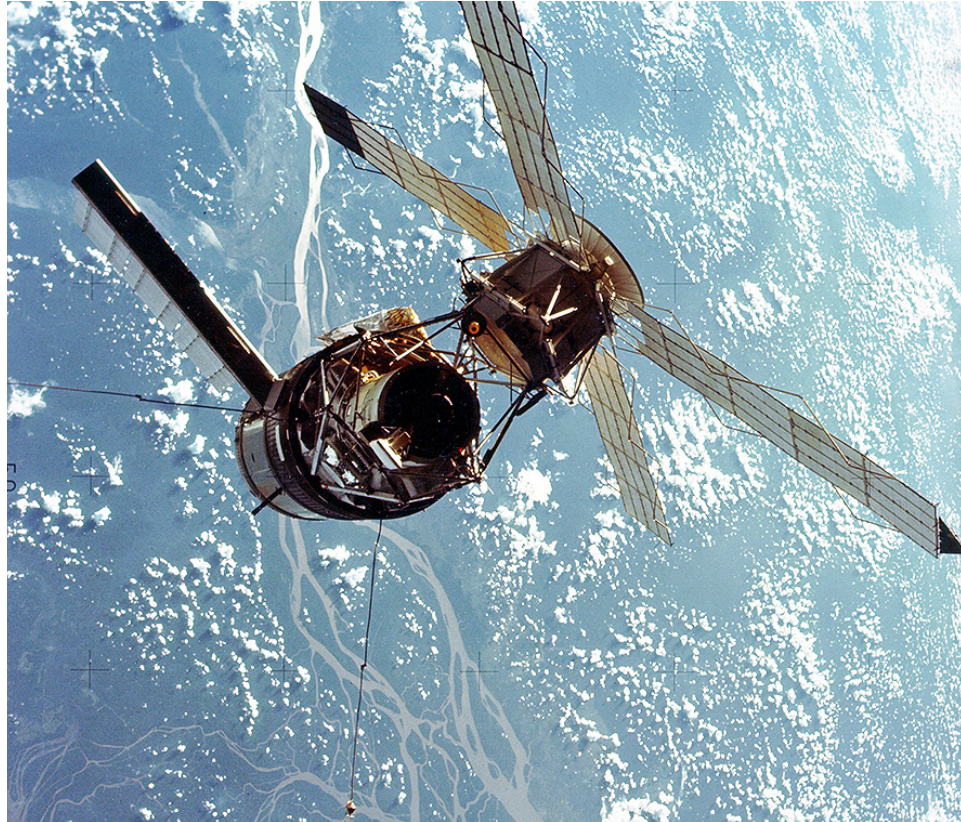
The History of Science Society will hold its annual meeting **21–24 November 2013** in Boston, Massachusetts. Visit <http://www.hssonline.org/Meeting/> for details.

The 46th fall meeting of the American Geophysical Union will be held **9–13 December 2013** in San Francisco, California. Visit <http://fallmeeting.agu.org/2013/> for details.

The annual meeting of the American Historical Association will be held **2–5 January 2014** in Washington, DC. Visit <http://www.historians.org/annual/next.htm> for details.

The 223rd meeting for the American Astronomical Society will be held **5–9 January 2014** in National Harbor, Maryland. Visit <http://aas.org/meetings> for details.

Image in Aerospace History



On 14 May 1973, the Skylab space station launched into orbit on board the last Saturn V rocket. The Skylab 1 crew—Pete Conrad, Paul Weitz, and Joe Kerwin—arrived on 25 May 1973. Skylab demonstrated the ability to conduct longer human missions and resupply them in space while also conducting solar astronomy and other experiments. The space station was home to three different crews, who occupied it for a total of 171 days.

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