



Glenn Takes Charge in ISS Battery Replacement

While batteries are necessary for electronics here on Earth, long-lasting, dependable batteries are essential to the operation of the International Space Station. The space station orbits the Earth every 90 minutes, and for about 35 of those minutes while in the Earth's shadow (eclipse), battery power must take over for the solar arrays.

To ensure the space station runs efficiently and effectively through 2028, NASA is developing a lithium-ion battery-based system to replace

nickel-hydrogen batteries currently on the station. NASA Glenn is co-leading the Lithium-Ion Battery Project with Johnson Space Flight Center.

"Lithium-ion batteries weigh less, are smaller and offer higher power. Additionally, one lithium-ion battery can replace two nickel-hydrogen batteries," explained Penni Dalton, a member of Glenn's ISS and Human Health Office who serves as Battery Subsystem



manager for the space station. "They are also designed for longer operation than

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C-2013-4865

Photo by Bridget Caswell

Center Earns CMMI Level 2 Flight Software Certification

NASA Glenn's Flight Software Branch recently achieved accreditation on the quality and consistency of its software development processes. In August, branch members participated in a week-long appraisal by the Software Engineering Institute of Carnegie Mellon University to earn Capability Maturity Model Integration (CMMI) organization certification at Maturity Level 2.

As a result of this achievement, customers can expect an organized, repeatable and proven approach to software development, as well as improved product and process quality as a result of this achievement.

"The successful achievement of CMMI Maturity Level 2 verifies that our organization follows best practices for software

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Left: Flight Software Branch members Phil Gonia, standing, and Joe Ponyik review data on the Spacecraft Fire Safety Demonstration project, which was part of the appraisal.

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Silver Snoopy Awards

Astronaut Doug Wheelock recently visited Lewis Field to honor 12 Glenn employees with the prestigious Silver Snoopy Award for their commitment to flight safety and mission success. See page 3 for details.



Gas Cylinder Return Project Results in Substantial Savings

Collaborative Effort Creates Safer Environment

Empty gas cylinders lying dormant can be costly. So NASA Glenn's Logistics and Technical Information Division (LTID) developed a plan to return leased cylinders to local vendors. The plan was not only instrumental in reducing rental costs of approximately \$270,000 annually but also in creating a safer work environment, since many of the cylinders were rusted and in poor condition.

Under the Gas Cylinder Reclamation Project, an LTID Logistics team focused on cylinders registered in Glenn's returnable container system. Over a 4½-month period, team members searched buildings, laboratories and shops for registered vendor-owned cylinders, with emphasis on larger vendors that charge higher rental costs. Rental rates range from 20 cents to \$1 daily for each cylinder, depending on the type of gas they contained and the size of the cylinder.

"This project was an exciting challenge for our Logistics team," explained Jeanine Hanzel, LTID/TIALS Logistics manager. "Through our hard work we were immediately able to see results that positively impacted the entire NASA Glenn community."

Hanzel said within the first 4 months more than 650 cylinders had been processed and returned, despite obstacles such as locked shops and cages and the fact that most gas cylinders have a 5-inch circumference and weigh 150 pounds. The plan included search and removal at both Lewis Field and Plum Brook Station.

Gary Crawford, ACOTR for the TIALS Logistics Contract, said the project could not have been successful without the collaborative effort of the directorates that rent gas cylinders. Additionally, staff members in finance, procurement, legal, logistics, safety and health were vital to the project's success.

—By Doreen B. Zudell



Thanks to this collaborative effort, LTID was able to return gas cylinders of various sizes and types to vendors, eliminating additional rental costs.

Flight Certification

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development," explained Lindsey Wilford, the Software Engineering Process Group (SEPG) lead at Glenn. "This ensures that the projects we support receive an increased level of quality in all of our products and processes."

Some of the projects included in the CMMI appraisal were Compatibility Test Sets, Cryogenic Propellant Storage and Transfer and Spacecraft Fire Safety Demonstration Project.

This certification meets an important agency requirement for software engineering, allowing Glenn to develop space-rated software systems



(nonhuman) and software for large-scale aeronautics vehicles, among other classes of software.

Space Station Battery Replacement

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the nickel-hydrogen batteries. Lithium-ion batteries offer a lifetime requirement of over 10 years as opposed to a 6-1/2 year requirement for nickel-hydrogen."

Dalton oversees overall battery development and testing including an engineering model of actual-size battery cells operating continuously at Johnson Space Flight Center in Houston, and the charge and discharge battery activities at the Naval Weapon Support Center in Indiana. Additionally, NASA Glenn technicians are conducting charge and discharge drills on 1/3-scale cells in building 301. The testing that is underway at Johnson, Glenn and the Naval Surface Warfare Center gives the project insight into any issues that arise on-orbit with the change. This allows the project team to make changes prior to building the first flight batteries.

One of the challenges Dalton and the team must overcome is developing batteries that will fit into an electric power system originally designed for nickel-hydrogen cells. "Getting the new batteries to operate in these battery slots without changing any existing on-orbit hardware is very challenging, but we're confident we will meet that goal," Dalton said.

The Critical Design Review for the Lithium-Ion Battery System occurred last month, well in advance of the first scheduled launch on the Japanese HTV (H-II Transfer Vehicle) launch in 2017.

—By Doreen B. Zudell

Ribbon Cutting Ceremony Highlights "Hub of Operations"

NASA Glenn employees and guests gathered for a ribbon cutting ceremony and open house for the new Shipping and Receiving Facility, or SaRF, at Lewis Field, Oct. 30. The 12,700 square-foot building enhances secure handling and expedient distributing of materials and equipment throughout Lewis Field, as well as the inspecting and sorting of incoming mail.

The event included accolades from Glenn's former and current senior leaders involved in the evolution of the SaRF, as well as employees who work in the new facility.

In her opening remarks, Center Operations Director Robyn Gordon said this is the first time Logistics will have its own space, designed for their specific needs, that offers improved efficiency, safety and security.

Transportation Manager Dr. Antoine Moss and Logistics Representative Christopher Mowcomber shared their excitement about working in this state-of-the-art facility that will serve as the "Hub of Operations" for the center.

Mowcomber, who is responsible for processing incoming freight into the new building, outlined several examples of features that ensure the safety and security of employees. Some of those include a video intercom system to announce the arrival of visitors; automatic dock levelers that eliminate the risk of injury associated with previous manual dock levelers; bar restraints to keep vehicles stationary when loading and unloading; and an explosion-proof inspection room.

Additionally, the building earned Leadership in Energy and Environmental Design (LEED) Gold Certification for New Construction from the U.S. Green Building Council.

SaRF became fully operational last month. —By Doreen B. Zudell



C-2013-4745

Above: left to right, SaRF Project Manager, Facilities Test Division/FANS, Jeff Schultz; Center Director Jim Free; Director, Center Operations Robyn Gordon; and Director, Facilities and Test Directorate Dr. Rickey Shyne join in the ribbon cutting. Below: Schultz, Free, Gordon, Brook Park Mayor Mark Elliott, Former Center Director Dr. Woodrow Whitlow Jr., former Associate Director Vernon "Bill" Wessel and Dr. Shyne were key advocates for the SaRF project.



C-2013-4747

Photos by Marvin Smith

Glenn Employees Earn Coveted Silver Snoopy Award

Astronauts' Highest Honor

On Oct. 31, astronaut Doug Wheelock surprised 12 Glenn employees by visiting their worksites to thank them for their commitment to flight safety and mission success. Following the visits, Wheelock presented Silver Snoopy Awards, the astronaut's recognition of excellence, at an awards reception.

Surprisingly, the actions of two award recipients, Robert Bruckner and Richard Manco, impacted a critical situation on the International Space Station during Wheelock's command of Expedition 25. All the honorees

received the coveted Silver Snoopy pin, a certificate, and astronauts' letter of appreciation. They include:

Eric H. Baker, Structures and Materials Division, for outstanding structural analysis and superior technical capability in developing critical technologies to ensure the safety and reliability of spaceflight hardware for future space transportation systems.

Robert Bruckner, Structures and Materials Division, for identifying the root cause of the ISS thermal control pump failure

during Expedition 25, which enabled specific operational modifications required to ensure future reliability, safety and performance of the critical ISS thermal control systems.

Dale Dragony, Mechanical and Fluids Systems Division, for outstanding technical support as principal designer for two key Multi-Purpose Crew Vehicle engineering studies: use of the European Space Agency's service module and the propulsion affordability study.

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News and Events

Notable Leaders Tell "The Centaur Story"

In recognition of the 50th Anniversary of the first successful launch of the Centaur upper stage rocket, two notable NASA Lewis/Glenn leaders from our center's past, Former Center Director Larry Ross and Joe Nieberding, presented a seminar titled "The Centaur Story" on Oct. 25 at Lewis Field. Centaur served as the workhorse for many of our nation's most ambitious space endeavors, including the legendary Pioneer, Viking and Voyager interplanetary missions. Pictured is Nieberding, standing, and Ross, seated by podium.



C-2013-4640

Photo by Bridget Caswell



C-2013-4659

Photo by Michelle Murphy

Aspiring Astronauts Take Early Training

On Nov. 2, NASA Glenn hosted nearly 350 students (grades 1 through 12) at the 21st annual Young Astronaut Day held in the Lewis Field hangar. Teams of students competed in a variety of engineering and science activities involving Lego robotics, wind tunnel tests, laser communications and more. Astronaut Stephanie D. Wilson, currently serving as chief of Glenn's Program/Project Integration Office, gave the keynote address and interacted with the students. Glenn's Exploration Systems Project Office, the AIAA Northern Ohio Section and the three partnering companies of Glenn's TFOME contract, sponsored this year's event. More than 70 volunteers from across the center participated. Pictured, left, astronaut Wilson advises students on development of their Lego robot for the Asteroid Capture challenge.

Overcoming Life's Challenges

During Glenn's Disability Awareness Month Observance, Oct. 30, Kelly Gilkey, Structural Systems Dynamics Branch, shared her personal story of growing up hearing impaired and overcoming challenges to become a successful biomedical engineer. Gilkey, who has a congenital, bilateral profound hearing loss, wears a cochlear implant and hearing aid. Dr. Rachel Vovos, of the Cleveland Clinic, right, explained auditory-based therapy and how Gilkey, left, has benefitted from the implant. Patricia Kons, SGT/Procurement Division, who teaches a special needs class at O'Connor Dance Studio, brought some of her students to perform dance selections.



Photo by Richard Woodard



Photo by S. Janise Veris

Little Feet Trick or Treat

Lewis Littles Folks teachers and more than 100 students at the onsite development center did not let the bad weather rain on their annual Halloween Parade, Oct. 31. Parents and friends brought the treats inside and filled the bags of various young costumed characters as they paraded around the center lobby.



Emergency and Inclement Weather Lines

Lewis Field: 216-433-9328 (WEAT)

Plum Brook Station: 419-621-3333



Photo by S. Jenise Veris

Remembering Our Veterans

Center management and employees supported a simple, but significant, wreath-laying ceremony coordinated by Glenn's Veterans Awareness Committee (VAC) at the Lewis Field flagpole, Nov. 7. Tom Hartline, director of Engineering, urged the crowd to thank veterans for their service and remember those who died in the line of duty. He also encouraged participants to thank those who continue to serve our country, as well as their families. Glenn Deputy Director Greg Robinson and VAC's Jonathan Drexler placed the wreath. Pictured, left to right: Hartline, Deputy Director Robinson and Associate Director Janet Watkins at the ceremony. Mark Hyatt, bearing the U.S. Marine Corps flag, is pictured in the background.

NASA Academies Expose "Future Leaders" to R&T

How do you ensure future leaders are equipped to carry on the NASA mission? You provide opportunities that offer young people hands-on experiences while working with NASA mentors on cutting-edge NASA research and technology.



Photos courtesy of NASA

Last summer, NASA Glenn hosted 18 Research Associates (RAs) identified as "likely future leaders" in the nation's space and aeronautics industry, national laboratories and agencies. These talented and highly motivated undergraduate and graduate students participated in NASA Space and Aeronautics Academies, rigorous, 10-week programs designed to immerse students in advanced science and engineering research projects, while exposing them to center operations and real-life issues that affect management decisions on current and future aerospace programs.

"Among other factors, RAs are chosen based on demonstrated interest and/or prior involvement in space or aeronautics research or projects; excellence in academic performance;

demonstrated leadership, and propensity for teamwork," Glenn's Academies Director Dr. Mark "David" Kankam explained.

Unlike most 9 to 5 summer research internships, the Academies' curriculum is fully engaging, including weekends. RAs live at one location to encourage bonding and facilitate teamwork on a selected combined Academies group project and individual team research projects proposed by Glenn mentors.

An alumnus of the NASA Academy Alumni Association serves as staff and aids in the curriculum design that includes evening lectures at the residence, and daytime onsite visits to NASA industry partners and collaborators to tour facilities and



Above: Members of the Space Academy following a field test for their "Venus Exploration" project aided by Glenn's MARS Aquatic Descent Instrument. Left: Dr. Kankam, far left, with the Aeronautics Academy RAs on a site visit to GE Aviation.

engage in technical exchange. Space X, Rolls Royce and GE Aviation were among this year's group of site visits. Similarly to other NASA Higher Education programs, the Academies conclude with final poster presentations where RAs report outcomes of their research projects to the Center community, and a graduation ceremony.

Examples of Glenn's 2013 NASA Academy complex projects include "All Electric Regional Transport Aircraft with Advanced Electric Motors, Power Management and Distribution, and Energy Storage" and "Real-time, Multi-modality, Multiple Cognitive State Monitoring to Improve Aviation Safety." NASA's Aeronautics Research Mission Directorate (ARMD) and the Center's

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Awards, Honors & Promotions

NASA Glenn's Kim de Groh, Space Environment & Experiments Branch, received the National Aeronautic Association's (NAA) prestigious Katharine Wright Trophy, Nov. 12, at the NAA Fall Awards Banquet. She was honored for her tireless efforts in mentoring young women for over two decades and for numerous technical achievements in the advancement of materials durability in the space environment.

The trophy, named in honor of Orville and Wilbur Wright's sister, Katharine, reflects how crucial her support was to her brothers' development of the first airplane, while highlighting a recipient's contributions to the success of others or a personal contribution to the advancement of aviation and space flight over an extended period of time.

de Groh, far right, accepts the trophy from NAA Board Member Pat Prentiss.



Dr. Barrett



Button

Dr. Michael J. Barrett has been selected deputy chief of the Space Technology Project Office, Space Flight Systems Directorate. He is responsible for projects performed in the Game Changing Development Program, Technology Demonstration Mission Program and Small Satellite Technology Program areas. Barrett previously supported the Asteroid Redirect Robotic Mission as the Solar Electric Propulsion Module manager assigned to the Chief Engineer's Office.

Robert Button, Energy Systems Branch, received the NASA Engineering and Safety Center (NESC) Leadership Award during the NESC Honor Awards Ceremony in October. Button is recognized for his outstanding technical leadership of the Extravehicular Mobility Unit Lithium Ion Battery Assessment. The NESC Leadership Award honors individuals who have had a pronounced effect upon the technical activities of a team of experts from NASA, industry, other government agencies and academia, leveraging their expertise to solve problems.



Dr. Reddy



Udom

The American Society of Mechanical Engineers (ASME) elected Dr. Dhanireddy "D.R." Reddy, chief, Glenn's Aeropropulsion Division, to the rank of Fellow. Reddy is lauded for his vision, motivation and outstanding reputation in research and technology for more than 25 years of leadership, as well as his personal contributions as a researcher to advancements in aerospace propulsion technology and computational fluid dynamics relative to aerospace propulsion systems.

Innocent Udom, University of South Florida graduate student in the NASA Harriett G. Jenkins Pre-Doctoral Fellowship Program (JFPF), won the student poster competition at the 64th International Astronomical Congress, Beijing, China, in September. His poster titled, "Photocatalytic Application of Zinc Oxide Nanowires for Green Space Exploration," was based on study while working as a JFPF fellow in NASA Glenn's Bioscience and Technology Branch. Udom's mentor was Dr. Al Hepp.



DeGreen



Laverne

John DeGreen has been selected as the civil systems manager in the Facilities Division. DeGreen is a registered professional engineer and LEED AP (Leadership in Energy and Environmental Design Accredited Professional), who has served as the civil engineer on many design and construction projects at Lewis Field and Plum Brook Station.

Carol Laverne has been selected as the Information Protection Program manager in the Risk Management and Security Office, Office of the Chief Information Officer. Laverne joins the organization from the Planning and Integration Office, Facilities and Test Division, where she previously served as the Maximo Systems Administrator and IT Relationship manager.

Retirements

James Fleet, Space Power & Propulsion, Communication and Instrumentation Branch, Facilities and Test Directorate, retired Nov. 30, 2013, with 33 years of federal service, including 30 with NASA.

Gloria Richards, Management Support and Integration Office, Research and Technology Directorate, retired Nov. 29, 2013, with 39 years of NASA service.



Fleet



Richards

NASA Academies

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Aeronautics Research Office vet all proposed Aeronautics Academy research projects prior to posting for prospective applicants.

This year marks the 20th anniversary of the first NASA Academy, a NASA Space Academy, founded by Gerald Soffen, the first Director of the NASA Goddard Office of University Programs. The NASA Aeronautics Academy was implemented for the first time in the summer of 2010, with Glenn as the lead center.

The National Space Grant Consortia and NASA's ARMD and Space Technology Mission Directorates sponsor the NASA Academies, which also include the Propulsion and Robotic Academies. Eligible students interested in the NASA Academies can apply now through NASA's One Stop Shopping Initiative (OSSI). See the Fellowships section for more details.

—By S. Jenise Veris

Exchange Holiday Sale

Now-Dec. 31



Come to the Exchange Store in Building 15 for great NASA and NASA Glenn gifts for family and friends. Save 20% off clothing, toys, calendars, Fisher space pens, glassware, lunch bags, gear bags, backpacks, golf balls and towels, Christmas ornaments, and much more. Save 10% off framed pin sets, freeze-dried ice cream, children's watches, and the new plush, Hello Kitty® Astronaut. Store hours are 9:30 a.m. to 3:00 p.m. VISA, MasterCard, Discover, American Express, Cash and Checks accepted.

More than a Memory



Cubbison



Fuller



Giordano

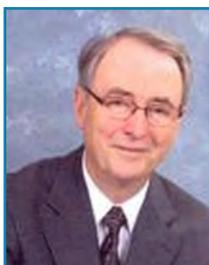
Robert W. Cubbison, 85, who retired with more than 40 years of federal service, died Sept. 23. A veteran of the U.S. Air Force, Cubbison began his NACA/NASA career in 1952 as a summer intern. After graduating Case Institute of Technology, he returned to work in the Inlet Technology Section of the Advanced Systems Division. Cubbison was an expert in fuel ramjet engine research and testing conducted in Glenn's 10- by 10-Foot Supersonic Wind Tunnel.

Harry Fuller III, 63, who retired in 2011 with 24 years of federal service, died Nov 11. Fuller was a Vietnam veteran, who began his NASA career in 1990. He graduated from the Apprentice program in 1995 as an electronic systems mechanic. Fuller worked primarily in the Engine Research Building, where he was the lead electronics technician for the build and delivery of the WC-B Single-Spool Turbine Rig. He retired from the Aviation Environments Technical Branch.

Salvatore M. Giordano Sr., 78, who retired in 1997 with over 30 years of federal service, died Sept. 25. Giordano, who was a veteran of the U.S. Army, served his entire NACA/NASA career as a research mechanic in the Test Installations Division.



Reiber



Wakeman

George A. Reiber, 96, who retired in 1974 with 27 years of federal service, died May 29.

Reiber was a U.S. Army veteran of World War II who began his NACA/NASA career as a member of the 1955 Apprentice class. He was a metalsmith who crafted the exterior metal covering for many of the space program's rockets. Reiber was a member of the Lewis Servicemen's Club, which performed numerous community outreach projects.

Joel E. Wakeman Sr., 75, who retired from NASA, died Sept. 27. Wakeman was a data analyst who worked at several centers during his NASA career. He transferred from Johnson Space Center in 1977 to head NASA Lewis' (Glenn's) Applications Programming Section, Computer Services Division. In 1983, he transferred to NASA Stennis Space Center, where he retired in his native Mississippi.

NASA Impact: "Glennovation" Feature Touts Glenn's Contributions to Society

Want to know more how NASA Glenn benefits you and your community? The Office of Technology Partnerships and Planning has developed a new feature that illustrates 98 technologies, developed or improved by NASA Glenn staff, that have made a significant, positive and clear difference to society. Visit <http://www.nasa.gov/centers/glenn/home/index.html> to learn more!



In Appreciation

I want to express my gratitude to the GRC family for their support during my recent illness and recovery. The cards, hugs, kind words and sometimes unexpected acts of kindness were humbling and reminded me again why GRC is such a special place to work. Thank you so very much.

—Eric Patton

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AeroSpace Frontiers is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the second Friday of each month by the Community and Media Relations Office in the interest of the Glenn workforce, retirees, government officials, business leaders and the general public. Submit short articles and calendar items via e-mail to the editor: doreen.b.zudell@nasa.gov or 216-433-5317.

January 2014 issue copy deadline: Dec. 13, noon

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Read *AeroSpace Frontiers* online at <http://aerospacefrontiers.nasa.gov>

Silver Snoopy Awards

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Timothy Dunlap, Manufacturing Division, for developing a method to hermetically seal sample tubes, eliminating the possibility of compromised science due to diminished fluid levels, that substantially improved the quality, performance and reliability of the In SPACE-3 experiment program.

Alan Linne, Chief Engineer Office, for leadership in developing and implementing the first integrated, multi-project Systems Engineering Management Plan, which has resulted in a more streamlined, effective process for meeting technical requirements for all ISS experiments and human research projects.

Richard Manco, Testing Division, for significant contributions to ensure flight safety and mission success of the ISS through the design, build and operation of a flow visualization test rig that produced data critical to validating the root cause failure mechanism of the ISS thermal control system pump during Expedition 25.

Alexandra Mills, ISS and Human Health Office, for dedication and hard work in establishing office level processes to streamline reporting critical information to management internal/external to the center, resulting in a more productive environment.



C-2013-4815

Photo by Bridget Caswell

Left to right, staggered: Sowers, Dunlap, Baker; Wernet, Bruckner, Linne, Deputy Dir. Robinson, astronaut Wheelock, Associate Dir. Watkins, Manco, Mills, Dragony, Scina, Zernic and Nguyen.

Xuan Nguyen, ISS Research and Human Health Office, for providing mission planning, manifesting and integration activities for Glenn's ISS Physical Sciences Research Investigations deployed to ISS over the past 12 years.

Ruth Scina, Space Operations Project Office, for sustained outstanding project management support to Glenn's Space Communications Office projects and NASA's Space Communications and Navigation program.

Thomas S. Sowers, Communications, Instrumentation and Controls Division, for developing critical liquid rocket engine health-management technologies focused on improving the safety of future manned spacecraft, including the Systematic Sensor Selection Strategy (S⁴) to improve engine diagnostic capabilities and post-flight maintenance,

and complex Monte Carlo-based engine simulation tools to quantify the effectiveness of a failure detection system for the J-2X engine.

Dr. Mark Wernet, Communications, Instrumentation and Controls Division, for his expertise in developing nonintrusive diagnostics for understanding the intricacies of complex fluid flows aiding the expansion of critical research payloads for the Human Spaceflight Program and successful utilization of the ISS.

Michael Zernic, Space Operations Project Office, for sustained public service and project leadership contributing to the development of a number of areas critical to human space flight, including the ISS's power system, communications technology and network services planning and operations.

—By S. Jenise Veris