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Honoring Hoot

Aerospace Appreciation Night focuses on former astronaut

By Jay Levine
X-Press Editor

Former NASA astronaut Robert L. "Hoot" Gibson was born in Cooperstown, N.Y., home of the Major League Baseball Hall of Fame.

Though he has not been inducted into the baseball Hall of Fame or played professional baseball, he has been chosen for a hall of fame and honored at a baseball game. Gibson became a member of the Astronaut Hall of Fame in 2003 and the Lancaster JetHawks Single A Advanced California League celebrated his achievements during the team's annual Aerospace Appreciation Night Aug. 14.

In addition to a barbecue and some fun prior to the game (for Dryden employees who purchased tickets), the JetHawks offered a bobble head figure of Gibson piloting a space shuttle to early arriving fans. To top off the event, the JetHawks also won the baseball game against the Inland Empire 66ers.

Gibson was aboard five space shuttle missions as pilot or commander, was the top student in his "Top Gun" U.S. Navy fighter graduating class, flew commercial airliners and is an air race pilot. In addition, he also holds or has held three spaceflight world records and six aircraft records.

He has accumulated more than 13,000 flight hours in more than 111 types of civil and military aircraft. He also has airline transport pilot, multi-engine and instrument ratings, and became a private pilot when he was 17.

During a presentation at Dryden Aug. 13, he recalled some of his adventures and answered questions about the space shuttles, space travel and key elements of his career.

A picture from space showing Edwards Air Force Base and Dryden was his opening slide. "I always had a warm spot in my heart for Edwards and Dryden," he said. "It has been such a thrill for me to come back here."

Gibson is familiar with Dryden after having completed several of his space shuttle missions with an Edwards landing and assistance from Dryden staff. His first experience at the center was in 1968 when, as a summer student-engineering assistant, he calculating aerodynamic loads on the X-24A from its captive-carry flights and compared flight data from the HL-10 glide flights to wind-tunnel research.

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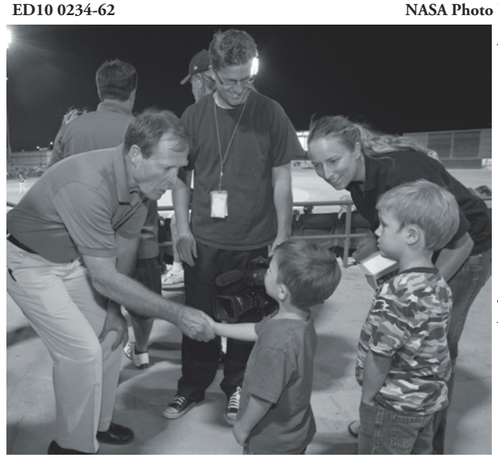
ED10 0234-62 NASA Photo by Tom Tschida



ED10 0234-56 NASA Photo by Tom Tschida

***Above from left**, Robert L. "Hoot" Gibson, Vance Brand, Mark Stuckey, Troy Asher and Davis Hackenberg are recognized at the JetHawks game Aug. 14. **At left**, Gibson shakes hands with Evan Soukup, as Evan's family looks on.*

Chasing the lightning

Researchers expect to peer into storms like never before

By Kim Newton
Marshall Space Flight Center

The connection between lightning and hurricane intensification has eluded researchers for decades, and for a riveting 40 days this summer, NASA lightning researchers will peer inside storms in a way they never have before.

Earth scientists and engineers at Marshall Space Flight Center in Huntsville, Ala., will soon fly the Lightning Instrument Package, or LIP, a flight instrument designed to track and document lightning as hurricanes develop and intensify. In August and September, the LIP will be flown on a remotely piloted Global Hawk airplane over the Gulf of Mexico and Atlantic Ocean at an altitude of 60,000 feet. The LIP will be part of a NASA hurricane study called Genesis and Rapid Intensification Processes, or GRIP for short. The study involves three storm-chaser planes mounted with 15 instruments. The LIP and the other instruments will be used together to create the most complete view of hurricanes to date.

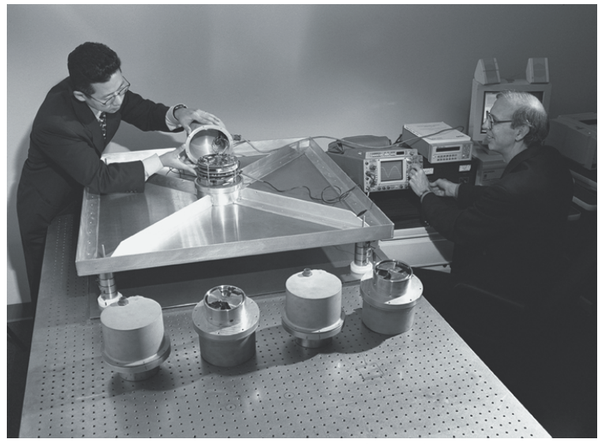
"We're now putting LIP on an aircraft that can stay in the air for 30 hours," said Richard Blakeslee, LIP principal investigator and Earth scientist at Marshall. "That's unprecedented. We typically fly on airplanes that fly over a storm for a period of 10-15 minutes. But this plane can stay with a storm for hours.

"We'll be able to see a storm in a way we've never seen it before," he added. "We'll see how the storm develops over the long term, and how lightning varies with all the other things going on inside a hurricane. It's the difference between a single photograph and a full-length movie. That's quite a paradigm shift."

While scientists know an increase in lightning means the storm is changing, it remains a mystery as to whether that increase signifies strengthening or weakening. Scientists have quite a few ideas but lack the data to firmly establish a concrete relationship. Researchers hope the LIP's upcoming flights will change that. If scientists can figure out the ties between lightning and hurricane severity, meteorologists may be able to greatly improve short-term forecasts. Researchers have connected lightning to phenomena from strong winds to flooding to tornadoes, and a few extra minutes of warning time can save lives each year.

ED10 0233-23 NASA Photo by Tony Landis

The Global Hawk team flew the aircraft Aug. 15 in preparation for the upcoming Genesis and Rapid Intensification Process, or GRIP, hurricane mission scheduled to begin any day.



NASA Photo courtesy D. Stoffer/Marshall Space Flight Center

Richard Blakeslee, right, and Tony Kim of Marshall Space Flight Center test the electric field mills used to measure lightning produced by thunderstorms.

"We can use lightning as a natural sensing tool to see into the heart of a storm," said Blakeslee. "Lightning allows us to get at rain and other processes going on within a storm."

For Blakeslee and the rest of the LIP team, this fall's hurricane study presents a tremendous opportunity. In its nearly 15-year lifespan, the LIP has been flown on nearly 100 missions in 10 major field campaigns, soaring over more than 800 storms. That's unparalleled for a lightning instrument, according to Blakeslee, and LIP researchers hope it will continue its long tradition of success.

The Guts of the Lightning Instrument Package

The LIP components may look simple but they're surprisingly complex. To measure the electric field in a storm, the instrument relies on electric field mills, devices that allow scientists to measure the amount of lightning a storm produces. Originally developed at NASA, the mills look like big cans – each about a foot long and approximately eight inches across. As the instrument flies through the air, a plate covering each can rotates, covering and uncovering four metal disks housed inside.

Uncover a disk and electricity from the storm rushes in. Cover the disk and it rushes back out. The whole process converts the electrical current from DC to AC and back to DC, allowing scientists to measure the strength of a storm's electric field and how prone to lightning the field might be. A sudden shift in the strength of the electrical field allows scientists to determine that a

See Lightning, page 8

2 students awarded Dryden scholarships

Two students were each awarded a 2010 Joseph A. Walker Memorial Scholarship by the Dryden Exchange Council. This year marks the first time the council has provided a second award.

"It's great we can support two scholarships this year," said Center Director David McBride. "We have two excellent selectees and the more [students] we can help, the better."

John Mullen and Nithya Kubendran each received an $8,000 award, which will be paid out in $2,000 annual increments over not longer than five years. Mullen is the son of NASA Code SH employee Dan Mullen and Kubendran is the daughter of Laguduva ("L.K.") Kubendran, program executive for the NASA Office of the Chief Technologist Flight Opportunities program. The students received their awards from McBride in separate ceremonies.

Mullen is a 2010 graduate of Desert Christian High School in Lancaster, where he held a grade point average of 4.0. He will attend LeTourneau University in Longview, Texas, this fall, majoring in mechanical engineering. A 2009 participant in Dryden's student INSPIRE – Interdisciplinary National Science Project Incorporating Research and Education Experience – program, Mullen was also active in the FIRST robotics program supported by the center.

"Competing with my teammates…since my freshman year in high school was one of the defining experiences of my life," he said of his robotics activities, "deeply influencing my career plans and college aspirations."

Kubendran, a 2010 Quartz Hill High School graduate, was first in her class of 691 with a 5.09 grade point average. She plans to attend the University of Southern California in the fall with a double major in physics and East Asian language and culture, particularly Japanese.

"All of the [academic] subjects were equally interesting and important," she said of her K-12 education, "but as I grew older, I developed an increasing love for

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ED10 0175-43 NASA Photo by Tom Tschida

Center Director David McBride presents a check to Nithia Kubendran. Her parents, Rohini and Laguduva Kubendran, also attended the presentation.

ED10 0175-43 NASA Photo by Tom Tschida

McBride presents a scholarship check to John Mullen, who had his parents, Dan and April, and younger brother James in tow for the presentation.

News at NASA

Transition under way

The President's Task Force on Space Industry Workforce and Economic Development, co-chaired by NASA Administrator Charles F. Bolden Jr. and U.S. Commerce Secretary Gary Locke, released its report to President Barack Obama Aug. 16 detailing recommendations for enhancing economic development strategies along Florida's Space Coast.

The task force was charged with developing a plan for how best to invest $40 million in transition assistance from the federal government in the Space Coast region as the space shuttle program winds down.

After review of the Space Coast's economic assets, employment needs, and development priorities, as well as suggestions submitted through a public website, the task force developed four key recommendations for the president: Sustain regional investments already under way; spur immediate opportunity; invest in smart economic growth initiatives through a new competitive fund; and build lasting infrastructure for success.

The majority of the $40 million investment will be dedicated to a fast-track competitive grant process. Thirty-five million dollars in grants will be awarded to the most promising job-creation and economic development programs, with competition announced Sept. 1. The additional $5 million will fund a new technical center to support commercial space launch and reentry activities. The full task force report may be viewed at http://www.nasa.gov/spacecoasttaskforce.

Students learn through work experiences

NASA Education programs are aimed at inspiring, preparing the next generation

Sixty-seven people involved in nine summer student programs at Dryden are getting the chance to learn what it's like working at a NASA center. Students are listed under the program in which they participated.

• The Achieving Competence in Computing, Engineering and Space Science, or ACCESS, program is designed for undergraduate and graduate students with disabilities who have strong backgrounds in science and a desire to pursue technical careers. Students work with scientists and engineers in an area compatible with their skills and interests. Representing the program at Dryden this summer are Adam Clark and Aaron Marshall.

• The Aerospace Education Research and Operations, or AERO, Institute awards internships to students for work assignments at Dryden that are made based on the needs of the NASA

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ED10 0154-3 NASA Photo by Tom Tschida

ED10 0154-11 NASA Photo by Tom Tschida

***Above**, Aerospace Education Research and Operations Institute students included, from left, Rachel de Leon, Calvin McLain, Shelby Flick and Diego Castellanos. **At left**, cooperative education students at Dryden include, from left, John Bird, Peter Fast, Erin Waggoner, Victor Gandarillas and Alex Chin.*

ED10 0154-9 NASA Photo by Tom Tschida

***Above from left**, Casie Clark, Cristina Donastorg and Alsidneio Bell were 2010 participants in the Minority University Students in Technology, or MUST, program. The scholarship program is aimed at undergraduate students in engineering and technology. **At left**, Adam Clark participated in the Achieving Competence in Computing, Engineering and Space Science, or ACCESS, program.*

A day on the job at NASA

Eight high school students who participated in the INSPIRE summer internship program at Dryden learned first-hand about the start-to-finish process of flight-testing experimental aircraft.

Dryden controls and dynamics engineer Brian Taylor, who served as mentor to INSPIRE interns, said the students modeled, tested and analyzed the aerodynamic and mass properties of a large model aircraft called the Dryden Remotely Operated Integrated Drone – or DROID – while going through the Dryden flight-approval process. The process entailed a series of technical reviews, safety analyses, development of mission rules and flight operations before actual data-collection flights were conducted.

They then completed two days of flight tests in late July totaling nearly two hours of flight time with the DROID aircraft. All planned test points were completed during 13 short flights at the Muroc Model Masters model aircraft flight operations area on the north side of Rosamond Dry Lake. The students analyzed the data transmitted from sensors on the aircraft, comparing the results to their models.

While one group of students flight tested the aircraft to determine takeoff distance, best rate of climb, thrust required for level flight and lift-to-drag ratios, the other group performed inertia swings on the aircraft in order to determine its mass properties.

Dryden operations engineer Leslie Monforton of Tybrin Corp., who flew the aircraft for the students' flight-test project, found the experience rewarding.

"It was a privilege working with these gifted students, both in coaching and flying the DROID for them," she said. "They all will have a great future."

The INSPIRE – Interdisciplinary National Science Project Incorporating Research and Education Experience – program is a multi-tiered, year-round initiative designed for students in grades 9-12 who are interested in science, technology, engineering and mathematics education and careers.

"The INSPIRE summer internship program provides the opportunity for students interested in careers in engineering to get direct project experience prior to entering their senior year of high school or first semester of college," said Kendra Titus, student and faculty programs coordinator in the Dryden education office.

Dryden's INSPIRE students include Bryce Anglin, Jessica Bacchus, Eric Chang, Allaina Honda, Brandon Le, Alex Lopez, Stephanie Sodergren and Elizabeth Toller. The DROID aircraft used in the INSPIRE flight tests is one of four at Dryden used for research and pilot training on remote-controlled aircraft.

ED10 0197-50 NASA Photo by Tom Tschida

Dryden INSPIRE students had a hands-on opportunity to learn about flight research this summer. The 2010 INSPIRE students and their Dryden colleagues were, from left, Eric Chang, mentor Brian Taylor, Elizabeth Toller, DROID pilot Leslie Monforton, Brandon Le, Bryce Anglin, Jessica Bacchus, ACCESS student Aaron Marshall and Allaina Honda.

Honor ... from page 1

During Gibson's first space shuttle mission, former astronaut and Dryden manager Vance Brand was the commander. The mission included the first landing at Kennedy Space Center, Fla. Brand also was at Dryden Aug. 13 to support his former colleague and answer a few questions.

Brand and Gibson have a number of things in common, including their involvement with U.S./Russian rendezvous in space. Brand was a part of the Apollo Soyuz mission in 1975, which was the first time the Russians and Americans met in space. Twenty years later, in June 1995, Gibson was the commander of the Space Shuttle Atlantis STS-71 mission, which marked the first space shuttle docking with the Russian Space Station Mir.

During Gibson's mission a fresh crew replaced the one aboard the Mir. Atlantis was modified to carry a docking system compatible with the Russian Mir Space Station. It also carried a Spacelab module in the payload bay in which the crew performed a number of life sciences experiments and recorded valuable information from those investigations.

Gibson went to Russia twice to train for the mission over about a year and a half. He recalled the uncertainty of what it would be like working with former adversaries. The mission included six Americans and four Russians.

"After all those years of being a Cold Warrior and training as a Navy fighter pilot to shoot down and kill Russian fighter pilots, I was sitting between two Russians fighter pilots, who had been trained to shoot down and kill me, too. Now I [had] to pretend that I like[d] them," he said.

"I found out, as you might expect, when you get to work with people, you find out we're all the same. It was a wonderful experience to work with all of these guys who had very much been adversaries."

Gibson recalled his fondest memory was of the Russian Air Force Museum in Monino, Russia, which is roughly the equivalent of the Smithsonian National Air and Space Museum. The museum featured every Russian military aircraft ever built and was stunning, he recalled.

ED10 232-31 NASA Photo by Tom Tschida

Above, *Vance Brand, left, and Robert L. "Hoot" Gibson recall a space shuttle mission.* ***Below****, Dryden employees enjoy a JetHawks baseball game.*

ED10 0234-54 NASA Photo by Tom Tschida

He said he learned one phrase in Russian that helped ease tensions and show an attempt at learning the language: 'I speak Russian very badly and I understand nothing.' "To this day, I can carry on a very poor conversation in Russian."

The docking mission was complex.

"This was the very first time a space shuttle had docked with anything and I had to fly Atlantis to this end with a module called Kristall. This was a fascinating piloting challenge because what I am doing is flying Atlantis manually, and I have to fly our docking ring up and into contact with the docking ring on Mir.

They told me, 'Okay, Hoot, you can fly sloppy; you just have to line them up within two inches. No pressure now, but 5 billion people will be watching you do that on television,'" he recalled.

Gibson had practiced 100 times in a simulator and it went well, he added.

More than 400 items were moved to the Mir from the shuttle payload bay, which is large enough to carry one and a half buses, on that mission. Gibson's handshake with Mission Commander Vladimir Dezhurov was deemed by then U.S. President Bill Clinton as a key event marking the end of the Cold War.

Shuttle missions are always interesting, but the launch was an especially exciting event, he said.

"It takes 30 seconds to go supersonic, accelerating straight up. It's like a catapult shot from a carrier, but it takes eight and a half minutes. It's an exciting ride. Booster separation looks like a train wreck and we fire the explosive bolts that are holding the boosters to us. Rocket thrusters take [the solid rocket boosters] away from us so we don't re-contact them. You are 30 miles up and 30 miles out over the Atlantic and going 4,000 miles per hour in two minutes. It's better than any Corvette ride."

He also relayed what a shuttle flight re-entry to Earth was like: "It's fire and flame for 15 minutes and then we return as a 100-ton glider," he said.

Also of note, the crew on Gibson's second space shuttle mission included NASA Administrator Charlie Bolden.

Gibson is the recipient of numerous international aviation medals, the Experimental Aircraft Association "Freedom of Flight" Award; the Defense Superior Service Medal; the Distinguished Flying Cross; three Air Medals; the Navy Commendation Medal with Combat "V"; a Navy Unit Commendation; Meritorious Unit Commendation; Armed Forces Expeditionary Medal; Humanitarian Service Medal; and a Vietnam Campaign Medal.

He continues a strong presence in aerospace by racing in his aircraft, "Riff Raff," a modified Hawker Sea Fury, at the annual Reno, Nev., air races. Regardless of Gibson's achievements, he remains active in aeronautics and has fond memories of his work at Dryden and Edwards Air Force Base.

ED10 0154-05 NASA Photo by Tom Tschida

From left, Benjamin Saidman, Jason Disbrow and Robert Peralta comprised the Tybrin Corporation students working at Dryden over the summer.

ED10 0154-04 NASA Photo by Tom Tschida

Representing the Undergraduate Student Research Program, or USRP, are, from left, Shawn Georg, Marcus Zellmer, Julianna Plumb, Brad Voracek, Paul Martinez, Alex Stuber and Willie Costa.

Students ... from page 4

center's branches or requirements of funding sources, such as the Aeronautics Research Mission Directorate at NASA Headquarters. This year's recipients include Diego Castellanos, Shelby Flick, Ryan LaQuay, Rachel de Leon, Calvin McLain and Daniel Wehunt.

• The Cooperative Education program, also known as the Student Career Experience program, integrates college-level academic study with work experience at a NASA center. Students are eligible for permanent employment after successfully completing their education and meeting work requirements.

Students working at Dryden this summer include John Bird, Devin Boyle, Alexander Chin, Peter Fast, Victor Gandarillas, Mark Gottscho, Monique Pierre-Louis, Logan Naber, Ashley Parham, Scott Schultz, Seth Trey, Samson Truong, Erin Waggoner, Thomas Williams and Zachary Wright.

• Alsidneio Bell, Casie Clark and Cristina Donastorg were 2010 recipients of the Minority University Student in Technology, or MUST, program. The scholarship program covers half of a student's tuition up to $10,000 for undergraduate students in engineering and technology in return for work at NASA centers.

ED10 0154-10 NASA Photo by Tom Tschida

Kaitlyn Fiechtner, left, and Helida Haro represented the Science Teacher and Researcher, or STAR, program during its inaugural year at Dryden.

Participants are limited to U.S citizens pursuing an undergraduate degree in science, technology, engineering or mathematics at a college or university in the United States who are members of an underrepresented group such as women, African Americans, Hispanic Americans, Native Americans or persons with disabilities.

• The Science Teacher and Researcher, or STAR, program is new to Dryden this year and gives opportunities to science teachers or researchers to work at Dryden. This year's awardees include Helida Haro and Kaitlyn Fiechter.

• The Student Temporary Employment Program, or STEP, is also referred to as the Stay-in-School program. It offers temporary employment ranging from summer jobs to positions that can last for as long as the student is pursuing his or her education.

Participating in STEP this summer are Heidi Aubry, Christine Bates, Ann Bryan, Mark Canning, Julia Early, Tiara Edwards, Briana Green, Mona Hatch, Shawn Hill II, Isaac Horowitz, Aaron Joffe, Christopher Novy, Zachary Pahle, Mark Perez, Kristin Phillips, Rachael Sousa, Matthew Waldman, Christian Weaver and Sharnell Wilson.

• Contractor Tybrin Corp. works with Dryden's technical branches to fill summer student positions. Participants this year included Jason Disbrow, Christopher Duggan, Deleena Noble, Robert Peralta and Benjamin Saidman.

• NASA sponsors the Undergraduate Student Research Program, or USRP, in which undergraduate students across the United States may apply for a 10-week summer session designed to attract students interested in fields and disciplines aligned with NASA's research and development mission.

The USRP students include Willie Costa, Shawn Georg, Paul Martinez, Julianna Plumb, Alex Stuber, Brad Voracek and Marcus Zellmer.

New management system for NSSC

In 2009, NASA Shared Services Center Executive Director Rick Arbuthnot established a committee led by the NSSC deputy director and comprised of members from NASA and a service provider to research various continuous-improvement approaches and recommend one for use at the NSSC. Prospective programs the team researched included Lean; Lean Six Sigma, or L6S; Business Process Re-engineering; and Six Sigma. The team concluded that L6S would be easily integrated, could be tailored to meet the center's unique needs, was flexible and scalable and was already in limited use at the center. The NSSC senior leadership team approved the implementation plan and governance structure in January 2010.

L6S combines Six Sigma and Lean, taking the best from each methodology for business-process improvements, and supports a strong focus on service.

Formal training is under way. On June 15, the NSSC senior leadership team participated in an all-day session for executives. Functional managers and leads participated in an all-day session during the week of August 10 and all employees will participate in a two-hour overview during October. Two NSSC employees will be trained to serve as L6S experts.

Lightning... from page 2

lightning strike has occurred.

In addition, a conductivity probe reveals how easily electrical current can flow through the storm to the upper part of the atmosphere. The probe is a small nosecone-shaped device with two sensor tubes attached to each side. As the plane flies near a hurricane, small electrical particles called ions rush through the tube, allowing the team to count them.

The LIP team uses all those data to determine how much lightning a hurricane produces and where it originates within the storm. By combining those data with wind speed, rainfall rate and other information, researchers can connect how lightning relates to hurricane intensification. And because Blakeslee and his team get their data real time, they can redirect the plane as needed to improve the likelihood of quality results.

After the summer hurricane study ends in September, the team will analyze, evaluate and eventually release the data, a process that should take several months. Following that, the LIP will continue to be flown in hurricane and storm studies in hopes of collecting more data. The more data, the better the forecasts, Blakeslee said – and the closer scientists come to understanding these powerful storms.

The LIP's Long Journey

Of course, Blakeslee and the rest of the LIP team have had to overcome their fair share of challenges.

"When we first started out, we didn't even know if what we do now was possible," Blakeslee said. "One of my colleagues told me, 'You won't be able to make current measurements over storms.' But I said, 'Yes, we can.' And now we do.

"It's a pretty rewarding feeling," he said. "The biggest challenge now is that there's always more to study than we possibly can. We've got to pick and choose, and sometimes that can be frustrating."

But for Blakeslee, there's nothing else he'd rather do.

"Lightning is just cool," he laughed. "I've always enjoyed hands-on science, and everything about lightning measurements is hands-on science. You build the instruments. You put them on airplanes. You go out and fly them. You get back the data. And then there's the satisfaction that it's not all abstract – we can actually apply what we're learning to real people, real situations and real problem-solving."

For now, the LIP team looks forward to sending their instrument out on an unprecedented journey – ideally, one that will take researchers one step closer to solving one of science's biggest mysteries.

Lakebed Legacies

Aug. 24, 1956 – The High Speed Flight Station receives a Lockheed YF-104A (#55-2961), later designated NASA 818. Between August 1956 and November 1975, the airplane made 1,444 research and support flights. The airplane is now on permanent display at the Smithsonian Institute National Air & Space Museum.

Aug. 10, 1973 – Gary Krier delivered F-111E (67-0115) to the FRC for the Integrated Propulsion Control System program.

Scholarship

... from page 3

Japanese and physics." College will give her access to Japanese cultural study, she said, as well as the opportunity to gain fluency in the language, and she also looks forward to studying abroad.

Exchange Council scholarships are named for former Dryden employees, with honorees selected on a rotating basis. Funds for the awards come from various council activities, including proceeds from vending machine sales, and from endowments left to the center.

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