

# Astrogram

Communication for the Information Technology Age

## Hubbard delivers upbeat address about Ames' changes, challenges and its numerous accomplishments

On June 19, Scott Hubbard came home to NASA Ames. It was a popular, if temporary, return to home base for the Ames center director. Center employees gave Hubbard a warm welcome, offering enthusiastic ovations both at the beginning and end of his remarks to employees at an 'all-hands' meeting. Hubbard has been away from Ames for nearly five months with the Columbia Accident Investigation Board (CAIB), and will be finishing up his service over the coming weeks.

Hubbard used the occasion of his return to welcome G. Allen Flynt, Ames' incoming deputy director, who will join the senior management team in early August from the Johnson Space Center. Hubbard also laid out his vision of the changes and challenges that lie ahead, and took the time to recognize the many accomplishments for which Ames employees can be proud. Hubbard spoke to the Ames community for nearly an hour with an upbeat, future-oriented message that brought employees up to date on several key issues.

Hubbard's 'mini-state-of-the-center' address began with him recounting a recent meeting with NASA Administrator Sean O'Keefe. At that time, he described the center's strategic role in science, aviation and aerospace, information technology and education, noting that the Ames mission fully supports the agency's vision and mission, as well as the President's Management Agenda.

"We are a multidisciplinary research and development center," he said, "responsible for breakthrough discoveries in astrobiology; developing air traffic management, control, safety and security technologies; educating and inspiring the next generation of explorers; and developing advanced thermal protection systems, information technology and fusing bio-nano-info technologies."

To illustrate Ames' diverse strategic roles, Hubbard noted that half of the center's budget comes from the Office of Aerospace Technology and the other

half from several science enterprises. Nearly half of the money goes to support science, the remainder to advanced software development, aeronautics and education, he added.

The guiding principle of the center's

ning and development," he said. Ames also must work with others inside and outside the agency to identify a 'OneNASA' proposal format and to address funding shortfalls for critical research facilities.

"We are exploring at least five ways of dealing with the issue of employees working in programs that lack funding," said Hubbard. These include identifying alternative suitable positions for employees, seeking new initiatives to bring in additional work, placing certain employees in the center's overhead and using retraining and other human resources tools.

Hubbard foresees several potential growth areas for Ames, including air traffic management, astrobiology, nanotechnology, information technology and thermal protection system research. "We will use all of the tools at our disposal to make sure we have the right skills and the right people to carry out the NASA mission," he said.

The center is seeking new lines of business for facilities such as wind tunnels, and creating an internal research and development budget to provide 'seed funding' for staff and new ideas. Hubbard said that while Ames remains fully competitive with academia and industry, we still must develop compelling new ideas. "We have a 60-year tradition of doing this," he said proudly. To succeed in a highly competitive environment, Ames people must write winning proposals, improve advocacy to headquarters, programs and the external community and form more collaborations. "This is the winning strategy," he said, noting that the 'OneNASA' philosophy is the key to enabling these collaborative efforts.

Ames' research and development products will make significant contribu-

*continued on page 12*



NASA photo by Dominic Hart

Left to right: Ames Center Deputy Director G. Allen Flynt and Ames Center Director G. Scott Hubbard on June 19 in the N-201 auditorium, just before Hubbard presented a state-of-the-center address at this all-hands meeting. He also introduced Flynt as the incoming deputy center director.

approach, according to Hubbard, is that "our work must have impact." Our success has to be measured by how well "we meet our milestones; infuse our technology into NASA missions; compete for peer-reviewed grants; manage our overhead; and have success in getting other agencies to implement the breakthrough technologies that we develop." He also cited the volume of Ames patents, publications, awards and public recognition as important success metrics.

Hubbard welcomed Ames' success in getting other agencies to use our technologies. He observed that the Federal Aviation Administration is incorporating various aviation and air traffic management technologies developed by Ames into its strategic approach. But "we must do a better job of working with the NASA enterprises and other field centers to infuse our technology into the earliest stages of mission plan-

creating an internal research and development budget to provide 'seed funding' for staff and new ideas. Hubbard said that while Ames remains fully competitive with academia and industry, we still must develop compelling new ideas. "We have a 60-year tradition of doing this," he said proudly. To succeed in a highly competitive environment, Ames people must write winning proposals, improve advocacy to headquarters, programs and the external community and form more collaborations. "This is the winning strategy," he said, noting that the 'OneNASA' philosophy is the key to enabling these collaborative efforts.

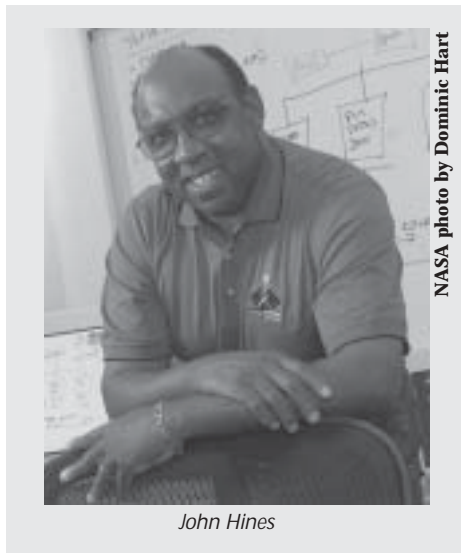
Ames' research and development products will make significant contribu-

*continued on page 12*

*Does silly work*

## 'OneNASA' brings benefits to agency's astrobionics program

Biological and medical technologies across NASA are stronger now, thanks to a NASA-wide team effort called 'astrobionics.' The program develops new technology and hardware for space-



NASA photo by Dominic Hart

John Hines

and ground-based research, as well as providing the latest information about its work across the agency.

Astrobionics supplies biological technology know-how to NASA scientists, engineers and managers. It functions as an integrated program/project team providing a NASA-wide technology capability in support of NASA's Office of Biological and Physical Research. The NASA team brings people together to collaborate not only within NASA, but it also links NASA people with peers in other government agencies, academia and industry. Astrobionics assists such key NASA programs as fundamental space biology, bioastronautics, astrobionics and biomolecular systems research.

"Particularly in biological technologies, there are a lot of commonalities that cross many disciplines at many NASA centers," said John Hines, manager of the astrobionics group at NASA Ames. "Because many groups and areas can use the same technologies, and there are not enough resources to conduct all these activities, this 'OneNASA' effort facilitates teaming and leveraging while breaking down historical barriers that blocked collaboration among centers."

"We've created project teams to identify common technology needs across multiple programs and across multiple NASA centers," Hines said. "The scope of the program includes project management, technology and product definition, technology development and application."

The program presently includes participants at Ames, Johnson Space

Center, Houston; the Jet Propulsion Laboratory, Pasadena, Calif.; and NASA Headquarters. In addition, discussions recently began about the future use of the astrobionics effort at Marshall Space Flight Center, Huntsville, Ala.; Glenn Research Center, Cleveland, Ohio; and Kennedy Space Center, Fla.

"A primary example of the 'OneNASA' concept within astrobionics is the Biomolecular Systems Research Program (BSRP)," said Hines, who also is BSRP program manager. "BSRP is the agency's lead for research into molecular and nano-scale biological technologies and represents the NASA element of a collaboration between NASA and the National Cancer Institute. The program manager is at Ames. The deputy, Darrell Jan, is at JPL and the enterprise scientist is at headquarters. BSRP hopes to expand to support research at Johnson,

Marshall and Glenn, in addition to Ames and JPL. Products resulting from the BSRP can be used in a variety of biological and medical applications."

To develop a particular technology, astrobionics works either entirely within NASA or with external partners. After researchers have decided that a potential technology has merit, astrobionics may develop working prototypes for testing. Successful technologies then can be transitioned to flight and other applications hardware developers for final implementation. By its very nature, the astrobionics sequence of steps creates liaisons between programs and projects and supports the 'OneNASA' concept. The collaborations that result can be helpful to all parties by providing cost sharing and other benefits.

Recently, astrobionics began a new *continued on next page*

## NASA astronaut receives warm welcome at Women in Science lecture

Dr. Ellen Ochoa, a NASA astronaut who has logged 978 hours on four space shuttle missions, received a standing ovation at her lecture in June in the 'Women in Science: No Limits' series held at the Flint Center in Cupertino.

Approximately 600 people attended the event, which was the third lecture in the fledgling series. After her talk, Ochoa was surrounded by an excited throng of students, children and adults, who simply wanted her autograph or to shake her hand.

Ochoa, crisp and professional, won the audience with her mission videos and informal comments about the challenges and rewards of being a NASA astronaut since 1991. Santa Clara County Supervisor Blanca Alvarado moderated the event.

"The purpose of the lecture series is to inspire the next generation of scientists and engineers and I can think of no better role model than Ellen Ochoa to convey the excitement of space and science to a broad audience," said Ames Center Director G. Scott Hubbard.

Currently, Ochoa is serving as deputy director of Flight Crew Operations at NASA Johnson Space Center. In this role, she has management oversight of the Astronaut Office and of the Aircraft Operations Division at Johnson.

Ochoa was a mission specialist on STS-56 (1993); served as the payload commander on STS-66 (1994); and served as a mission specialist and flight engineer on STS-96 (1999) and STS-110 (2002).

On STS-110, Ochoa was one of the astronauts who operated the International Space Station's robotic arm, helping to install a part on the space station

and maneuver crew members during three of the mission's four spacewalks. Ochoa is a graduate of Stanford University with a doctorate in electrical engineering.



NASA photo by Astrid Terlep

NASA astronaut Ellen Ochoa

Prior to her talk, Ochoa was feted at a reception at DeAnza College, sponsored by the Hispanic Foundation. Several Hispanic media organizations conducted interviews with Ochoa, including L'Observador, Univision Television and Tech TV.

NASA, De Anza College and the National Center for Women in Science, Technology, Engineering and Mathematics co-sponsor the series.

By KATHLEEN BURTON

## 'OneNASA' benefits

*continued from previous page*

project, the Technology Integration Agent (TIA). TIA helps researchers and managers define requirements, assess potentially useful technologies and integrate them into ongoing and future projects. TIA has a database of its assessments for participating users. TIA includes a team of scientists and technologists who find new technologies and know how and decide if these could be useful in ongoing or future space efforts. TIA employees reside at Ames, JPL, Johnson and headquarters.

Astrobiology may build new hardware that scientists can use to conduct research during space flight. This hardware should be reliable, safe, automated and tailored to dovetail with the unique environments onboard spacecraft. The effort could include a development cycle that starts at a requirements definition and goes step by step to final certification, documentation and testing.

For example, the astrobiology team is developing advanced technologies to monitor astronaut health during space flight and ground tests. The monitoring program is called the Smart Healthcare Management System. One of its systems, Lifeguard, measures human vital signs. It was recently delivered to Johnson Space Center for use during human tests in an underwater laboratory off of the Florida coast.

The astrobiology group also is developing advanced, shoebox-sized, biological payloads for use in small autonomous satellites that are part of the Fundamental Space Biology Program. Scientists intend to use these payloads for genetics studies of the effects of microgravity and space radiation on biological specimens such as yeast, various cells and nematodes.

"The interesting thing about these biological payloads is that you have to do all your analysis in space, and transmit data back to Earth because no samples will be returned," said Hines.

To foster collaborations outside of NASA, the astrobiology program uses a number of tools and procedures to carry out partnerships. To formalize cooperation with other government agencies, program participants prepare memorandums of understanding and agreements. To work with industry, the program utilizes Space Act agreements and other kinds of agreements and contracts. To work with academia, the astrobiology team makes cooperative agreements, grants and contracts.

More information about the astrobiology program is on its Web site at: <http://astrobiology.arc.nasa.gov/>

BY JOHN BLUCK 

## Ames' Code FM supports NASA STS-107 Columbia investigation

The Ames Hardware Development Division (Code FM) provided critical manufacturing capability to Johnson Space Center (JSC) in support of the STS-107 Columbia investigation.



*The shuttle showing highlighted wing panels.*

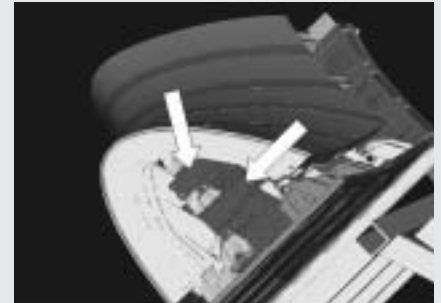
With a real example of the spirit of 'OneNASA,' Ames and other members of the NASA Fabrication Alliance from Dryden Flight Research Center, the Jet Propulsion Laboratory, Kennedy Space Center, Marshall Space Flight Center and Stennis Space Flight Center provided essential support to JSC.

More than 500 parts were manufactured and the entire test article assembled in less than five weeks to duplicate a key portion of the Columbia

left wing shown in the photo at left. The integrity of the reconstructed wing was tested by firing blocks of the external tank foam insulation from a large air cannon to develop an understanding of the effect of foam strikes on the reinforced carbon-carbon (RCC) panels suspected of failure in the loss of Columbia.

The Ames Code FM contribution included over 450 hours of precision machining to make the spanner beams shown by the arrows in the photo below in just seven days and delivered one day early.

"We had demonstrated the 'OneNASA' approach and proved that when we collaborate, total success is the outcome," said Dan Petersen, manufacturing project manager at JSC.



*Shuttle wing section*

## Students present memorial quilt to Ames



NASA photo by Tom Trower

Ames Center Director G. Scott Hubbard (third from left) recently received a STS-107 Columbia memorial quilt from third grade students from Bollinger Canyon Elementary School in San Ramon. Their teacher, Bob Dolin (back row, right) accompanied them. The students sewed 21 panels into a quilt. It will be displayed in the visitor center for a few weeks and then sent to the astronaut office at Johnson Space Center and presented to the families of the Columbia astronauts. Guy Hull from Channel 7, KGO news (left with camera) filmed the occasion with news anchor Rigo Chacon (not pictured). Mike Reeves, Ames tour program manager, (back row, center) was also present at the event.

## Space Settlement Design Contest Award winners tour Ames

More than 30 students, teachers and parents spent June 16 touring Ames. The students were award winners in the

ets from Victoria Callor, which included follow-up materials and activities supporting their visit.

imported several data sets including the Mars site, Olympus Mons and protein-assisted, nano-scale engineering giving the students a glimpse into the future. David Kao also presented visualization data sets and animations of the V-22, that were well received by the students.

The Space Settlement Design award winners concluded their tour of Ames in building N-258. Gina Morello-Ficcadenti and Marcia Redmond, both of Code IN, presented a dynamic view of the visualization and computer labs, which inspired many questions from the students. The students were also provided blinking NASA pendants as a memento of their tour.

Credit goes to all Ames volunteers who provided support for this exciting and unique educational experience that truly reflects the thoughts and words of NASA Administrator Sean O'Keefe. "The greatest mission this agency has ever accepted is helping to open the mind of a child to unimagined possibilities."

Special thanks to Al Globus, BJ Navarro, Dr. Ruth Globus and Dr.

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NASA photo by Bryan Yager

Space settlement design contest award winners during their tour of Ames on June 16.

tenth annual Space Settlement Design Contest. This year's contest included entries from over 325 students with 25 teachers assisting. Submissions came from Austria, India, Japan, Romania and 12 states. Two students from Iasi, Romania won the grand prize for their submission, Teba 1. Horia Mihail Teodorescu and Lucian Gabriel Bahrin are middle school students of teacher Professor Horia Nicolai Teodorescu. For contest results and details, visit: <http://www.nas.nasa.gov/About/Education/SpaceSettlement/Contest/>

The students participated in activities at the visitor center in the morning. Mike Reeves, Ames tour program manager, gave an outstanding presentation covering the history and research projects at Ames. This was followed by a student presentation by the team Asgard. These students from Mission High School in Fremont placed first in the 10th-to-12th-grade division and provided a comprehensive and creative view of their award-winning design.

The students then were given an overview of the 120-foot-by-80-foot wind tunnel and then were escorted to the FutureFlight Central by Chris Roden, Marilyn DaCosta, Wenonah Vercootere and David Kao. Nancy Tucker of Code AFJ provided a view of the Mars database, Arctic images sent back from the Haughton crater, a Mars analog site on Earth as well as a demo of runway operations at San Francisco airport and Los Angeles airport. An added highlight was a simulated landing of the space shuttle at Kennedy Space Center.

The students were treated to lunch at the Ames Mega Bites cafeteria where they were presented with award pack-

were then escorted to building T27A by Marilyn DaCosta, of Code SLR, and were introduced to the hyperwall by developer Chris Henze, of Code INR. Henze

## Ames celebrates diversity

On June 19, the Ames African-American Advisory Group (AAAG) and

Ames summer students displayed their graphical skills and artistic talents in the AAAG logo contest.

More information about the AAAG and NAAC can be found on the Web



Ames employees looking at the displays at the recent Juneteenth celebration at Ames.

the Native American Advisory Committee (NAAC) co-hosted a Juneteenth celebration. The event took place in the Ames Mega Bites cafeteria.

Juneteenth celebrates African-American freedom while encouraging self-development and respect for all cultures.

Warren Vincent, a charter member of the 100 Black Men of Silicon Valley, shared a brief history of Juneteenth with the participants before the crowd was entertained by the smooth sounds of a local up-and-coming R&B performer. A barbecue dinner was provided by AAAG's very own chef Robert Finnie!



NASA photos by Dominic Hart

R&B performer at the Juneteenth celebration.

sites which are linked to the Equal Opportunities Web site located at: [www.eo.arc.nasa.gov](http://www.eo.arc.nasa.gov).

## 'Spare the Air' environmental program launched at NASA Ames

Ames' 'Spare the Air' program for this summer kicked off in June. By starting this program, it is hoped that our air pollution levels at the center will be reduced.

What is the 'Spare the Air' program? 'Spare the Air' began in 1991 and is a voluntary air-pollution reduction program sponsored by the Bay Area Air Quality Management District. On days when ozone (smog) levels are expected to violate state and federal health standards, residents are asked to refrain from activities that cause pollution. If everyone makes clean air choices, the air will be healthier to breathe.

What can you do to spare the air? We at this center can play an important role in the 'Spare the Air' campaign. Our combined efforts can go a long way toward improving air quality on smoggy days. Here are the top 10 ways you can 'Spare the Air':

- Try not to drive too often. Cars are the major source of air pollution in the Bay Area. Before jumping into your vehicle to run an errand, or even go to work, consider alternative means of transportation.
- Take transit. The Bay Area is served by a number of transit agencies. Take transit and let someone else deal with the traffic. Treat yourself to a stress-free commute.
- Carpool or vanpool. Why not share a ride? Whether you're driving to work, the gym, a baseball game or to the beach, find a carpool partner. Take turns driving and give yourselves a break from road stress a few days a week. Ames has a commute alternatives office that has information on public transit, carpools and bike transit. For more information regarding Ames' Commute Alternative Program (ACAP), contact Amanda Dunham at ext. 4-1895 or visit the ACAP Web site at: [http://jf.arc.nasa.gov/NASA\\_Only/acap/index.html](http://jf.arc.nasa.gov/NASA_Only/acap/index.html).
- Telecommute (when approved by your supervisor). Why commute at all if you can arrange to telecommute from home? You'll save commute time and expenses.

- Refuel in the evening and don't top off. Putting gas into your vehicle releases volatile organic compounds (VOCs) into the air. Throughout the day, these VOCs mix with oxides of nitrogen (NOx) in the air, 'cook' in the summer heat and form ground-level ozone. Refueling in the evening decreases the opportunity for VOCs to form into ozone.
- Trip-link. Cold engines pollute five times more than warm ones. A cold engine is one that has been sitting for over an hour. When possible, link all of your errands together into one trip to minimize cold starts.
- Avoid consumer spray products. In the Bay area, 45 tons per day of pollution come from spray products. That is more VOC emissions than the total VOC emissions from all the Bay area oil refineries. These aerosol products include hairspray,

furniture polish, cooking sprays, bathroom cleaners, air fresheners, antiperspirants, insecticides and hobby craft sprays.

- Use water-based paints. Oil-based paints and varnishes contain a high percentage of VOCs that evaporate into the atmosphere and create smog. Water-based latex paints are less polluting and easier to wash off your hands and equipment.
- Barbecue as much as you like, just don't use lighter fluid. Lighter fluid literally goes up in smoke, causing a half-ton of smog each day in the Bay area. Try using an electric or a chimney briquette starter instead; you'll actually get a faster start.
- Ban gasoline power from your lawn and garden chores.

For more general information regarding 'Spare the Air,' visit the Web at: [www.sparetheair.org](http://www.sparetheair.org).

## Space Settlement Design contest award winners tour Ames

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Charles Wade for their support in making this an unforgettable experience for the students.

The contest is divided into two separate categories, 6th-9th and 10th-12th grade divisions.

Students design their space settlements and related materials and then submit their entries to Ames for judging. Teachers use the contest as an instructional thematic in their science curriculum. The contest promotes team building, space physics and project-Web based learning in addition to addressing national science standards.

Space colonies are seen as permanent communities in orbit, as opposed to living on the moon or other planets. The work of Princeton physicist Dr. O'Neill and others has shown that such colonies are technically feasible, although expensive. Settlers of the high frontier are expected to live inside large, air-tight rotating structures holding hundreds, thousands or even millions of people along with animals, plants and single-celled organisms vital to comfort and survival. There are many advantages to living in orbit; zero-gravity recreation, environmental independence,

plentiful solar energy and terrific views to name a few.

There is plenty of room for everyone who wants to go; the materials from a single asteroid can build space colonies with living space equal to about 500 times the surface of the Earth. Entries for next year's contest will be due on March 31, 2004. Encourage your children and teachers to participate. Materials that support space settlement activities may be found at: <http://www.nas.nasa.gov/About/Education/SpaceSettlement/teacher/>. The contest and related Web site are funded and operated by Code SL.

For more information about the Fundamental Space Biology Program, visit the Internet site at: <http://fundamentalbiology.arc.nasa.gov/>.

For information about NASA's Office of Biological and Physical Research visit the Internet at: <http://spaceresearch.nasa.gov/>.

BY BRYAN YAGER ▲

*Eat up your day*

## Former NASA engineer Larry Hofman passes away

Larry B. Hofman, retired NASA engineer, of Grand Junction, Colo., passed away at home on June 9, two months after being diagnosed with cancer at age 61.



Larry B. Hofman

Hofman was born Nov. 10, 1941 in Manhattan, Kan., to Donald B. and Fern Wells Hofman. He was raised in Manhattan and later attended Kansas State University, graduating as an electrical engineer. On Aug. 11, 1962, Hofman married Joyce Comstock in Manhattan, Kan.

Hofman and Joyce raised their two children, David Allen and Linda Marie, in Sunnyvale, where they resided for many years.

Hofman began his career at NASA as an electrical engineer in October 1967, in the Systems Engineering Division. One of his first assignments was to develop the real-time, telemetry decoding software for a new, data-error correction method on the Pioneer 9 spacecraft. This software was deployed at NASA ground stations the world over and the algorithms were used for over 30 years as the Pioneer spacecraft returned data from their pathfinding voyages. The coding and decoding provided a truly pioneering, error-correction method that allowed the Pioneer 9 (and later Pioneer Jupiter fly-by and Pioneer Venus missions, as well as the Helios mission) to double the transmission rate of information they collected.

Hofman's other NASA projects involved the creation of the processing laboratory for Landsat data involving

natural resource evaluation and monitoring for western-state agencies. Hofman became branch chief of the Administrative Data Processing Branch in 1986, guiding that organization for many years as technology evolved from mainframe to client server and finally to the Internet and the World Wide Web. He ended his career in the NAS Division, once again working on the cutting edge of computer technology.

Hofman retired in February 1998, after more than 30 years as a computer applications software and systems engineer and manager at NASA Ames. The same traits of curiosity and enthusiasm that lead Hofman to be an Eagle Scout and made him such a fun and stimulating friend contributed also to his remarkable NASA career. For those who knew him, he was one of the kindest, most sincere and honest friends anyone could have.

Hofman and his wife moved to Grand Junction after his retirement, because of their love of the town and the beautiful country of Colorado and Utah. Hofman had a great love for the outdoors, and he took advantage of the

surrounding area for many outdoor activities such as hiking, running, photography and hunting. Although he was much farther from any oceans, he also maintained his active interest in scuba diving and underwater photography.

Hofman is survived by his wife, Joyce, of Grand Junction; son, David of San José; daughter, Linda Scholten of Sunnyvale; his mother Fern Hofman of Grand Junction; his brother, Lyle of Larkspur, Colo. His father, Donald B. Hofman, preceded him in death.

The family is grateful for the loving care provided by Hospice and Palliative Care of Western Colorado and suggests that in lieu of flowers, memorials be made to them at: P. O. Box 60307, Grand Junction, Colorado 81506; or to Habitat for Humanity of Mesa County, a project Hofman loved and personally contributed to, at P.O. Box 4947, Grand Junction, Colorado 81502.

A get-together in honor of Hofman is being planned for the Bay area. Contact Pat Elson at e-mail [pelson@bayarea.net](mailto:pelson@bayarea.net) if you would like to be notified about this event.

BY JOYCE HOFMAN ▲

## AAE sponsors Employee Day

On June 26, the Ames Aerospace Encounter held another in its series of Ames Employee Days at the Ames Aerospace Encounter.

All on-site personnel were invited to attend. This was a terrific opportunity for Ames employees and their children and guests to see and experience this unique, interactive facility that makes math, science and technology come alive.



NASA photos by Dominic Hart

Lynn Albaugh of Code JIT explores the many activity areas at the AAE on Employee Day with her grandson Garrick Musladin.



Kids participating in the many science activities at the recent AAE employee day.

The Encounter is booked year round with 4th, 5th and 6th grade student field trips. Two days have been opened for this summer to accommodate requests by Ames employees to share this learning facility with their children.

The second Ames Employee Day at the AAE for this year will be held Tuesday, July 29, from 10 a.m. until 2 p.m.

The Encounter is located on the second floor of Building N226.

## Center Briefs

### NASA'S newest unmanned aircraft makes successful first flight

A milestone in the development of high-altitude, long-endurance, remotely operated aircraft occurred in June with the successful flight of NASA's Altair. Altair is the first unmanned aerial vehicle (UAV) to feature triple-redundant flight systems and avionics for increased reliability.

The slender-wing aircraft lifted off the runway at General Atomics Aeronautical Systems' Inc. (GA-ASI) flight test facility at El Mirage, Calif. The purpose of the historic first flight was to evaluate the UAV's basic airworthiness and flight controls. After the successful test flight, Altair glided to a landing on the remote desert runway. The entire flight was conducted at low altitude within a relatively short range of the El Mirage flight test facility.

"This is what we've been waiting for," said Glenn Hamilton, Altair project manager at NASA's Dryden Flight Research Center (DFRC), Edwards, Calif. "Now we can move forward with getting UAVs into the national airspace and conducting research," he said.

### NASA biotechnology activities enhancing quality of life

What do an anthrax-killing device, soybeans in space, artificial bone-replacement materials, light-emitting diodes for wound healing, a new medicine to treat bone loss, a water bottle that filters out bacteria, a perfume and advanced techniques for pharmaceutical drug design have in common?

These technologies and others have or are being developed by more than 150 companies that are partners with NASA's Space Product Development Program and its 15 research partnership centers across America.

### Spacecraft trio peeks at secret recipe for stormy solar weather

A three-spacecraft collaboration recorded for the first time the entire initiation process of a high-speed eruption of electrified gas from the sun, providing clues about the sun's secret recipe for stormy weather. The recent observation confirmed the predominant scenario for how these eruptions, called coronal mass ejections, are blasted from the sun.

The three spacecraft involved were NASA's Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI), which takes pictures of flaring regions using the sun's high-energy X-rays and gamma rays; NASA's Transition Region and Coronal Explorer (TRACE), which makes images using ultraviolet light from the sun; and the Solar and Heliospheric Observatory (SOHO) spacecraft, a collaboration between NASA and the European Space Agency.

## Mars rovers embody girl's dream

Launched into space along with the Mars Exploration Rover were the dreams of many young American students and one in particular. In June, NASA selected an essay written by nine-year-old

emony.

NASA and Denmark-based Lego Company co-sponsored the naming contest in collaboration with the Planetary Society in Pasadena. Students in grades K-12 submitted names for each of the rovers and wrote essays explaining why those names should be chosen.

"I used to live in an orphanage," said Collis, reading from her winning essay. "It was dark and cold and lonely. At night, I looked up at the sparkly sky and felt better. I dreamed I could fly there. In America, I can make all my dreams come true. Thank you for the 'Spirit' and 'Opportunity.'"

Lego President Kjeld Kirk Kristiansen said his company hopes to inspire youth to create and dream, just as early NASA missions inspired him.

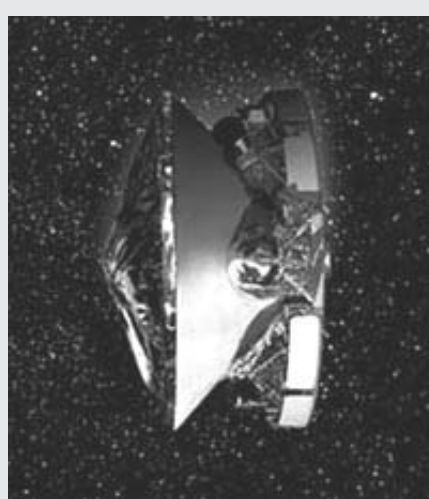
"As a child, I was enchanted by the idea of exploring space. I used to spend hours building spacecraft with Lego bricks," Kristiansen said. "The early days of space exploration stimulated the creativity of an entire generation, expanded our imagination and encouraged us to push our limits, making us braver and better human beings. By involving children in the 'Name the Rovers Contest' and other related playful learning activities, we hope to motivate and inspire the next generation of explorers."

Collis was born in Siberia and came to the United States at the age of two. An animal lover and space enthusiast, she now dreams of becoming an astronaut.

"She has in her heritage and upbringing the soul of two great space-faring countries," O'Keefe said. "One of NASA's goals is to inspire the next generation of explorers. Sofi is a wonderful example of how that next generation also inspires us."

'Spirit' was launched on June 10, and 'Opportunity' is scheduled for a July lift off. They will land at two sites on Mars in January 2004 to perform several experiments, including a search for signs of the past existence of liquid water.

BY ALLISON MARTIN ▲



Artist's rendition of the Mars Rover 'Spirit.'

Scottsdale, Ariz., student Sofi Collis from nearly 10,000 entries to rename the two rovers.

NASA dubbed Mars Exploration Rover (MER) 'Spirit' and the second rover 'Opportunity' during an unveiling ceremony held in June at NASA Kennedy Space Center.

"Now, thanks to Sofi Collis, our third-grade explorer-to-be, we have names for the rovers that are extremely worthy of the bold mission they are about to undertake," said NASA Administrator Sean O'Keefe at the cer-

## Safety Data

	Civil Servants	Contractors
Not recordable first aid cases	1	2
Recordable no lost time cases	0	0
Lost time cases (Under new OSHA rules, lost time is defined as restricted duty and or days away from work (lost work days)	0	0
Restricted duty days	0	0
Lost work days	0	0

Data above is for June 2003.

### VPP STAR Tip

Employees interviewed can describe what they are supposed to do in all types of emergencies for which planning has been done.

...Margaret Richardson, in *Preparing for the Voluntary Protection Programs*, Copyright © 1999 by John Wiley & Sons

## NASA scientists honored for innovative research

As the nation celebrates 100 years of powered flight this year, three innovative aerospace projects developed by

successful collaboration between NASA, the FAA and our contractors. PDARS enables the FAA to measure the capacity,

and alleviate problems associated with a previous coating for the flexible blanket insulations on the exterior of the shuttle orbiter. The coating material consists primarily of colloidal silica and other high-emissive agents. The coating is water based and, therefore, environmentally friendly. It provides fire protection to many substrates, such as ceramic, wood and metal. The coating can be easily applied by spraying or brushing and can be used on any type of material, whether rigid, flexible or fabric.



NASA photo by Dominic Hart

Left to right, first row: Irving C. Statler, NASA Ames and Thomas R. Chidester, NASA Ames. Second row: Brian E. Smith, NASA Ames; John C. Bobick, ATAC Corp.; and Donald L. Crisp, ATAC Corp. Third row: Loren J. Rosenthal, Battelle; John Schade, ATAC Corp; and Elliott Smith, ATAC Corp. Not pictured are: James A. McMahon, Richard Nehl, and Frank Soloninka, FAA; David Maluf, NASA Ames; Hoan Mai, Computer Sciences Corporation; Peter Tran, QSS Group, Inc.; and Wim den Braven, ATAC Corp.

NASA Ames were honored at the 'Turning Goals Into Reality (TGIR)' conference in June in Williamsburg, Va.

This year's theme was 'The Second Century of Flight: Technology Challenges and Opportunities,' focusing on NASA's role in the future of aerospace. The conference gathers the top aerospace teams from NASA, industry and academia to celebrate technology advancements of the past year.

The Ames honorees at the conference were the Performance Data Analysis and Reporting System team receiving the administrator's award; the Protective Coating for Ceramic Materials team receiving the commercializing technology award; and the JavaPathFinder Model Checking team receiving the engineering innovation award. Also honored were the Ames members of the COBRA (Co-optimized Booster for Reusable Applications) Main Engine Project led by Marshall Space Flight Center.

The Performance Data Analysis and Reporting System (PDARS) project provides Federal Aviation Administration (FAA) Air Traffic Control decision-makers at the facility level with a set of previously unavailable comprehensive tools and methods for monitoring the health, performance and safety of day-to-day, air traffic control operations. The reporting system enables the FAA to measure capacity performance and safety of its air traffic services in response to congressional mandates and plays a key role in helping to reduce accidents.

"PDARS is remarkable for its suc-

cessful collaboration between NASA, the FAA and our contractors. PDARS enables the FAA to measure the capacity, performance and safety of its air traffic services. What has emerged has benefited both safety and efficiency," said Dr. Irving Statler, Code IHS, level II project manager for aviation system monitoring and modeling under the Aviation Safety Program. "The administrator's award is a truly great honor for the PDARS team," he added. PDARS was developed by researchers in the Human Factors Research and

Technology Division, the Computational Sciences Division, the FAA's Office of System Capacity, the ATAC Corporation, the Battelle Memorial Institute, the Computer Sciences Corporation and the QSS Group, Inc.

The Protective Coating for Ceramic Materials was developed to eliminate

JavaPathFinder Model Checking is a revolutionary software tool that is capable of automatically detecting errors in the thousands of lines of code within JAVA-based software. It is based on a technique called 'model checking' that enables exhaustive analysis of a flight software system. The software is capable of efficiently detecting and then playing back the defective code that traditional testing misses, allowing engineers the ability to consider new possibilities such as integrated modular avionics in flight computers.

The conference was developed by NASA's Office of Aerospace Technology to honor the year's top teams for their significant contributions towards NASA's aeronautics and space objectives.

For more information about the TGIR 2003 conference, visit the Web at: <http://www.hq.nasa.gov/office/aero/curevent/tgir/index.htm>

BY JONAS DINO ▲

## OSHA holds seminar at Ames

Codes JA and QH organized an instructive seminar in June at which OSHA representatives explained the rules that apply to recording and reporting workplace injuries and illnesses. Bob Whitman, chief of the OSHA Division of Recordkeeping Requirements, explained the importance of accuracy in injury and illness records, giving his top 10 reasons that these records must be accurate.

Valerie Struve, senior program analyst in the OSHA Office of Statistical Analysis, gave a detailed presentation of the rules that govern which injuries are recordable, how to properly complete and post the new OSHA 300 log and the new rules for recording hearing loss and ergonomic injuries and illnesses. Seventy-one invited participants representing 28 on-site contractors attended the all-day session.

This session was remarkable in that it illustrated the benefit of having a partnership with OSHA under VPP rather than an adversarial relationship. Whitman repeatedly expressed



NASA photo by Tom Trower

Employees of AMTI, Cube Corp, DMJM&N, Johnson Controls, Lockheed Martin, PAI, Raytheon, South Bay Maintenance, Sectec and 17 other NASA contractors listen as Valerie Struve of the OSHA national office explains changes in injury and illness recordkeeping rules

his opinion that OSHA must vigorously enforce its rules upon the worst 5 percent of work sites, but that more is to be gained by providing assistance to the 95 percent that are trying to do the right thing. At the very best sites, excellent performance should be rewarded, which OSHA does through VPP.

BY STAN PHILLIPS ▲



## NASA artist in residence tours Ames' key research facilities

Performance artist Laurie Anderson toured NASA Ames in June as part of her introduction to NASA and its programs. NASA Headquarters hired



NASA photo by Dominic Hart

Laurie Anderson, NASA's artist in residence, during her tour of NASA Ames in June.

Anderson, known for her experimental, multimedia career, to be the first artist in residence through 2004.

"When they asked me to be their artist in residence I said, 'Well, sure, what do I do?' And they said, 'We don't really know, we've never had one before,'" Anderson said.

She came to Ames to learn about NASA's work and her options as a NASA artist. Snapping photos and taking notes, Anderson asked technical and theoretical questions. She also asked individuals about their opinions and goals to better understand the human side of Ames' work.

During her visit, organized mainly by Ames employee Julie Mikula, Anderson toured some of the center's key facilities. She began with the Human Performance Research Laboratory. There, she saw the cockpit display of traffic information (CDTI), a 3-D display that may one day provide pilots with more information about nearby planes and weather fronts than is currently available.

"It gives (an airplane) enough information to fly its own path," principle investigator Walt Johnson explained to Anderson. "It's more autonomous."

Anderson also tried a Space Station Orientation virtual reality (VR) simulation, which shows how body cues are

altered or absent in zero gravity. What Anderson found the most difficult was orienting herself, since the VR program does not show the user his or her body parts.

"It's confusing not seeing a piece of your knee, for example," she said. "You have no body control."

Anderson found the shuttle cockpit simulator interesting and she said the sound of solid rocket boosters firing was "beautiful." An auditory device that makes sounds seem to come from different directions appeared to intrigue Anderson.

At her second stop, chief of nanotechnology Harry Partridge gave Anderson an overview of nanotechnology. It is the creation of usable materials, devices and systems through the control of matter on a nanometer scale. A nanometer is a billionth of a meter. He explained the ways that researchers can apply the science, from medicinal to aviation sensory uses. He said that nanotechnology provides more energy possibilities in smaller spaces.

"The goal is if you can control things at the nano level, you can exploit things in ways you couldn't before," Partridge said.

Anderson was fascinated by the prospects of nanotechnology. "The large scale of the universe is amazing," she explained, "but to deal with things that are so small and yet can affect so much – that is absolutely incredible." She also visited the nanotechnology research laboratory.

Later, at the Automation Sciences Research Facility, scientists and technologists showed Anderson the personal satellite assistant (PSA) and the K9 rover. In these devices, she saw how design and function combine to create new tools and technologies. Anderson also viewed the MERBoard, an interactive view screen for different types of collaborative projects.

But while the device's function intrigued Anderson, she found its rectangle shape limiting.

"Have you ever thought of a different set-up?" she asked. "I am on a quest against rectangles. There's a tendency to think that things have to fit into this rectangle shape and they just don't."

She discussed design options with the staff, including a round-table model. Things don't have to always be standardized, she said.

"I was impressed with the level of interest she displayed and the types of questions she asked," said Bob Duffy of computational sciences. "I found her

point of view interesting. Creativity was the common ground between her and the folks here."

In the Center TRACON Automation System (CTAS) lab, Anderson was amazed to learn how much information air traffic controllers must manage. She said it was great that NASA was working on maximizing safety and efficiency for commercial air travel.

The Vertical Motion Simulator (VMS) took Anderson for a spin – literally. This huge simulator can mimic the flight of various aircraft and the space shuttle. After battling a simulated side wind while landing, Anderson exited from the VMS wide-eyed. She grinned and remarked, "That was just great!"

In the Crew-Vehicle Systems Research Facility (CVSRF), which houses two airline simulators, Anderson was impressed with the tests involving human factors in aviation safety. Human factors research includes the study of human performance and human-machine interaction. Next, she stood in the center of Future Flight Central, an airport control tower simulator and watched a simulated shuttle landing.

"This is really, really exquisite," she said.

Anderson concluded her visit in the Ames Aerospace Encounter (AAE), an educational experience that gives students two hours of hands-on experience. It includes areas such as aerospace, aviation and space sciences. It is an aspect of Ames that Anderson believes is crucial.

"It is so vital to reach [the youth] at that age, to inspire them," she said. "You have a great tool."

By the end of the day, Anderson said her head was spinning.

"It must be so fun to work here!" she commented. "And today, we've just skimmed surfaces. This has been mind-boggling."

Anderson also visited the Jet Propulsion Laboratory in Pasadena, Calif. and the Space Telescope Science Institute on the Johns Hopkins University Homewood Campus, Baltimore, which is responsible for Hubble Space Telescope operations. She hopes to see Kennedy Space Center in the near future.

Anderson is not sure what art medium she will use. It could be anything from music to film to visual art. For now, she is just seeing what moves her, she said.

A native of Chicago, Anderson lives in New York City. She will be touring in Italy with her band starting in July.

BY ALLISON MARTIN ▲

## Ames Freedom to Manage simplifies the purchasing process

Ames employees who wish to buy electronic and information technology (EIT) will now have less paperwork and more help, thanks to Ames Freedom to Manage (af2m) program efforts.



NASA photo by Dominic Hart

Left to right: Laurindo Veras, Dennis Gonzales and Doug Pearson discuss final ARC 789 database changes at Ames.

The paperwork reduction began when an employee contacted af2m in October 2002, saying that the ARC 789 form, which is designed to help employees comply with Section 508 regulations, was very difficult to understand. Section 508 is a regulation that requires federal agency EIT to be completely accessible to people with disabilities.

In response, Web designer and af2m task-team member Dennis Gonzales joined with IT planner Doug Pearson and system analyst Laurindo Veras, who were already working on a solution.

"ARC 789 is complex paperwork," explained Pearson. "The form was eight pages – just looking at it overwhelmed you. Six of those pages were a questionnaire, and much of it was not relevant to the purchase you were making."

The questionnaire also confused purchasers because it asked questions which individuals without disabilities don't know how to answer. Now, as of mid-June, the solution is in place.

The new ARC 789 online form has been revised so that there is only one page of questions. As the buyer lists which EIT is being purchased, it automatically asks only questions that apply to that particular EIT.

Buyer Karen Adams of Code JIT is happy with the reduction in paperwork. "Many government documents are extensive, so simplification is always helpful. I think this is going to be great. The easier they can make things, the less stress," she said.

The team has implemented a database containing ARC 789 forms as well as the voluntary product accessibility template (VPAT). This gives users answers to complex or confusing questions and provides examples for users to follow. However, Gonzales stresses that it does not relieve users of their responsibility of making sure the EIT is Section

508 compliant.

This compliance is essential for any government EIT purchase, although credit card purchases under \$2,500 do not currently require an ARC 789 form. Gonzales and Adams fear that this loophole allows employees to disregard the regulation and they caution against taking it too lightly.

For example, even items costing less than \$2,500 purchased through task order contracts require ARC 789 forms because the contract itself is valued at more than \$2,500.

Aside from the system changes, there are two options for those who need help to fill out forms. Through SERV-I charge-back system, a buyer can hire people to help complete ARC 789 for a fee of \$40 per item.

Employees may also contact Veras with any concerns or questions.

"I am always available and more than glad to help," Veras said. "If they want us to call vendors, we will."

In the past, Code JT has offered classes and town hall meetings to help people learn how to fill out the forms.

"The last (meeting) wasn't full so we haven't had one in a while," Pearson said. "But if people ask for it, we could arrange it."

The af2m response is not over yet.

The team will be checking back on the solution in a few months, according to Gonzales.

"We will see if it is up to par on what had originally been started," he said. "If it needs to improve, we want to be sure we are still working on it. But, hopefully, when we do the check-back, we will find that everything has improved."

The team will be sharing its solution with the rest of NASA in the hopes that more centers will adopt a similar strategy. It would also increase the amount of information available to Ames employees, according to the team.

"Our next step is to let the other centers know, and there is nothing intrinsically that prevents them from putting their VPATs in too," Pearson said. "The database has the potential to grow beyond the system we are using. My hope is to keep the simplicity but increase the size."

The new ARC 789 on-line form and database may be found on the Web at: [www.section508.arc.nasa.gov](http://www.section508.arc.nasa.gov).

Employees may contact af2m with any concern or complaint by filling out an on-line form at [af2m.arc.nasa.gov](http://af2m.arc.nasa.gov), or by contacting any task team member. Comments may be anonymous or identified.

BY ALLISON MARTIN ▲

## Braxton awarded for robotics support

NASA Ames FIRST Team 254 salute Lewis Braxton III by awarding him honorary medals for his support of their team these past few years. Since 1999, Braxton has been a chief supporter of the 'Cheesy Poofs,' both in spirit and through resources.

As a result of Braxton's support, the Cheesy Poofs have won the Silicon Valley Regional for five consecutive years. There are over a thousand teams across the nation and no team has even come close to this.

While Ames engineers Steve Kyramarios and Robert Homes have been the backbone of the design, Braxton has been a cornerstone of support. Braxton has attended nearly all of the local competitions these past few years.

"Mr. Braxton has really been there for us," said Edwin Sabathia, formerly a student on team 254 and now an employee at Ames.

The team awarded Braxton a first-place medal from the Silicon Valley Regional, a second-place medal from the Sacramento Regional and the most prestigious award FIRST grants, the chairman's award from the Sacramento regional.

"A couple of years ago, the team

was having some really tough times financially and Braxton came to our rescue" said Mark Leon, founder of the Cheesy Poofs.



NASA photo by Tom Trower

Top row, left to right: Edwin Sabathia, Mark Leon, Chris Isikoco, Marcella Grant, Jim Urhausen. Lower left: Lewis Braxton III.

# Length of Service 2003 ceremony honors employees

The 2003 Length of Service Awards ceremony was held at Ames in June. Employees with 25 years or more of federal service for the period July 1, 2002 to June 30, 2003 were honored. Special recognition was paid to 13 Ames employees who have reached their 40, 45, 50 and 55 years of federal service milestone. They are:

40 years of service

Pamela L. Empert, Terry L. Grant, John E. Humbert, Charles S. Hynes, Gilbert H. Leibfritz, Michael D. Makinen, Lemuel E. Mauldin III (retired), Ralph Pelligra, Michael D. Shovlin and James R. Stallcop

45 years of service

Michael J. Bondi

50 years of service

James A. Jeske

55 years of service

Vernon J. Rossow

**Code A - Office of the Director of Aerospace**

25 years of service

Theresa Bracero  
Robert R. Brunelle  
Shirley M. Burek  
Unmeel B. Mehta  
James L. Brown  
Jeff R. Figone

30 years of service

James M. Joyce  
Seth S. Kurasaki  
Robert Wong

45 years of service

Michael J. Bondi

50 years of service

James A. Jeske

55 years of service

Vernon J. Rossow

**Code C - Office of the Chief Financial Officer**

25 years of service

Charlotte Y. Dicenzo  
Beverly L. Davis

35 years of service

Randy D. Rodrigues

**Code D - Office of the Director**

25 years of service

Linda M. Lee  
Stephanie R. Langhoff

30 years of service

Meredith Moore  
Bonnie L. Samuelson  
Arelene C. Spencer

**Code F - Office of the Director of Research and Development Services**

25 years of service

Terry C. Bland  
Thomas F. Foster  
Thomas R. Gilbertson  
Clifford C. Imprescia  
Darrell L. Kirk  
Ronald G. Lamica  
James H. Lesko  
Peter S. Lissol  
John N. Perry  
James B. Scott  
Mark C. Zelinsky

30 years of service

Jon B. Bader  
Barry K. Cunningham  
Ernest R. Jennings  
Ronald H. Strong  
John S. Torres  
Tony L. Walker

35 years of service

Herbert J. Finger  
Ronald L. Halverson  
Roy W. Hampton  
Danilo C. Ompoc

40 years of service

Gilbert H. Leibfritz

**Code I - Office of the Director of Information Sciences and Technology**

25 years of service

Doris Chow  
Ching-Mao Hung  
Alan A. Wray

30 years of service

Robert W. Mah  
John W. Parks

40 years of service

Terry L. Grant  
Charles S. Hynes  
James R. Stallcop

**Code J - Office of the Director of Center Operations**

25 years of service

Jane K. Babicz  
Naomi Castillo-Velasquez  
Dora M. Herrera  
Janet Jarmann  
West Kurihara  
Norma J. Layton  
William C. Likens



NASA photo by Dominic Hart

Steven Zornetzer, deputy director for research at Ames, presents the length-of-service award to Vernon J. Rossow for his 55 years of federal service.

30 years of service

Dennis J. Korb  
Joan M. McCullough

35 years of service

Karen L. Adams  
Marjorie S. Stathes

40 years of service

John E. Humbert  
Michael D. Makinen

**Code Q - Office of the Director of Safety, Environmental and Mission Assurance**

35 years of service

Andrew J. Hocker Jr.

40 years of service

Ralph Pelligra

**Code S - Office of the Director of Astrobiology and Space Research**

25 years of service

Geoffrey A. Briggs  
David M. Lesberg  
Karen A. Parker  
Antonio A. Trias  
Larry D. Webster

30 years of service

John R. Allmen  
Rene C. Castaneda  
Joseph J. Hanzel  
Arthur D. Jones (Retired)  
Christopher B. Wiltsee

35 years of service

David Goorvitch  
Emily M. Holton

40 years of service

Pamela L. Empert  
Lemuel E. Mauldin III (Retired)  
Michael D. Shovlin

# Hubbard delivers upbeat address about Ames' changes, challenges and its numerous accomplishments

*continued from front page*

tions to aeronautics and space exploration, according to Hubbard. Advances in the bio-info-nanotechnology field are enabling revolutionary capabilities in biosensors. Ames has an important role in the Mars Exploration Rover missions, providing expertise in thermal protection systems and arc jet testing, wind tunnel parachute testing, and mission systems software tools. We are helping the agency understand and protect our home planet by developing the Traffic Management Advisor now in use by the FAA at six air traffic control facilities. Further, future projects that hold great promise in the exploration of the universe include the Kepler mission, SOFIA and the Space Station Biological Research Project. Finally, Ames' education programs are fulfilling the mandate to 'inspire the next generation of explorers' through facilities such as the Ames Aerospace Encounter and cooperative agreements with community colleges and universities.

The 'take-home' message from the center director is that "we are continuing to be transformed in a positive way." We need to work hard to get the support required for our facilities, and we need to rebalance our skill mix. "We're going to continue to make outstanding contributions to the agency," he added. "We've had change behind us and change is in front of us. We're not afraid of change," Hubbard said. "The future is really bright and I couldn't be more happy to be here today."

In his first remarks to Ames employees, soft-spoken new deputy director Flynt said "when Scott first offered me this position, I was fearful of not being able to live up to the standards of this center." However, he said, "I pledge to strive to help each employee and the center to be successful and to maintain an open-door policy." Flynt said he is optimistic that his background in human space flight will complement Ames' long history as a research center. He also offered to provide "help where help is needed," and to "stay out of the way of great people when it is not. You have a lot of great people here," he said. "I'm excited to be here and to be a part of things. I hope I can help."

In reflecting upon his experience as a member of the CAIB, Hubbard said "it's been an honor and a privilege to serve the agency and the country. I am humbled."

Hubbard noted that the CAIB was organized around four groups: investigating materials, flight operations, engineering and technical analysis and the NASA culture. He serves on the engi-

neering and technical analysis team. The board is using a software tool known as Investigation Organizer, which was developed by Ames' Chief Engineer Tina Panontin and a group from Code I. Hubbard also noted that Ames has made contributions to the accident investigation in several other areas, including thermal protection and aerothermodynamics, simulation of shuttle ascent aerodynamics, data integration, debris scanning and virtual reconstruction technology and accident theory. The center also provided more than two million hours of supercomputing resources, a canine search team and debris-search support.

Another software tool developed at Ames, CART 3D, which won this year's

Software of the Year award, was used to determine the trajectory of the foam after it broke off the shuttle's external tank. "This has been a huge contributor to understanding the accident," Hubbard said. "We think we're getting much closer to knowing what actually happened." The board plans to deliver its final report to O'Keefe and Congress at the end of July.

Hubbard concluded his remarks by thanking Deputy Director for Research Dr. Steve Zornetzer and Associate Director for Astrobiology and Space Programs Estelle Condon for their leadership and stewardship of Ames during his prolonged absence with the CAIB.

BY ANN SULLIVAN AND DAVID MORSE ▲

## A bugle blast from the full-cost initiative

In early May, the Full-Cost Policy and Operations Team presented its findings and recommendations to the agency's full-cost committee. This represents the culmination of nearly six months of effort to identify all issues related to the full-cost initiative and to make recommendations for resolving these issues.

The committee, chaired by Gwendolyn Brown, deputy CFO for financial management, reviewed 27 decision memoranda based upon the recommendations that were proposed by the full-cost team report. These memoranda address a variety of areas, such as roles and responsibilities under full-cost, funds control, reimbursables, and both center and corporate general and administrative costs. These memoranda are being signed off by the full-cost committee and will be posted on the full-cost Web site shortly.

To raise awareness of the full-cost initiative, Owen Barwell, director for full cost, will visit all of our centers to provide the latest news and information on the initiative and to garner feedback from the project, line, finance and resource communities. Check the full-cost initiative Web site to see when Barwell will visit the center.

In addition to the communications effort, the full-cost training team will be developing a series of training and educational events. First, a basic course, 'Full Cost 101,' will be developed and delivered through Web-based training. The Web-based training course will be available in July to provide all NASA employees with a basic knowledge of full cost and the reasons why NASA has embraced this business practice.

The full-cost training team will also

develop a course that will focus on managing and making decisions in a full-cost environment. This course is designed specifically for project, resource, service pool and line managers and will support the NASA policy guidance (revised yellow book). The course should be available to the centers in mid-August.

Full cost is a standard approach to how we will manage our programs. For some, it is a new way of thinking. For others, it's simply a clarification to what we've been doing for the past year or so. The goal is to make sure you are fully informed and prepared to manage your programs in FY04 using full-cost principles. Check the Web site for the latest information on full cost at: <https://fullcost.hq.nasa.gov>

BY SUSAN LEE ▲

## Bowling League

Sign up now for the all-Ames Bowling League, 2003 winter season. The league starts in September, after Labor Day. The team bowls on Tuesday nights, at the Palo Alto Bowl on El Camino Real.

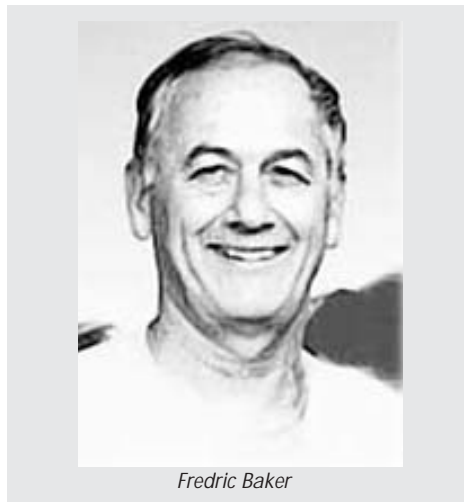
The league welcomes new bowlers looking for a team, as well as four-member teams and substitute bowlers. Since team rosters determine the number of bowling lanes we are assigned, it's important now to start forming your team, or sign up for existing teams needing members.

For questions about the bowling league, or if you wish to sign-up, contact Toby Garcia at ext. 4-1382, or e-mail at [tgarcia@mail.arc.nasa.gov](mailto:tgarcia@mail.arc.nasa.gov).

## Former Ames employee Fredric Baker passes away

Fredric Baker, 68, passed away on May 20. Baker was born July 21, 1934, in Turner, Mont.

In the mid 1960s, after Baker received his bachelor's degree in electrical engineering from San José State University, he began his NASA Ames career in



Fredric Baker

the instrumentation division. While in that division, he worked on developing a microwave landing system (MLS) to be used at Crows Landing.

In the early 1970s, Baker moved to the avionics branch. While there, he managed the Stoland and V/Stoland projects. He received a master's degree in systems engineering from the University of Southern California. In the late 1970s, Baker became the assistant chief of the Quiet Short-Haul Research Aircraft project (QSRA). During that time, the QSRA proved the concept of 'upper surface blowing for very high lift' as the QSRA successfully completed the landings on the aircraft carrier 'Kitty Hawk.' Soon after, Baker became the assistant chief of the Rotor Systems Research Aircraft Branch.

Besides his work at Ames, Baker loved public speaking. On many occasions, Baker spoke to school groups. Moon rocks were a popular feature at that time. Baker spent 32 years as a part-time and later full-time instructor in math and electronics at San José City College and Boise State University after his retirement.

When Baker retired from Ames in 1989, he and his wife Susan moved to Boise, Idaho, where they purchased a dental supply business and operated it until they sold it in 1998.

He was a baseball fan of the local minor league team in Boise. He and Susan had a room in their house for a player to stay each season. During spring season, they would go to Arizona to

watch some of 'their' players try and make it to the big leagues.

Baker was the eternal optimist who envisioned everything as positive. He was always a happy, friendly and enthusiastic person. He believed that what happens is supposed to happen and prepares you for the future.

Baker is survived by his wife Susan, three children, seven step-children, their families, a brother in Salt Lake City, a sister in Malta, Mont. and many

retired Ames co-workers.

Memorials may be sent in Baker's name to:

The Fredric August Baker  
Scholarship Fund  
c/o Wells Fargo Bank  
818 E. Boise Avenue  
Boise, ID 83705.

Please reference Account #3987819053.

## NASA Tech Briefs editor tours Ames

In June, NASA Tech Briefs editor Linda Bell visited NASA Ames.

During her visit, Bell viewed several facilities unique to Ames--including FutureFlight Central, the Crew Ve-

ing magazine.

If you are interested in receiving a copy of NASA Tech Briefs or having an article published, contact Lisa Williams at ext. 4-2954 or e-mail her at:



Chris Henze, Code INR (left), demonstrates to Linda Bell, NASA Tech Briefs editor, the movement of the nanotubes displayed on the Hyperwall.

hicle System Research Facility and the Center for Nanotechnology.

Bell's primary interest during her tour was the Nanotechnology Center. She also interviewed Ames Center Director G. Scott Hubbard, who will be featured in the August issue of 'Who's Who at NASA' column in NASA Tech Briefs, which will focus on nanotechnology at NASA and the federal labs.

NASA Tech Briefs magazine has the largest circulation of any engineer-



NASA photos by Dominic Hart

Left to right: Meyya Meyyappan, Code AS; David Lackner, Code DK; and Linda Bell, editor, NASA Tech Briefs, look on as Chad Paavola, Code SSR, explains the finer aspects of nanotechnology.

liwilliams@mail.arc.nasa.gov or ext. 4-2954.

*Speak up and*

## Event Calendar

**Ames Amateur Radio Club**, third Thursday of each month, 12 noon, N-228 (across from N-255). POC: Michael Wright, KG6BFK, at ext. 4-6262.

**Ames Ballroom Dance Club**. Classes on Tuesdays. Begin classes at 6:15 p.m. Higher-level class meets at 5:15 p.m. Held in Bldg. 944, the Rec. Center. POC: Helen Hwang, hwang@dm1.arc.nasa.gov.

**Ames Bowling League**, Palo Alto Bowl on Tuesday nights. Seeking full-time bowlers and substitutes. Questions to sign up: Mike Liu at ext. 4-1132.

**Ames Child Care Center Board of Directors Mtg**, every other Thursday (check Web site for meeting dates: <http://acc.arc.nasa.gov>), 12 noon to 1:30 p.m., N-215, Rm. 212. POC: Tom Maier, ext 4-3643.

**Ames Contractor Council Mtg**, first Wednesday each month, 11 a.m., N-200, Comm. Rm. POC: Anita Fогtman, ext. 4-4432.

**Ames Diabetics (AAD)**, 1st & 3rd Weds, 12 noon to 1 p.m., at Ames Mega Bites, Sun room. Support group discusses news affecting diabetics. POC: Bob Mohlenhoff, ext. 4-2523/e-mail at: [bmohlenhoff@mail.arc.nasa.gov](mailto:bmohlenhoff@mail.arc.nasa.gov).

**Ames Federal Employees Union (AFEU) Mtg**, third Wednesday of ea. month, 12 p.m. to 1 p.m., Bldg. 19, Rm 1042. Info: <http://www.afeu.org>. POC: Marianne, ext. 4-4055.

**Ames Mac Support Group Mtg**, third Tuesday of ea. month, 11:30 a.m. to 1 p.m., Bldg. N262, Rm 180. POC: Julie ext. 4-4694 or Tony ext. 4-0340.

**Ames Model Aircraft Club**, flying radio-controlled aircraft at the north end of Parsons Ave. on weekend mornings. POC: Mark Sumich, ext. 4-6193.

**Ames Sailing Club Mtg**, 2nd Thurs of ea. month (Feb through Nov), 11.30 a.m. - 1 p.m. Bldg. 223, Ames Visitor Center & Gift Shop, special events room. All are welcome. POC: Jeff Smith, ext. 4-2586.

**Environmental, Health and Safety Information Forum**, first Thursday of each month, 8:30 a.m. to 9:30 a.m., Bldg. 221/Rm 155. URL: <http://q.arc.nasa.gov/qe/events/EHSeries/> POC: Julie Morsellino at ext. 4-6810.

**The Hispanic Advisory Committee for Excellence HACE Mtg**, first Thurs of month in N255 room 101C from 11:45 a.m. to 12:45 p.m. POC: Eric Kristich at ext. 4-5137 and Mark Leon at ext. 4-6498.

**Jetstream Toastmasters**, Mondays, 12 p.m. to 1 p.m., N-269/Rm. 179. POC: Cathy Payne at ext. 4-0003.

**Model HO/HO3 Railroad Train Club**, Bldg. 126, across from south end of Hangar One. Work nights: usually Fridays, 7:30 p.m. to 9:30 p.m. Play time: Sundays, 2 p.m. - 4 p.m. John (408) 735-4954 (W) or (408) 281-2899 (H).

**Natl' Association of Retired Federal Employees, (NARFE)**, Former and current federal employees. Your only contact with Congress. Join to protect your federal retirement. Chptr #50 meets the first Fri. of each month at HomeTown Buffet, 2670 El Camino (at Kiely), S. Clara, 11 a.m., lunch \$6.70. POC Earl Keener (408) 241-4459 or NARFE 1-800-627-3394.

**Native American Advisory Committee Mtg**, fourth Tues each month, 12 noon to 1 p.m., Bldg. 19, Rm 1096. POC: Mike Liu at ext. 4-1132.

## College interns graduate from Ames internship program

More than 40 Foothill and De Anza college students recently graduated from the colleges' NASA Ames and private sector internship program. The graduation brings the total number of interns enrolled in the internship program to

filiated positions in the next three to five years, according to NASA's Associate Administrator for Education Adena Loston.

At the graduation, John Ossenfort, systems administration engineer in the Computational Sciences Division at NASA Ames, spoke about his work with the MERs Mars habitat research group providing assistance to the project through his work on the communications linkages at the remote research site in the Utah desert.

Manpreet Kaur, event and public relations coordinator for the Computer History Museum, spoke about her experience setting up speaker events

continue to evolve and improve our lives and our communities," Kanter said. "We have to plan ahead and think ahead to introduce future students to fields that we may never have thought of 10, 20 or 30 years ago. The fact that we can introduce people to so many options in their lives and that they will find fulfillment and career choices is what keeps me inspired."

"The success of our internship program is directly attributed to the hard work of our students as well as NASA Ames supervisors who continue to provide mentoring support and personal guidance to our new interns," said Valerie Sermon, FHDA NASA Ames private sector internship program director. "We're proud that our students play a vital role in supporting research and development at NASA Ames. With every graduation ceremony, our alumni tell us their NASA internship was more than work experience, it was the professional development experience of a lifetime," Sermon stated.

For information about the Foothill-De Anza NASA Ames and private sector internship program, access its Web site at: [nasa.fhda.edu](http://nasa.fhda.edu) or call ext. 4-5560.



NASA photo by Tom Trower

Top row, left to right, interns: Malcolm Dryden, Justin Jones, Ali Mattu, John Ossenfort and Rachael Smith. Front row: Left to right: Valerie Sermon, Ames internship program director; Dr. Martha Kanter, chancellor of the Foothill-De Anza Community College district; Susan Schenck, Ames internship program coordinator; interns: Michelle Devins; Tiffany Green, Heather Knisley and Pamela Liquori.

3,300 since the program's inception in 1971. Today, more than 400 current civil servants and contractors employed at NASA Ames are graduates of the innovative Foothill-De Anza internship program.

Administered by the Foothill-De Anza (FHDA) Community College District, the goal of the internship program is to ensure that there is a qualified pool of potential employees who can effectively demonstrate in-demand skill sets and possess the education required to replace the nearly 30 percent of engineers, scientists and professionals who are predicted to retire from NASA-affiliated

for 500 people through her year of work.

At the graduation ceremonies, Executive Assistant to the Center Director Jack Boyd shared the fascinating history of the contributions to space research from NASA Ames interns, so they would know they, too, played a critical role in the history of space research.

Newly appointed Foothill-De Anza Community College District Chancellor Martha Kanter shared her reflections on the value of the internship experience for students and the value of their contributions to the research at NASA Ames.

"As an educator, it is exciting to me that the science and technology fields

### Astrogram deadlines

Deadline:	Publication:
July 25	Aug 2003
Aug 25	Sep 2003

All Ames employees are invited to submit articles relating to Ames projects and activities for publication in the *Astrogram*. When submitting stories or ads for publication, submit your material, along with any questions, in MS word by e-mail to: [astrogram@mail.arc.nasa.gov](mailto:astrogram@mail.arc.nasa.gov) on or before the deadline.

## Ames Classifieds

Ads for the next issue should be sent to [astrogram@mail.arc.nasa.gov](mailto:astrogram@mail.arc.nasa.gov) and must be resubmitted for each issue. Ads must involve personal needs or items; (no commercial/third-party ads) and will run on a space-available basis only. First-time ads are given priority. Ads must include home phone numbers; Ames extensions and email addresses will be accepted for carpool and lost and found ads only. Due to the volume of material received, we are unable to verify the accuracy of the statements made in the ads. Caveat emptor!

## Housing

For rent, room in condo unit. Share unit with prof'l female, San José (near Campbell, 15 mls from Ames). No pets, N/S, \$600/mo. and half utils. Avail. now through March 31, 2004. Call (408) 977-0673 or e-mail [accemad93@earthlink.net](mailto:accemad93@earthlink.net).

Duplex: 2bd/1ba and 1 bd/1ba, gar. large back yard, pet OK. In Mt.View, 5 mins to Ames. Call (650) 962-8728, ask for Long.

3 bd/2ba sgl family house for rent in Milpitas. Two-car garage, central heating, fireplc, remodeled kitchen, baths, W/D, refrig., storage shed, large bkyrd, close to 237/680/880. Looking for clean, prof, non-smokers tenants. \$2,000/mo. E-mail [gdelcarmen@mail.arc.nasa.gov](mailto:gdelcarmen@mail.arc.nasa.gov)

Walk to work! For rent: 3bd/1.5ba twnhs, near Moffett and 101, \$1,800/mo. W/D, microwv, cntral heat, patio/yard, N/S, small pets ok. Call (650) 906-9528.

3 bd/2 1/2 ba twnhouse for rent in South San José. Near H85 and 87. No pets or smokers. \$1,500 per month. Call (408) 281-7011.

## Transportation

'90 Acura V6L, auto., AC, PS, ABS, sunfr, tinted windows, gr. cond. \$3,000. or B/O. Call (408) 226-3535.

'95 Jeep Wrangler, white/tan. Hard top 31K mls. Exc. cond. \$8,500 or B/O. Call (408) 377-4427.

'96 Mercury Mystique 4-dr, 59K mls ABS brakes, air cond., pwr steering, locks. AM/FM cass., cruise con., dual air bags. \$4,700. Call (650) 386-6700.

'00 Volvo S40, 4 dr sdn, 40K mls, Red, AT, AC, PS, PW, PL (rmt), AM/FM w/CD, mn roof, leather \$14,000. Hank (408) 262-4974.

'01 Honda Odyssey EX, exc. cond., runs great! 51K mls, leather, 7" LCD monitor w/DVD/VCR, tow pkg, Canyon Grey, \$20,500 or B/O. Call (408) 847-3034.

'01 VW Turbo Beetle GLS. Silver w/gray interior. 5-spd. Pwr windws, locks, mirrors. Sun rf. Like-new cond., interior spotless. 32K mls, \$12,500 or B/O. E-mail: [jazzgekko@aol.com](mailto:jazzgekko@aol.com). Call (415) 377-7245 (cell).

## Miscellaneous

Lanier RC model airplane kit, 1/4 scale \$50. Call (408) 847-9106 after 6 p.m.

1/2 carat diamond pendant w/chain \$2,000. 1 carat tw 14K solid gold custom made women's ring \$3,500 or B/O nego. Ching (209) 679-1542.

DUAL-CPU computer, P2/333MHz, w/integ. U/W SCSI, sound, AGP slot, and SVGA monitor. \$160. Mike (510) 278-2601.

Electric golf cart. '94 Club car driven around mobile home park. Roof and windshield. Exc. cond., includes charger. \$1,150 or B/O. Call (408) 867-3348 or [rpmckenna@earthlink.net](mailto:rpmckenna@earthlink.net).

## Exchange Information

Information about products, services and opportunities provided to the employee and contractor community by the Ames Exchange Council. Visit the web site at: <http://exchange.arc.nasa.gov>

**Beyond Galileo N-235 (8 a.m. to 2 p.m.)**  
ext. 4-6873

Ask about NASA customized gifts for special occasions. Make your reservations for Chase Park

**Mega Bites N-235 (6 a.m. to 2 p.m.)**  
ext. 4-5969

See daily menu at: <http://exchange.arc.nasa.gov>

**Visitor Center Gift Shop N-223**  
(10 a.m. to 4:00 p.m.) ext. 4-5412

NASA logo merchandise, souvenirs, toys, gifts and educational items.

**Tickets, etc...(N-235, 8 a.m. to 2 p.m.)**  
ext. 4-6873

Check web site for discounts to local attractions, <http://exchange.arc.nasa.gov> and click on tickets.

**NASA Lodge (N-19) 603-7100**

Open 7 days a week, 7:00 a.m. to 10 p.m. Rates from \$40 - \$50.

## Vacation Opportunities

Lake Tahoe-Squaw Valley Twnhse, 3bd/2ba-equipped, balcony view, horseback riding, hiking, biking, golf, river rafting, tennis, ice skating and more. Call (650) 968-4155, [DBMcKellar@aol.com](mailto:DBMcKellar@aol.com)

South Lake Tahoe cottage w/wood fireplace, hot tub. Rates \$50 to \$130 per night. Call (650) 967-7659 or (650) 704-7732.

Vacation rental, Bass Lake, 4 mls south of Yosemite. 3bd/1.5 ba, TV, VCR, MW, frplc, BBQ, priv. boat dock. Sleeps 8. \$1,050/wk. Call (559) 642-3600 or (650) 390-9668.

Big Sur vacation rental, secluded 4bd/2ba house in canyon setting. Fully eqpd kitchen. Access to priv. beach. Tub in patio gdn. Halfway between Carmel and Big Sur. \$175/night for 2; \$225 for 4 and \$250 for more, plus \$150 cleaning dep. Call (650) 328-4427.

Incline Village: Forest pines, Lake Tahoe condo, 3 bd/2 ba, sleeps 8. Fireplc, TV/VCR, MW, W/D, jacuzzi, sauna, pool. \$120/night low season; \$155/night high season. \$90 cleaning fee and 12% Nevada room tax. Charlie (650) 366-1873.

Tahoe Donner vacation home, 2 bd/2ba. trees, deck, sun, fun. Access to pools, spa, golf, horseback riding, \$280 wkend, \$650 week. Call (408) 739-9134.

Pine Mountain Lake vacation home. Access to golf, tennis, lake, swimming, horseback riding, walk to beach. Three bedrooms/sleeps 10. \$100/night. Call (408) 799-4052 or (831) 623-4054.

Full sofa/sleeper, white, upholstery in gd shape. Photo avail. \$350. Call (510) 428-1446.

Bedding, Stearns and Foster full-size mattress/box: \$175. Daybed and trundle w/two twin size mattresses: \$300. Exc. cond. Call (408) 239-6413.

Bonfante Garden tickets on sale for \$15. Proceeds go to Wildlife Education and Rehabilitation Center, a non-profit organization. Call (408) 779-9372.

S-Cargo car top carrier, good cond., approx. 8-9 cubic ft capacity, \$30 or B/O. John (408) 249-8209.

Oak bunk bed w/3 storage drawers, guard rail, ladder, mattresses and linen included, very gd cond., \$300. Call (408) 245-1975 day or eve.



# DANCING

## Every Tuesday at Ames!

*Disco (Hustle): July 1 – 22*

*East Coast Swing: July 29 – August 12*

*Dance Party: August 19*

*West Coast Swing: August 26 – September 9*

*Waltz: September 16 – 30*

*Salsa & Casino Rueda: July 1 – 29*

**Dances starting Tuesday July 1st, 2003:**

5:15 - 6:15 Level 2 Hustle lesson (for more experienced dancers)

6:15 - 7:00 Level 1 Hustle lesson (for less experienced dancers)

7:30 - 8:30 Level 1 Salsa (for less experienced Salsa dancers)

8:30 - 9:30 Level 2 Casino Rueda (for more experienced Rueda dancers)

The Ames Ballroom Dance Club is open to all Ames & Moffett employees, students & retirees. No previous dance experience is necessary for the beginning level 1 and a partner is not required. Just come prepared to learn how to dance and have fun! New dances start every three weeks.

**Location:**  
Building 944, the old Recreation Center on Edgriba Road, across the street from McDonald's and the Golden Bay Credit Union.

**Cost:**  
Your first lesson is FREE -- so come and check it out!  
\$30 for the quarter, \$15 for students, \$5 drop-in per week

**You can learn at the Ames Ballroom Dance Club!**

For further information please contact by email:  
[Helen.Hwang@nasa.gov](mailto:Helen.Hwang@nasa.gov)



*Make it go away  
af2m.arc.nasa.gov*

# Desktop video group provides video-conferencing bridge

Ames personnel are encouraged to use the Ames video-conferencing bridge to bring multiple audio-video clients and end stations together for desktop conferencing. The bridge, known as a multi-controller unit (MCU), allows conferences to be configured in a variety of ways. It can support up to 18 ISDN sites and 30 IP sites with variable rates from 64 kilobits per second (kb/s) for audio to 384 kb/s for ISDN and 448 kb/s for IP.

An audio line, such as a Meet Me number, can also join the conference for those without video capabilities. The MCU has 21 different screen layouts from one user to many users on the same screen to accommodate your video preference.

The MCU can either accept a call or dial to a conferencing end station. Conferences can be supported by an operator or configured to automatically start a conference. An unattended meeting

room can also be set up for regular scheduled meetings.

Users can dial in with a voice-only connection, but to be seen, the video-conferencing bridge requires a Polycom view station, Polycom Via video, or any other H.320 (ISDN) or H.323 (IP) compliant equipment. These systems can range from a small desktop solution that integrates with your existing computer to a full-scale, stand-alone, room-based system.

Video conferencing offers more advantages than simply the convenience of seeing the people with whom you are speaking. The technology saves time and money, allowing participants to conduct business and promote relationships without leaving the home office. For example, here at Ames, the NASA Astrobiology Institute (NAI) has been using the bridge successfully for two years to collaborate with other NASA sites and with universities around the world.

For more information, contact Steve Kyramarios at e-mail: [Steve.N.Kyramarios@nasa.gov](mailto:Steve.N.Kyramarios@nasa.gov)

BY DIANE HAWKS ▲

## SHARP program kicks off at Ames



NASA photo by Dominic Hart

Summer High School Apprenticeship Research Program (SHARP) students pose with their mentors and program staff in June after an orientation session in Bldg. 3 to kick off their intensive eight-week apprenticeship experience at NASA Ames. Twenty-three local high school juniors and seniors from the greater Bay Area comprise a total of 211 students who 'earn and learn' during the commuter component of SHARP at Ames and other NASA field installations. The 23-year-old research-based mentoring program, traditionally designed to increase underrepresented student participation and success rates in science, mathematics, technology, engineering and geography, provides a potential pipeline of diverse and talented professionals in those fields. Under the guidance of their mentors, students conduct meaningful research, prepare written reports and make oral presentations. They also participate in a variety of enrichment activities aimed at developing their professional, communication and leadership skills.

## Ames emergency announcements

To hear the centerwide status recording, call (650) 604-9999 for information announcements and emergency instructions for Ames employees. You can also listen to 1700 KHz AM radio for the same information.



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