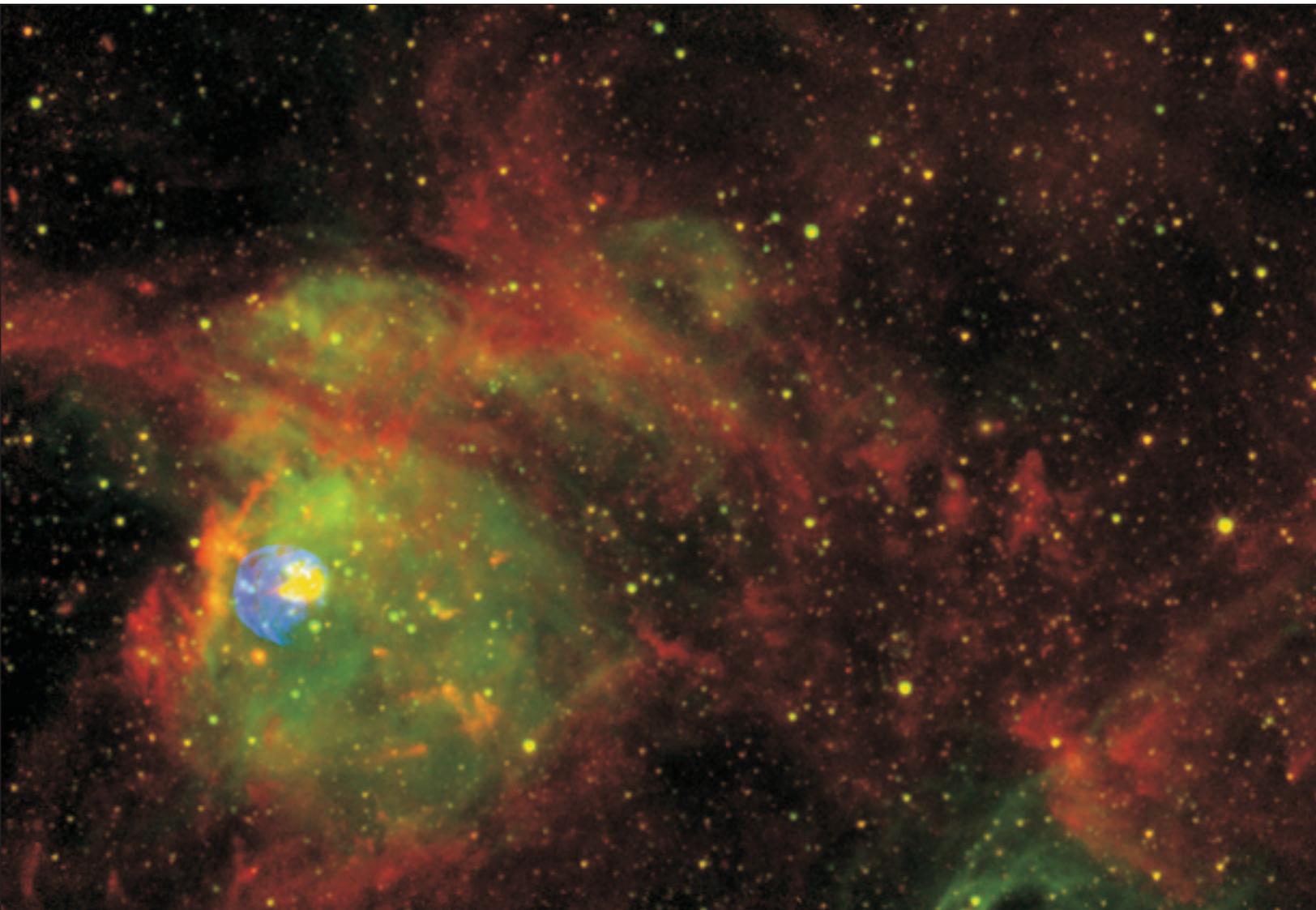




Lyndon B. Johnson Space Center  
SPACE CENTER ROUNDUP  
Volume 45 • Number 12  
DECEMBER 2006

# Roundup



*It's beginning to look a lot like...*

*This composite Hubble image from the far reaches of space captures what appears to be an intergalactic holiday light display. The upcoming Hubble repair mission, scheduled for mid 2008, will provide unlimited possibilities to further understanding of our mysterious universe. To learn more, see story beginning on page 6.*

# FROM THE *director*

A MESSAGE FROM CENTER DIRECTOR MICHAEL L. COATS



I'm hoping that by sharing a very personal experience it may possibly help someone else in our NASA family. Two years ago I had a near-fatal heart attack. This column is an unabashed plea for all of you to get periodic wellness exams. Medical professionals will recommend exams based on your age and risk factors, including many new diagnostic tests available today. There are many ways to modify risk factors for heart disease and to detect disease early, so you can avoid my personal experience.

I've learned a lot about heart disease since my heart stopped beating two minutes after my wife and I walked into a hospital emergency room. A blood clot had completely blocked one artery, and it took 16 shocks with the defibrillator in the ER before my heart could sustain a steady heartbeat long enough to clear the artery with a stent. Even though I had never had high cholesterol, had no family history and had just passed an annual physical, I was fortunate to have classic heart attack symptoms that even I couldn't ignore. But I almost waited too long, as the vast majority of people do, and my wife misses the humor when I joke that I had almost two minutes to spare.

I've learned some interesting facts about heart disease over the last two years. Even though they are generally protected until menopause, far more women die from heart disease than from any other cause, including four times as many as from breast cancer. Recent medical studies indicate that while many more men have "classic" heart attack symptoms (e.g., chest or arm pain, feelings of unease, profuse perspiration), women's symptoms are not nearly as classic and range "from nose to toes." As the ER professionals emphasized during my week in the Intensive Care Unit, when in doubt, get to an emergency room! At worst, it could cost you \$100 when they send you home with indigestion. At best, they can work miracles and save your life. (In fact, you get your \$100 back if you are admitted!)

I talked with many cardiologists, and they all emphasized that "risk factors" for heart disease need to be assessed regularly. The two dominant risk factors are family history and smoking. Others include age (men over 45 and women over 55), excess weight, high cholesterol, high blood pressure, lack of exercise and stress. Your doctor can recommend periodic physicals based on your age and risk factors as well as a test to detect heart disease early. These can include running on a treadmill to EBCT (electron beam computerized tomography) that can detect early calcium buildup in the arteries before it becomes severe. Some simple recommendations to pursue for your own health and well-being include stopping smoking, entering an exercise program, eating right, getting enough sleep and, when necessary, using medications to lower your cholesterol. We have a terrific new wellness program and exercise facility with classes and information that can help you with many of these preventive strategies.

I was lucky in the extreme. I had little or no permanent damage, and I didn't miss the utter joy of playing with my granddaughters. Every one of you, government and contractor, is a precious and valued member of our NASA family. Please don't press your luck like I did.

A handwritten signature in black ink that reads "Mike". The signature is written in a cursive, flowing style.

# Space station broadcasts going high-definition

by Kendra Phipps

**IN THE NEAR FUTURE**, space buffs will be able to get a much better look at the International Space Station and its crew: NASA is going high-definition.

For those whose home televisions are not yet equipped, the high-definition television (HDTV) format provides a much clearer, sharper image than the traditional analog format. According to the Federal Communications Commission, an HDTV picture can contain as many as 1080 horizontal lines, compared with an analog picture's 480. It also features a longer, movie-screen-shaped picture.

"It will be the TV system of the future," said JSC's Carlos Fontanot, chair of the Space Station Imagery Working Group.

To be specific, it will be the system of Feb. 17, 2009 and onward. On that date, analog broadcasting is scheduled to stop, having been replaced by digital. HDTV is one type of digital television. Fontanot said that the format is "pretty much in its infancy right now," but that networks are gearing up for the conversion. Some already offer programming in HDTV.

NASA is joining the ranks of organizations preparing for 2009. In order to get its high-definition ducks in a row, the agency sent an HDTV encoder and professional-quality camera to the space station on the STS-115 mission. The encoder, called Space Video Gateway, has been deployed, configured and powered up, and the space station crew tested the new system with a downlink on Oct. 18.

"Everything went as planned," said Fontanot about the trial run. "It was very successful." He said that the test relied on organizations from around the center, including the imagery group, engineering, space station avionics, public affairs, flight controllers and schedulers, and the Digital TV Working Group from Marshall Space Flight Center.

The first live HDTV programming from the space station took place Nov. 15. Thanks to a Space Act Agreement, the Discovery Channel and the Japanese network NHK had the rights to the programming. This is not the first time that NASA has worked with the HDTV industry: Earlier this year, the agency announced a partnership with HDNet that allows the network to broadcast all remaining shuttle launches in high-definition. However, the live downlink marked the first HDTV broadcast from space.

With the successful test and the first live broadcast under his belt, and the first live broadcast coming up, Fontanot said that he is glad to announce the convergence of HDTV and on-orbit broadcasting.

"HDTV is here!" he said.

For more information about digital television, including HDTV, go to [www.dtv.gov](http://www.dtv.gov).



*ISS Imagery Working Group Chair Carlos Fontanot works in the Mission Control Center during the test, along with Public Affairs Officer Rob Navias.*



*Flight Director Dana Weigel and Capcom Jim "Vegas" Kelly watch the high-definition test from their consoles.*

# Powering up with STS-116

Space Shuttle *Discovery* and its crew will undertake one of the most challenging missions to date in the construction of the International Space Station. STS-116, which is designated as flight 12A.1 in the station assembly sequence, will also include the first station crew rotation by a shuttle mission in four years.

STS-116's construction work will focus on the installation of the Port 5 (P5) integrated truss segment and efforts to reconfigure and redistribute the power generated by the station's U.S. solar arrays. The crew will perform three spacewalks and use the shuttle and station robotic arms to assist.

The STS-116 crew will bring online electricity generated by a second giant set of solar panels that was added to the station during STS-115 in September. The electrical power available to the station's systems will be almost doubled.

## LAUNCH AND DOCKING

*Discovery* will launch from Kennedy Space Center (KSC) to begin a two-day trip to the station. On Flight Day 2, the crew will prepare for docking and conduct shuttle heat shield inspections. Docking is slated for Flight Day 3. The shuttle crew then will spend a week at the orbital outpost conducting spacewalks, transferring cargo and working with the station's Expedition 14 crew.

Launch will mark the start of *Discovery's* 33rd flight into space and the 117th in the history of the shuttle program. STS-116 will be the 20th to the orbital outpost.

## THE CREW

The STS-116 crew is a mixture of veterans and first-time space travelers.

STS-116's commander is Mark Polansky. His first spaceflight in 2001 was as pilot on STS-98, which delivered the U.S. Destiny Laboratory module to the station. Polansky, a former U.S. Air Force pilot, joined NASA as an aerospace engineer in 1992 and became an astronaut candidate in 1996.

Pilot William Oefelein will make his first trip into space during STS-116. He is a commander in the U.S. Navy and became an astronaut candidate in 1998. Oefelein has accumulated 3,000 hours flying time in more than 50 aircraft.

Robert Curbeam will make his third trip into space as a mission specialist and lead spacewalker during STS-116. The Navy captain

joined NASA in 1994, was a member of the STS-85 crew in 1997 and he flew to the station with Polansky on STS-98. Curbeam is an experienced spacewalker with more than 19 hours during three excursions.

Mission specialists Joan Higginbotham, Nicholas Patrick, Christer Fuglesang and Sunita Williams all will make their first flights into space. European Space Agency (ESA) astronaut Thomas Reiter will join the STS-116 crew as a mission specialist when Williams replaces him as a member of the Expedition 14 crew.

Higginbotham's career at NASA began nine years before she was selected as an astronaut candidate in 1996. She supported 53 space shuttle launches at KSC in different engineering and management roles.

Patrick joined NASA in 1998 as an astronaut candidate. He received a doctorate in mechanical engineering from the Massachusetts Institute of Technology and is an experienced pilot.

Fuglesang is a member of the ESA astronaut corps and has a doctorate in experimental particle physics. He has extensive training at NASA and with the Russian Federal Space Agency (Roskosmos).

Williams will be the NASA science officer aboard the station when she becomes a member of the Expedition 14 crew shortly after *Discovery* docks. She is also scheduled to join Expedition 15 during her six-month stay on the station. Williams is a commander in the Navy and was selected as an astronaut candidate in 1998.

Reiter became a member of the Expedition 13 crew in July and the Expedition 14 crew in September. He is the first ESA astronaut to live aboard the station. Reiter previously spent 179 days on the Russian Mir space station in 1997-98.

## CARGO

The P5 truss spacer will ride to the station inside *Discovery's* payload bay and be attached to the P4 truss segment on Flight Day 4. It also will provide an attachment point for the P6 and its set of solar arrays during a future assembly mission.

The P5 truss contains cables that one day will transmit data and power between the P6 Photovoltaic Module and the other



segments of the space station. P3/P4 was added to the space station during STS-115 in September. The P5 will be part of the Integrated Truss Structure, which eventually will span 356 feet.

A small pressurized logistics module (SPACEHAB) will ride to the station inside the payload bay. The pressurized module—measuring 10 feet long, 14 feet wide and 11 feet high—will be filled with about 5,800 pounds of station supplies and research equipment, and an Integrated Cargo Carrier that holds spare parts and equipment.

## SPACEWALKS

The STS-116 crew is slated to conduct three spacewalks. Curbeam will perform all three, teaming with Fuglesang during the first two and Williams for the third. All three spacewalks will be staged out of station's Quest airlock.

Curbeam and Fuglesang will conduct the first spacewalk on Flight Day 4 to assist with the installation of P5 to P4. They will finalize the installation with power, heater and data cable connections.

The mission's second spacewalk is set for Flight Day 6. Curbeam and Fuglesang once again will team to redirect part of the power channel by routing primary power through the Main Bus Switching Units, which have been stored outside the station since 2002.

On Flight Day 8, Curbeam and Williams will finalize the power reconfiguration.

## UNDOCKING AND LANDING

*Discovery* is slated to undock on Flight Day 10. The STS-116 crew will conduct final inspections of the orbiter's heat shield, deploy three small technology-demonstration satellites and prepare for landing. The satellites will be mounted inside canisters in the payload bay.

Landing is scheduled to take place at KSC on Flight Day 13.



Above: *The STS-116 mission will launch no earlier than Dec. 7 from the Kennedy Space Center.*

Left: *Scheduled to launch aboard the Space Shuttle Discovery are, front row (from the left), astronauts William A. Oefelein, pilot; Joan E. Higginbotham, mission specialist; and Mark L. Polansky, commander. On the back row (from the left), are astronauts Robert L. Curbeam, Nicholas J.M. Patrick, Sunita L. Williams and the European Space Agency's Christer Fuglesang, all mission specialists. Williams will join Expedition 14 in progress to serve as a flight engineer and science officer aboard the International Space Station.*

# Hubble re-servicing mission a 'go'

Space shuttle astronauts will make one final house call to NASA's Hubble Space Telescope as part of a mission to extend and improve the observatory's capabilities through 2013.

Hubble is the first major optical telescope to be placed in space, the ultimate mountaintop. Above the distortion of the atmosphere, far above rain clouds and light pollution, Hubble has an unobstructed view of the universe. Scientists have used Hubble to observe the most distant stars and galaxies as well as the planets in our solar system.

From far to near, from the earliest moments in the universe to current sandstorms on the surface of Mars, Hubble's launching in 1990 marks the most significant advance in astronomy since Galileo's telescope. Our view of the universe and our place within it has never been the same.

NASA Administrator Michael Griffin announced plans for a fifth servicing mission to Hubble Tuesday, Oct. 31, during a meeting with agency employees at NASA's Goddard Space Flight Center in Greenbelt, Md. Goddard is the agency center that is responsible for managing Hubble.

"We have conducted a detailed analysis of the performance and procedures necessary to carry out a successful Hubble repair mission over the course of the last three shuttle missions. What we have learned has convinced us that we are able to conduct a safe and effective servicing mission to Hubble," Griffin said. "While there is an inherent risk in all spaceflight activities, the desire to preserve a truly international asset like the Hubble Space Telescope makes doing this mission the right course of action."

This mission will provide unlimited possibilities to further our understanding of our mysterious universe.

"I know (there are) probably a lot of excited and happy astronomers and scientists, but also a lot of teachers and students that use Hubble as a training tool," Michael Good, mission specialist for the fifth Hubble servicing mission, said. "We're looking forward to making Hubble better to inspire and discover."

The flight is tentatively targeted for launch during the spring to fall of 2008. Mission planners are working to determine the best location and vehicle in the manifest to support the needs of Hubble while minimizing impact to International Space Station assembly. The planners are investigating the best way to support a launch mission for the Hubble flight. The present option will keep Launch Pad 39-B at the Kennedy Space Center available for such a rescue flight should it be necessary.

Griffin also announced the astronauts selected for the mission. Veteran astronaut Scott D. Altman will command the final space shuttle mission to Hubble. Navy Reserve Capt. Gregory C.

Johnson will serve as pilot. Mission specialists include veteran spacewalkers John M. Grunsfeld and Michael J. Massimino and first-time space fliers Andrew J. Feustel, Michael T. Good and K. Megan McArthur.

"It really is a great day for discovery and exploration," Altman said. "This is a tremendous opportunity for science and the future. It's thrilling for all of us to be a part of the team to keep Hubble alive."

The two new instruments that will be installed on the Hubble are the Cosmic Origins Spectrograph (COS) and the Wide Field Camera 3 (WFC3). The COS is the most sensitive ultraviolet spectrograph ever flown on Hubble. It will probe the cosmic web, the large-scale structure of the universe whose form is determined by the gravity of dark matter and is traced by the spatial distribution of galaxies and intergalactic gas.

WFC3 is a new camera that is sensitive across a wide range of wavelengths (colors), including infrared, visible and ultraviolet light. It will have a broad spectrum from the planets in our solar system to the early and distant galaxies beyond Hubble's current reach and to nearby galaxies with stories to tell about their star formation histories.

Other planned work includes installing a refurbished Fine Guidance Sensor that will replace one degrading unit of the three units already onboard Hubble. The sensors control the telescope's pointing system. An attempt will also be made to repair the Space Telescope Imaging Spectrograph. Installed in 1997, this spectrograph stopped working in 2004. The instrument is used for high-resolution studies in visible and ultraviolet light of both nearby star systems and distant galaxies, providing information about the motions and chemical makeup of stars, planetary atmospheres and other galaxies.

"Hubble is a really special instrument that resonates with people worldwide, and I am happy to be part of this team," McArthur said.

This special telescope has been one of the most influential in answering questions about our elusive galactic home.

"Hubble has been rewriting astronomy textbooks for more than 15 years, and all of us are looking forward to the new chapters that will be added with future discoveries and insights about our universe," said NASA's Associate Administrator for the Science Mission Directorate Mary Cleave.

The Hubble servicing mission is an 11-day flight. Following launch, the shuttle will rendezvous with the telescope on the third day of the flight. Using the shuttle's mechanical arm, the telescope will be placed on a work platform in the cargo bay. Five separate spacewalks will be needed to accomplish all of the mission objectives.



*Astronauts C. Michael Foale, left, and Claude Nicollier (on Discovery's robotic arm) install a Fine Guidance Sensor into a protective enclosure in the shuttle's payload bay. Foale and Nicollier performed the second of three spacewalks to service the Hubble Space Telescope on the STS-103 mission. A large-format camera inside Discovery's cabin was used to record this image, while the shuttle was orbiting above ocean and clouds.*

“The Hubble mission will be an exciting mission for the shuttle team. The teams have used the experiences gained from Return to Flight and station assembly to craft a very workable Hubble servicing flight. The inspection and repair techniques, along with spacewalk planning from station assembly, were invaluable in showing this mission is feasible,” said Associate Administrator for Space Operations Bill Gerstenmaier. “There are plenty of challenges ahead as the teams do the detailed planning and figure the best way to provide for a launch-on-need capability for the mission. There is no question that this highly motivated and dedicated flight control team will meet the challenge.”

The Hubble is a challenge with tangible payoffs toward space exploration goals.

“The search for planets outside our solar system is a big question. Hubble is part of that,” Grunsfeld said. “It marries science and human spaceflight. It makes discoveries on its own, but also in concert with Spitzer and Chandra (telescopes). So Hubble plays a key role in inspiring young people to go into science and technology, and they may go on to be the first crew to Mars.”

The Hubble servicing mission crew is thrilled to be a part of this exciting new human spaceflight milestone.

“As I've been sitting here, I remember a night when I was 10 and realized a person was standing on the moon,” Altman said. “I thought of how I could go out there. Now we're part of that and we're excited to make Hubble continue to be the success story it is now.”



NASA STS103-402-017

# Home away from home for the holidays

by Kendra Phipps

**“...no matter how far away you roam,  
If you want to be happy in a million ways,  
For the holidays you can't beat home  
sweet home!”**

— “(There's No Place Like) Home for the Holidays”  
by Robert Allen and Al Stillman

Sometimes it just isn't possible to get home for the holidays.

Say, for instance, that you're an astronaut on the International Space Station and Christmas falls in the middle of your six-month mission. Thrilled as you are to be living and working in space, you'd probably wish you could fly home long enough to carve a turkey and open presents with your loved ones.

That situation has been a reality for many astronauts and cosmonauts, and the Operational Psychology Group does everything it can to ease the homesickness.

“Communication, keeping the families connected—that's our highest priority,” said Operational Psychology Group Lead Gabrielle Avina with Wyle Labs.

The team, part of Johnson Space Center's Behavioral Health and Performance Space Medicine Group, strives to make space feel more like home for long-duration crew members. The tools in the team's belt include family videoconferences, online news updates and uplinks of the latest movies, just to name a few.

Every so often, in addition to the virtual visits and electronic entertainment, the Operational Psychology Group gets to send up more tangible reminders of home: crew care packages. These special deliveries, which arrive on space shuttles and Russian

Progress spacecraft, contain items like pictures, snack foods and handwritten cards and letters.

Care packages take on extra significance around the holidays, when they often contain festive, personalized Christmas stockings for each crew member.

Nancy “Tad” Young, administrative associate with the group, said that this tradition began in 1989 in the Krug (now Wyle) Softgoods Lab. The stockings were made from Nomex, a colorful and fire-resistant fabric, but the team members knew they needed a little something extra.

“I was asked to paint on them with flight-approved Sharpie markers,” said Young, who has added her artistic flair to the stockings ever since. She creates a drawing on paper—trying not to duplicate any past designs—then paints it on a stocking and adds the crew member’s name in English or Russian.

While the stockings are certainly keepsakes, it just wouldn’t be right to send them up to space empty. The Group stuffs them with small treats and gifts, including items from the astronauts’ families, adds a Velcro closure and sends them up on the flight closest to Christmas. STS-116 will do the honors this year.

Astronauts and cosmonauts also deck the “halls” of the space station with a custom-designed Nomex Christmas tree, which was delivered by STS-112 and is reused each year.

Young said she enjoys being a part of these unique traditions.

“The crew members are away from their families at holiday time,” she said, “and it just tickles me to think that the personalized stockings I paint could possibly bring a little smile.”

The gifts may arrive through an airlock instead of a chimney, but the spirit remains the same. The same present-opening rules apply, too.

“We put a note on them that says ‘Don’t open till Christmas,’” said Avina. “Hopefully they won’t peek.”



Above: Astronaut William S. (Bill) McArthur Jr., Expedition 12 commander and NASA space station science officer, poses with Christmas decorations in the Destiny Laboratory of the International Space Station.



Every year, the team sends up Christmas stockings like these, decorated by Nancy “Tad” Young.

Opposite page: It’s not often that Santa hats and short-sleeve shirts are worn together, but the STS-103 crew members felt quite natural blending the two onboard the Space Shuttle Discovery. In front are (from left) astronauts Claude Nicollier, Scott J. Kelly and John M. Grunsfeld. In the rear are (from left) Steven L. Smith, C. Michael Foale, Curtis L. Brown Jr., and Jean-Francois Clervoy. Brown and Kelly were commander and pilot, respectively. All the others are mission specialists, with Smith serving as payload commander.

THE HABITABILITY DESIGN CENTER MAKES REALITY...

# What the mind conceives

By Catherine E. Borsché

**A**vivid imagination tops the list of required job skills for the team that works in the Habitability Design Center (HDC) at Johnson Space Center. On any given day, you can find HDC team members doing computer-aided design, drawing rough sketches of a future lunar rover, creating a wooden spaceship mockup or trying to simplify a graph for a future crew's instruction manual. The team takes what is only a grandiose idea and turns it into something concrete for engineers to work with.

The group, comprised of aerospace architects, resides within the Habitability and Human Factors Branch. Its biggest challenge is incorporating the human element into futuristic engineering designs for extreme environments.

"It's just a great era right now to be a conceptual designer at NASA, because you have all these new vehicles that we're building. There are a lot of eras where this team might have been bored, but right now is a good time for industrial designers and architects to be here," Rich Szabo, Human Factors design engineer, said.

"What we have been tasked to do is to try and really get human factors incorporated into the engineering design processes," Evan Twyford, aerospace

architect, said. "Traditionally the human element hasn't been treated as its own subsystem, and I think that's one of the (really) important things we have been trying to accomplish. We want human requirements up to the same level as environmental control, avionics and all the other stuff that goes into the building of a spacecraft or living quarters."

One of the main goals of the team is to create a product or an environment so seamless that it does not detract from the actual task an astronaut would perform.

"We're all about maximizing efficiency through design. We look at the actual architecture of the interior and where things are located, such as stowage or instrumental controls," Twyford said.

"We're unique from any other design group here at JSC, or across NASA, because we're focused on using human factors as a design tool," Szabo said. "Other design teams generally reside within an engineering directorate environment, where it's all about meeting requirements. But we try to have a different focus and combine design skill with human factors knowledge."

When it comes to perfecting its designs, the HDC team thinks in more abstract terms. Not only do its members value simplicity and function, but they are also



cognizant of the "wow" factor.

"Our secondary objective is to create anticipation by presenting cool solutions, so whether the public is seeing the image in a magazine or in a news article or on the Internet, it's something that can excite the mind," Chip Conlee, aerospace architect, said.

Szabo had his own analogy for their creative process.

"It's the same as taking a basic product like a shopping cart and creating something that not only is a great design, but also viscerally looks cool, so you are eager to use it. We want to get people enthusiastic about this hardware and some of the space vehicles again—and not just create cut-aluminum, boring, inside-of-a-Boeing airplane-type interiors," Szabo said.

*Habitability Design Center and Lunar Lander team members discuss vehicle internal architecture.*



*Habitability Design Center team members, from left to right, are Rich Szabo, Garrett Finney, Robert Howard, Evan Twyford and Chip Conlee.*

To get its plans implemented into reality, the team works with a variety of groups across NASA, many of which are integrally involved with engineering.

“Typically we are brought in pretty early in the process. We provide a lot of conceptual design solutions, and I think one of our big strengths is the ability to come out with a lot of really good ideas and drawings to help the engineers work through these concepts before anything gets too set in stone,” Twyford said.

The HDC team is working on the cutting edge of new exploration goals. A big project that the team recently completed was a lunar lander study with Architecture Habitation Integration. The aim of this intense, 12-week project was to create a lunar lander concept with fuel tanks that could be purged after a lunar landing and outfitted for habitation inside of the tanks. The crew of the lunar lander would essentially attach all the spent tanks together and then use the old tanks as an outpost. The HDC team did a lot of the conceptual design work and built mockups for the task.

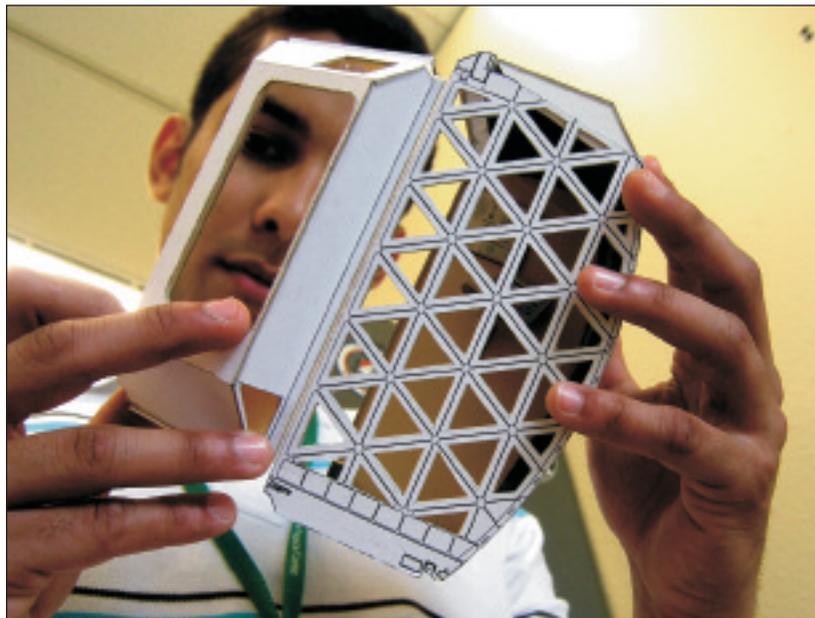
The HDC team also built a Crew Exploration Vehicle mockup for evaluation, and now its members are moving on to other stimulating projects—potentially a lunar rover.

The team is currently working on a project with a tighter-than-normal timeline for completion.

“We’re also working the Crew Quarters Project for the International Space Station. The Crew Quarters element is scheduled to fly in about a year and a half and just went through a 10-percent design review,” Szabo said. “So we do work on actual hardware that’s going to fly rather soon and is going through its critical design review. Our team is capable of going past that early design comfort zone and staying with it through its core design reviews.”

Boredom is never a concern for the HDC team, as its members relish the unique experiences they have on the job.

“It’s exciting to be on the ground level of where the really innovative stuff is happening at NASA and to be able to go home and read in magazines about what NASA’s plans are, and then see the project you’ve been working on for months—it’s just really cool,” Twyford said.



**Top photo:** *Chip Conlee, aerospace architect, evaluates the displays and controls configuration inside the ascent vehicle.*

**Above:** *Early in the design process, the Habitability Design Center generates scale models to make engineering concepts tangible to the NASA community.*



# The X Prize Cup encourages space entrepreneurs

The spaceflight faithful made their pilgrimage to the New Mexico desert for the second annual X PRIZE Cup—a metaphorical Mecca for fans of commercializing space transportation and tourism.

Following an executive summit of the world's visionaries and leaders in science, exploration and technology, the two-day event in late October filled the Las Cruces skies with rocket launches, aircraft fly-overs and space competitions.



## Space Center Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Johnson Space Center, Houston, Texas, and is published by the Public Affairs Office for all Space Center employees. The Roundup office is in Bldg. 2, Rm. 166A. The mail code is AP411. Visit our Web site at: <http://www.jsc.nasa.gov/roundup/online/> For distribution questions or to suggest a story idea, please call 281/244-6397 or send an e-mail to [jsc-roundup@mail.nasa.gov](mailto:jsc-roundup@mail.nasa.gov).

Joanne Hale Editor  
Kendra Phipps Assistant Editor  
Catherine Borsché Staff Writer  
Marshall Mellard Graphic Designer

**PRSR STD**  
**U.S. POSTAGE**  
**PAID**  
WEBSTER, TX  
Permit No. 39