



## Mission update

### STS-103

**Target launch date:** Dec. 6 at 2:37 a.m. EST  
**Launch window:** 42 minutes  
**Target landing date:** Dec. 16 at 12:45 a.m. EST  
**Mission duration:** 9 days, 22 hours  
**Orbiter:** Discovery, OV-103

### STS-99



**Target launch date:** Jan. 13, 2000 at 7:18 a.m. EST  
**Launch window:** 2 hours, 30 minutes  
**Target landing date:** Jan. 24 at 11:22 a.m. EST  
**Mission duration:** 11 days, 4 hours  
**Orbiter:** Endeavour, OV-105

## Spaceport News editorial change

*Spaceport News* will have a new editor, effective with the Nov. 26 issue.

Please direct all comments and suggestions to Gary White, *Spaceport News* editor. He can be reached by e-mail at Gary.White-4@ksc.nasa.gov or by phone at (321) 867-2814.

# Spaceport News

America's gateway to the universe. Leading the world in preparing and launching missions to Earth and beyond.

John F. Kennedy Space Center

## Paving the road to KSC 2000

In an Aug. 31 presentation to employees, KSC Director Roy Bridges outlined a plan to take a hard look at the center's organizational structure in order to better direct its transition into a Spaceport Technology Center.

### KSC 2000 Team Basic Tenets

- Existing work must continue safely and successfully.
- No employee will lose his or her civil service status, but some may have new opportunities to assure our future as a center.
- Our customers need us to be successful.
- We want and need your input, understanding and full support.

The plan called for the formation of the KSC 2000 Team, constructed of a small core team of strategists, a larger group of organizational representatives and several outside consultants. *Spaceport News* recently met with the core team to discuss what progress has been made since Aug. 31, what the group is working on currently, and where the center is headed.

**Q. It's been two months since you were formed as a team. What have you done since then?**

**A.** Initially, we laid out a project plan and broke it up into different phases. The first phase was data gathering, synthesis and analysis. The second phase is model development, and the third phase will be to form organizational implementation teams.

Up until now, we've spent a lot of time in the data gathering, synthesis and analysis stage, which has been

very labor intensive. For example, we sent out questionnaires to all NASA directorates at KSC and asked them to respond to a specific set of questions about their organizational structure, how they manage their workforce and their respective roles. We have defined each organization's products and key processes.

We also prepared issue papers, which we've put on the table for discussion across the center. These papers were also on the KSC 2000 Web site to solicit employees' input on specific topics.

Organizational representatives to the KSC 2000 effort then evaluated and synthesized all of the information gathered.

**Q. What are data synthesis teams?**

**A.** We have six different data

(See KSC 2000, Page 4)

## Buzzards tour the VAB as part of migratory trip

They don't appear to be the typical snowbirds one might expect to see in Florida, but the turkey vultures and black vultures (commonly referred to as buzzards) that have been entering KSC's Vehicle Assembly Building (VAB) over the past few weeks are indeed migratory creatures.

Not unlike the snowbirds, a large number of turkey vultures like to winter in Florida. During their recent migration from the northeastern United States on their way down south, several turkey vultures decided to take a tour — or a detour — from their usual outdoor journey for a closer inside inspection of the VAB.

Once they entered the premises, however, some weren't sure how to leave.

"It's not unusual for birds to get themselves into a situation where



Two turkey vultures take a stroll around the sub-roof of the Vehicle Assembly Building.

they don't know how to get out," commented Eric Stolen, a wildlife biologist with Dynamac.

Stolen is a member of the

Buzzard Abatement Team, recently formed at KSC to address the

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# Birds ...

(Continued from Page 1)

turkey vulture situation in the VAB.

Stolen's previous experiences studying black vulture and turkey vulture foraging behavior as part of his graduate work at University of Central Florida came in handy on the team.

"Turkey vultures are very social," Stolen noted. "They roost communally, so people are bound to see large aggregates of them together. It's unfortunate that people tend to be afraid of vultures or large birds in general since they typically aren't a threat to people."

But they can be a threat to other things, such as building materials.

"They like to pick at things," Stolen added. "It's just part of their behavior. They have been known to

pick screens apart over pool enclosures or pull at the roofs on houses."

For this reason and for health-related issues, the team, led by Spencer Woodward, NASA test director in the Launch and Landing Office, discussed ways to safeguard KSC's assets while protecting the buzzards and preventing their entry into areas from which they couldn't escape.

"Buzzards entering the VAB is not a new situation," Woodward said, "but they've found their way into access areas to the 41st floor and above. Once there, they make themselves at home; they don't know how to leave the building. Unfortunately, this creates a potential health hazard — both to VAB workers and to the birds."

Bird droppings, for example, on



A lone turkey vulture looks over VAB activity from the light structure on an upper level floor.

floors, pipes and other areas created a need for a thorough cleaning.

So the team needed to comprise representatives from many different areas across Kennedy Space Center.

Members of the team include participants from NASA (including Operational Television, or OTV, for monitoring buzzard entry and activity), United Space Alliance (for Occupational Safety and Health, crane operations and overall safety concerns), Dynamac, Launch Coast Services (for clean-up) and the United States Fish and Wildlife Service (for bird removal).

"We use a hoop net or trap that won't hurt the bird and then we put it in a bag and release it," said Marc Epstein, a biologist with the

U.S. Fish and Wildlife Service.

The wildlife agency is continuing to assist NASA with removal of the birds from the Vehicle Assembly Building until a solution can be found.

In addition, the U.S. Fish and Wildlife Service is providing technical assistance (such as explaining how to stop the birds from entering the building and being trapped) to the team in order to reach a solution.

The team has resolved to block the buzzards' access to the VAB's upper levels with a mesh material as a physical barrier.

Scaffolding and netting will also be installed to reduce risk, however minimal, to flight hardware from falling birds or debris.



## Florida Space Launch Symposium nears

The fifth annual Florida Space Launch Symposium is scheduled for Nov. 16-17 at the Airport Hilton in Melbourne, Fla.

This nationally recognized event will feature spacecraft manufacturers, launch providers, payload processors, insurers, representatives from the legal community and government experts working together to advance the U.S. space program.

This year's theme,

"Planning Together for a New Vision," highlights the Cape Canaveral Spaceport's 50 years of unmatched expertise in bringing people to space and space to people.

Panel members will discuss the latest technologies, policies and trends associate with space transportation in an open-dialogue forum with all participants.

KSC Director Roy Bridges is scheduled to attend the symposium.

## Tenth annual Business Opportunities Expo



On Oct. 27, the 10th annual KSC and 45th Space Wing Business Opportunities Expo was held at Port Canaveral. The event attracted more than 900 NASA and contractor technical and procurement staff to network with about 130 supply and service vendors from across the southeast. Exhibitors displayed a wide range of computer technology, valves, test and measurement equipment and employment services. Most exhibitors provided information and demonstrations. The expo is sponsored annually by the NASA/KSC Small Business Council, the 45th Space Wing and Canaveral Port Authority.

# Kerr named to SES position

Scott Kerr has been named deputy manager, Expendable Launch Vehicles (ELVs) and Payload Carriers Programs, effective Oct. 24. In this Senior Executive Staff (SES) position, Kerr is responsible for program integration of NASA ELV and payload carriers activities at KSC.

Prior to this position, Kerr was deputy director, Payloads Processing Support.

Then, he was responsible for the development, operation and maintenance of the engineering of payload data management systems, payload facilities systems and equipment, payload test and checkout systems, expendable launch vehicle telemetry systems, payloads and ELV communication and network systems. He was also responsible for sustaining engineering of all payload ground support equipment. His management responsibility was for 104 NASA employees and technical oversight of more than 600 contractor staff.

From 1993 to 1997, Kerr was chief, Engineering Systems Division. Prior to that position, he was chief of the Checkout and Communications Branch, responsible for payload checkout



Scott Kerr

systems and payload communications systems.

Since he joined NASA in 1988, he has also served as chief of the Networks and Communications Section and network manager, Payload Management and Operations Directorate.

Kerr received a bachelor of science degree in Physics in 1979 from Montana State University, a master's degree in Space Technology from Florida Institute of Technology in 1995, and was a NASA Fellow at Massachusetts Institute of Technology's Center for Advanced Engineering Study in 1995.

## November employees of the month



November employees of the month are, left to right, Pamela Bohn, Safety and Mission Assurance; Maria Stelzer, Logistic Operations; Karen Crook, ELV and Payload Carriers Programs Office; Truemilla Johnson, Administration Office; Maxine Cherry, Engineering Development; Deborah Denney, Office of the Chief Financial Officer; Jim Draus, Shuttle Processing; Kurt Leucht, Checkout and Launch Control System Office; Michele Foster, Joint Performance Management Office; Susie Barth, Space Shuttle Program Launch Integration; Barbra Bronsberg, Installation Operations; Dawn Shaible, Space Station Hardware Integration Office; and Connie Wilcox, Procurement Office. Not shown is Robert Wark, Space Station and Shuttle Payloads.



AFL-CIO President John Sweeney toured KSC on Nov. 1, taking time to speak with managers and workers during his visit. He is seen here shaking the hand of an employee in KSC's Vehicle Assembly Building. Sweeney visited the area because he was a keynote speaker at an employee benefits conference in Orlando. About 5,000 union employees work in the space program. Seven affiliated international unions belonging to the

AFL-CIO are represented at the space center. Positive labor-management relations are fostered by NASA's Relations Management Office.

## Native American Heritage Month celebrated this month



The month of November is set aside for celebration of Native American Heritage Month. During this month, KSC employees take time to reflect on the valuable contributions of Native Americans to our country, society and to the

KSC community. On Nov. 8, the KSC Native American Intertribal Council (NAIC) hosted a Celebration of Drums, Song and Dance (top).



The Native American Intertribal Council, which is an organization for KSC employees of Native American descent, hosted the event. Above, Delores Green, a crew quarters manager in KSC's Astronaut Office, got a close-up look at a Native American dance costume. The council, which is dedicated to celebrating the Native American culture, meets regularly to share native heritage, further cultural exchange and foster knowledge of our respective heritages.

# KSC 2000 ...

*(Continued from Page 1)*

synthesis teams, each with a different charter. Team One looked at unnecessary duplication and overlap throughout the center. This is our Common Functions Team.

Team Two has looked at the proper role of the KSC civil servant, and they've taken a hard look at what a civil servant should do and what a contractor should do. This is our Civil Service Role Team.

Team Three looked at technology development: What does technology development truly mean, and how do we get a handle on the number of ongoing projects we have across the center?

We asked a fourth team to give us an independent evaluation on whether they thought our organizations are scoped at about the right size and identify where there may be areas in which we can realize greater efficiencies and make improvements. This is the Organizational Headcounts/Critical Mass Team.

A fifth team was formed to look at organizational business practices in private industry, and they've come back to us with suggestions on different modeling techniques. This is the Organizational Model Concepts Team.

And finally, Team Six has been looking at implementation

techniques that we can use as we reach the final phases of this transition. This is the Implementation Requirements Team.

Three or four organizational representatives make up each team, and they have all worn centerwide hats — thinking about the good of the center as a whole. These are people who have a great deal of experience in a lot of different organizations at KSC, so experience has been factored into everything that we do.

### Q. What exactly did these data synthesis teams do?

A. Each team had a charter, which was basically a set of deliverables that we asked for.

They've had access to all of the data collected thus far and have been key contributors to the reorganization effort. They provided us with reports based on their findings, including recommendations on possible improvement areas; outsourcing options; areas in which we might need skills in the future; possible realignment, restructuring or consolidation; making organizations more effective and efficient; and incorporating industry's best practices.

We've gathered a tremendous amount of data, and synthesis is the process we're using to turn that data into information that we can use to make wise decisions as we move forward.

### Q. How are you moving

### forward?

A. We've taken this information and pulled it all together to develop high-level models.

For example, we defined four specific models: a functional model, a process model, a product model, and a competency-based model. We gave the teams a definition of what we meant by those models, and the teams are now structured as 'model development teams' to go and flesh out what these models might look like in great detail.

We also formed two wild card (freelance) teams to go off and develop models from scratch.

So in total we have six different teams working on model development. We expect that whatever model is ultimately adopted at Kennedy Space Center, it will probably be a hybrid of the models from all six teams.

For example, what might be a good model based on product, competency or process may be good for certain purposes, but not for other business purposes.

So what we hope to do by focussing on these four kinds of models plus the two freelance models is drive out the best kinds of practices for all parts of the organization, and we'll develop a hybrid that will suit all the needs of the center.

### Q. On your Web page, you state that "members of the KSC 2000 Team traveled to Wright Patterson Air Force Base to benchmark a competency-based organization." What did you learn?

A. We have gone to Wright Patterson, we've gone to Marshall Space Flight Center, we've conducted phone interviews with other organizations, plus we have consultants working with us who bring with them a database of industry best practices.

The trip to Wright Patterson was significant because the organization we looked at out there is where they develop all of the aircraft systems for the Air Force, so it was a strong development organization.

It's important that we understand that so we can evaluate their systems as we look at our growth in becoming a development organization as well.

### Q. What can employees who work primarily in operations expect as KSC transitions into a 'development center'?

A. We have to keep in mind that we're Kennedy Space Center. We have a very, very vibrant operational role that's going to continue for quite some time. The trick is striking a balance between maintaining a strong operational presence and starting to build a technology development role.

One of our primary objectives is to recognize KSC's continuing inherently governmental operational role and culture while institutionalizing a technology development role and culture.

We're not phasing out operations and going strictly into development. We're evolving into a culture that allows both, because we need both.

As we progress further as a Spaceport Technology Center, we really need to get away from folks identifying themselves as strictly 'operations' or 'development.'

We are all Spaceport Technology, and we all have a role. We're all part of the team that is Kennedy Spaceport.

Everyone who is part of Kennedy Space Center today will be part of Kennedy Space Center after this restructuring. An employee may be in another group or have new opportunities, but everyone will be part of the new organization.

### Q. What kinds of opportunities?

A. From a career standpoint, restructuring will offer opportunities to broaden backgrounds, experience and education. Positions may also get more competitive.

The space program has changed dramatically in the past decade, as we move more toward space commercialization.

This has had a significant impact on NASA, and the Agency is more cognizant of the business realities and the types of changes that are needed to make us more competitive.

### Q. What will restructuring bring to Kennedy Space Center?

A. We have more business today than we can handle. We need to

**(See Transition, Page 5)**

## KSC 2000 Team Objectives

- Identify resources for technology development work at KSC while continuing safe and effective support of customers
- Recognize a continuing inherently governmental sustaining (operational) role and culture while institutionalizing a technology development role and culture at KSC
- Attract, develop and retain a highly competent, agile and flexible workforce
- Posture KSC to live within allotted resources (dollars and people)
- Minimize organizational self-reliance and functional duplication across KSC by providing an accountable/responsive service structure and culture
- Provide new KSC customers with a single "one stop shopping" interface
- Improve alignment of KSC workforce with KSC Implementation Plan and Roadmap

# The Leonids are coming! The Leonids are coming!

As our society comes to rely on satellites, cell phones, and other space-age gadgets, forecasting solar storms and meteor showers may become just as important as knowing the chances of rain tomorrow.

And as early as next week, we may be treated to a very visible reminder of the importance of space weather when a Leonid meteor shower strikes on Nov. 18.

A Leonid meteor shower happens every year around Nov. 17 when Earth passes close to the orbit of comet Tempel-Tuttle.

Usually not much happens. The Earth plows through a diffuse cloud of old comet dust that shares Tempel-Tuttle's orbit, and the debris burns up harmlessly in Earth's atmosphere. A typical Leonid meteor shower consists of a meager 10 to 20 shooting stars per hour.

But every 33 years, something special happens. Comet Tempel-Tuttle swings through the inner solar system and brings a dense cloud of debris with it.

For three or four years after its passage, the Leonids can be very active. In 1966, for example, more than 100,000 meteors per hour were seen from parts of North America.

Curiously, there isn't a full-fledged storm every time Tempel-Tuttle passes by. Sometimes there's simply a stronger-than-average shower. Sometimes nothing happens at all.

So what's the probability of a significant meteoroid precipitation this year? That's what stargazers

and satellite operators everywhere would love to know.

Most experts would agree that predicting the Leonids can be tricky. To understand why it's so difficult, it is helpful to know the difference between a "meteor shower" and a "meteor storm."

Simply put, meteor showers are small and meteor storms are big. Meteor showers produce a few to a few hundred shooting stars per hour. Meteor storms produce a few thousand to a few hundred thousand meteors per hour. A meteor storm, like a total solar eclipse, ranks as one of nature's rarest and most beautiful wonders.

So will there be a storm in 1999? Experts say probably yes.

Tempel-Tuttle visited the inner solar system most recently in late 1997 and early 1998. The subsequent Leonids display, in November 1998, was observed by people all over the world as a dazzling display of fireballs (shooting stars with magnitudes brighter than -3).

Nevertheless, the 1998 Leonids were a shower, not a storm. The maximum rate of meteors last year was about 250 per hour.

Scientists have learned that if the Earth crosses the orbit of Tempel-Tuttle too soon after the comets passage, then there is no storm, just a strong shower.

Apparently that's what happened in 1998. In recent history, no Leonid storm has ever occurred fewer than 300 days after Tempel-Tuttle passed by Earth's orbit. In 1998, Earth followed the comet to the orbit-crossing point by only



This photo of the 1998 Leonid meteor shower on Nov. 17, 1998, shows the Little Dipper to the lower left, and the Big Dipper on its handle to the right. There are a total of seven meteors seen here, with the upper left meteor being about -2 magnitude, and the upper center right meteor about -3 magnitude. Can you find all seven meteors?

257 days.

The period of maximum activity during the 1998 Leonid shower took place about 12 hours before the Earth crossed Tempel-Tuttle's orbital plane.

The early activity caught many observers by surprise, but it was business as usual for the unpredictable Leonids. Rainer Arlt of the International Meteor Organization noted that while the maximum activity came early, there was a secondary maximum when the Earth passed the comet's orbit.

This pattern is similar to that observed in 1965, the year that preceded the great Leonids storm of 1966.

That year, the Leonids was one of the greatest displays in history, with a maximum rate of 2,400 meteors per minute or 144,000 per hour. The 1966 event was somewhat unexpected. The comet had passed by Earth's orbit in 1965, so astronomers were aware that something might happen. But, judging by the paucity of the 1899 and 1932 showers, it was widely thought that the orbit of the debris stream had been deflected so much by gravitational encounters with other planets (mainly Jupiter) that a close encounter with Earth's orbit was no longer possible.

The best predictions suggested a strong shower over Western Europe with 100 or so meteors per hour. Instead, there was an stunning display of shooting stars over

western North America.

If the 1999 Leonids are anything like the 1966 storm, stargazers are definitely in for a treat.

In 1999, the Earth will pass nearly three times as far from the comet's orbital path as it did in 1966 and more than six times farther than it did during the great storm of 1833.

If the peak of the Leonids arrives exactly when the Earth passes through the comet's orbital plane, scientists indicate that Europe and West Africa would be the best places to watch the show. However, Leonid meteor showers frequently arrive much earlier or later than predicted, so any place on the globe could be favored.

If the peak of the Leonids occurs over Europe or the Atlantic Ocean, then observers in the United States could be in for an unusual treat. The Leonid radiant would just be rising over North America at the time.

In the eastern United States, sky watchers would see a large number of earth-grazing meteors skimming horizontally through the upper atmosphere. "Earth grazers" are typically long and dramatic, streaking far across the sky.

Most experts agree that 1999 is the most likely year for a Leonids meteor storm during the current 33 year cycle. However, if 1999 turns out to be a disappointment, don't

## Transition ...

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restructure so that we can take on more varied and exciting business.

We hope that at some point in time, Kennedy Space Center will be the epicenter of the world's spaceports.

We want to make Kennedy Space Center more valuable to our customers because our customers can only be successful if we are successful.

### Q. When can employees expect to see some of this restructuring commence?

A. Phase One of data gathering, synthesis and analysis wrapped up in October. We expect to complete model development in November and commence implementation later this year, perhaps early next year.

By year's end, employees will most likely have a clearer picture of what kinds of changes they can expect.

(See Leonids, Page 8)

# KSC/CCAS Open House was a full house

The KSC/Cape Canaveral Air Station (CCAS) Open House was host to employees and their families who came to tour America's spaceport on Nov. 6. More than 8,030 vehicles entered through KSC and CCAS gates on this sunny Saturday to enjoy many popular attractions, such as a view of the orbiter Atlantis in Orbiter Processing Facility Bay 3 (at right) and the Freedom Star solid rocket booster retrieval ship at CCAS' Hangar AF (below).



Thomas Pentrack (at right) points out a space suit in the International Space Station Center to his son, Michael, as crowds stream past a solid rocket booster nose cone in the Vehicle Assembly Building (below). Other families got a good look at Destiny (the U.S. Laboratory) in the ISS Center (below left), while fireman helped children get a handle on fire safety during a demonstration at KSC's Fire Station (left).



## National Space Club luncheon planned

Controversial at times and called "the most ambitious engineering feat ever attempted by mankind" by some, the International Space Station will be the subject of the November luncheon of the National Space Club, Florida Committee.

Brewster Shaw, Boeing vice president and general manager, International Space Station (ISS), will be guest speaker.

Shaw leads a multi-contractor industry team in designing, developing, testing, launching and operating NASA's international orbiting laboratory. Boeing is NASA's prime contractor and supplier of all the U.S. hardware and software.

During his government career, Shaw has served as combat fighter pilot, test pilot and Space Shuttle astronaut and program manager. He is a veteran of three space shuttle flights and has logged 533 hours of space flight. He has held a series of increasingly responsible positions with the Boeing Company and at Rocketdyne Propulsion and Power.

The luncheon will be held Friday, Nov. 19, beginning at 11:30 a.m. at La Cita County Club in Titusville. Individual tickets are \$16 with corporate tables of eight available for \$150 each.

Reservations can be placed with Judy Casper at 459-1067.

## KSC transitioning into a Spaceport Technology Center

In KSC's ongoing transition into becoming a Spaceport Technology Center — where development activities are just as vital and visible as operations — *Spaceport News* is devoting a series of articles to the center's projects and progress. These are but two of the stories covered in KSC's most recent report on research and technology, which includes 81 separate projects in differing stages of development.

### Oxydizer Scrubber Liquor Control System

This new technology promises multiple environmental benefits by eliminating the second-largest waste stream at KSC and in the process generating a high-quality fertilizer.

The Technology Development office initiated the project about six years ago as a means of reducing the hazardous wastes that result when hypergolic oxidizer is loaded into the Space Shuttle and some payloads. The hazardous waste generated from this operation was an estimated 311,000 pounds each year with an annual disposal cost estimated at \$70,600.

Engineers came up with an improved process that uses an on-demand potassium hydroxide feed process instead of a batch sodium hydroxide process. Consequently, instead of hazardous waste, the process produced pH neutral potassium nitrate — a fertilizer that can be sprayed directly onto the ground. Plans call for the fertilizer to be used on citrus groves at KSC.

In addition to changing hazardous waste to fertilizer, the process uses hydrogen peroxide to enhance the efficiency of the scrubber, thus preventing pollutants (nitrogen oxides) from entering the atmosphere.

After laboratory tests and field tests, engineers have developed a prototype for an oxidizer scrubber control system that further refines the

process.

NASA, in conjunction with Dynacs Engineering Co., Inc., and United Space Alliance, plans to install the new oxidizer scrubber control system on Launch Complex 39 Pad A. Validation testing of the new system is scheduled for November and December 1999. Installation on Pad 39B and other facilities such as the Orbiter Processing Facility and Hypergol Maintenance Facility is planned for future years.

Rebecca Young, former KSC Clean Air Program manager and waste management authority, said, "To see the success of this project is very gratifying, as it not only prevents pollution and reduces waste, it also provides a useful commodity, the fertilizer, for the KSC citrus grove."

### X-33 Rocket System Fuel Tank Electrostatic Coating

The X-33 rocket program serves as a demonstration of the design for future single-stage-to-orbit reusable launch vehicles. A potential design flaw led to a project in which the Materials Science Laboratory is working to develop a coating material that could prove valuable in many commercial applications. In its current design, the X-33 contains a small space between its fuel and oxidizer tanks and its outer shell, an area in which fuel and oxygen vapors could accumulate.

Shortly before construction of the first vehicle, it became apparent that the insulating foam on the outside of the tanks had dangerous electrostatic properties. The position of the coating in a difficult-to-reach location added to the challenge. After a testing process, the Materials Science Laboratory settled on a lightweight electrostatic coating for all fuel and oxygen tanks. But further review created doubts about whether the material could withstand the high temperatures of re-entry from space as well as periods of multiple launches without maintenance.

The KSC team conducted more tests and finally came up with another material that consists of small foam beads coated with silver and applied with an epoxy base. Subsequent testing satisfied concerns about the capacity of the coating to retain its antistatic properties amid elevated temperatures and extended launch cycles.



## KSC employees cared and shared in '99 CFC

This year's Combined Federal Campaign, the annual time for federal employees to reach out and help people in need, ended on a high note.

NASA employees at KSC, including those assigned to KSC resident offices and the Office of the Inspector General, generously contributed in excess of \$245,000 — far exceeding the assigned dollar goal of \$216,000.

"This campaign just confirmed what I already knew," said KSC Director Roy Bridges. "Our employees always rise to the occasion. Their generosity remains strong, and they truly lived up to this year's campaign slogan: 'Those who care, share!'"

Barbara Brown, who was this year's campaign chairperson, agreed: "The campaign cabinet, unit coordinators and key solicitors worked extremely hard in making quality



contacts, and the employees responded — as always. The results speak for themselves."

This year's CFC Victory Celebration Picnic will be combined with the KSC holiday celebration to be held next month.

# Discovery rolls one step closer to Hubble mission launch

The Space Shuttle Discovery rolled over from Orbiter Processing Facility Bay 1 on Nov. 4 to the Vehicle Assembly Building, where it was mated with an external tank and solid rocket boosters for launch of STS-103.

At press time, Discovery remained in the VAB to change out a main engine, with a launch date set for Dec. 6. Discovery's crew is slated for a 10-day mission to rendezvous with and repair the Hubble Space Telescope during four spacewalks.

The mission will be the third to repair the nine-year-old observatory. Hubble was launched into orbit aboard Discovery on April 24, 1990, and has provided revolutionary insights into the workings of our solar system and the universe beyond. The cosmic images captured by the observatory have dazzled millions and have helped increase the general public's awareness of astronomy.

Among the tasks of the STS-103 crew will be replacing the telescope's six gyroscopes. A minimum of three are needed to keep the Hubble stable enough to conduct observations. Currently, only three

gyroscopes are operating.

Having fewer than three working gyroscopes would preclude science observations, although the telescope would remain safely in orbit until a servicing crew arrived.

The gyroscopes, which are part of Hubble's pointing system, provide a frame of reference to determine where the telescope is pointing and how that pointing changes as the telescope moves across the sky.

In addition to replacing all six gyroscopes on the flight, the crew will replace a guidance sensor and the spacecraft's computer. NASA's Hubble Space Telescope is the first observatory designed for routine maintenance, upgrade and refurbishment on orbit. The program is planned as a 20-year mission with periodic servicing by Shuttle astronauts. Hubble's modular design allows for more than 90 spacecraft components and all of the scientific instruments to be replaced on orbit.

Other Hubble servicing missions are scheduled for 2001 and 2003. NASA plans to end Hubble's operations in 2010 with a 'close-out' Shuttle mission.



Orbiter Discovery rolled over to the Vehicle Assembly Building (VAB) from Orbiter Processing Facility bay 1 on Nov. 4. In the VAB, it was mated with an external tank and solid rocket boosters for launch on mission STS-103, targeted for Dec. 6. STS-103 is the third servicing mission to the Hubble Space Telescope, which was carried into orbit by the Shuttle Discovery in April 1990.

## Leonids ...

*(Continued from Page 5)*

despair. There are other studies that suggest 2000, 2001 or even 2002 could be better years. The Leonids are simply hard to forecast.

If 1999 is the year, when should you look?

For a shower or storm like the Leonids that might be relatively brief, it is best to start watching no later than midnight. With this in mind you may decide it's a good idea to begin observing even earlier — like 10 p.m. on Nov. 17.

However, it is important to

remember that such predictions are always uncertain.

The 1998 Leonid fireball display occurred nearly 16 hours before the predicted maximum.

No matter where you live, the morning of Nov. 18 will probably be the best time to look for Leonids in 1999.

Conventional wisdom says that meteor observing is always best between midnight and dawn local time on the date of the shower.

One thing seems sure, no matter where you live: The Leonids are coming, and on Nov. 18, the place to be is outside, looking up.

## 3-2-1... countdown to call the coast



In the videoconference room at Headquarters, key representatives of KSC contractors, along with KSC directorates, filled the room during an early morning phone call on Nov. 1 from Florida Governor Jeb Bush (seen on the video screen) in Tallahassee, Fla. The call was placed to inaugurate the change of KSC's area code from 407 to 321. Deputy Director for Business Operations Jim Jennings received the call. Also in attendance was Robert Osband, Florida Space Institute, who suggested the 3-2-1 sequence to reflect the importance of the space industry to Florida's space coast.



John F. Kennedy Space Center

## Spaceport News

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Contributions are welcome and should be submitted two weeks before publication to the Media Services Branch, AB-F1. E-mail submissions can be sent to Susan.Maurer-1@ksc.nasa.gov

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