



The Launch Pad

January - March 2011



ISS Marks 10th Anniversary

The International Space Station (ISS) marked its 10th anniversary of continuous human occupation on Nov. 2, 2010. Since Expedition 1, which launched Oct. 31, 2000, and docked Nov. 2, the space station has been visited by 196 individuals from eight different countries. At the time of the anniversary, the station's odometer will read more than 1.5 billion statute miles (the equivalent of eight round trips to the Sun), over the course of 57,361 orbits around the

Earth. Since the first module, Zarya, launched at 1:40 a.m. EST on Nov. 20, 1998, it has made a total of 68,519 orbits of our home planet, or about 1.7 billion miles on its odometer. As of the Nov. 2 anniversary date there have been 103 launches to the space station: 67 Russian vehicles, 34 space shuttles, one European and one Japanese vehicle. A total of 150 spacewalks have been conducted in support of space station assembly totaling more than 944 hours. The space station, including its large solar arrays, spans the area of a **U.S. football field**, including the end zones, and weighs 827,794 pounds. The complex now has more livable room than a conventional five-bedroom house, and has two bathrooms and a gymnasium. Additional launches will continue to augment these facts and figures, so check back here for the latest: http://www.nasa.gov/mission_pages/station/main/onthestation/



Someone we think you should meet

Robert L. Satcher, Jr.
(PH.D, M.D.)
NASA Astronaut

Experience:

- Doctorate in chemical engineering from MIT, and a graduate of Harvard Medical School
- Selected by NASA in May 2004
- February 2006 - completed Astronaut Candidate Training
- Mission Specialist on the crew of STS-129, 31st mission to the International Space Station, Atlantis (Nov. 16-29, 2009)
- Performed two spacewalks for a total of 12 hours and 19 minutes of Extravehicular Activity (EVA)
- Mission was accomplished in 171 orbits of the Earth, travelling 4.5 million miles in 10 days
- See more astronauts:

<http://www.jsc.nasa.gov/Bios>

Hubble Telescope Ten facts:

1. The Hubble costs \$1.5 billion
2. The Hubble travels 353 miles above the Earth
3. It travels around the Earth at a speed of five miles per second
4. The Hubble was launched on April 24, 1990, from the space shuttle Discovery
5. It receives its energy from the sun through two 25-foot solar panels
6. The Hubble should remain in space for 20 years
7. It transmits about 120 gigabytes of data every week
8. The Hubble Telescope is 43.5 feet long, 14 feet wide, and weighs 24,500 pounds
9. The Hubble Telescope is able to lock onto an object that it is photographing
10. The optical Hubble Telescope was named after Dr. Edwin P. Hubble. Dr. Hubble was the scientist who confirmed his theory of the expanding universe. This provided the foundation for the BIG Bang Theory



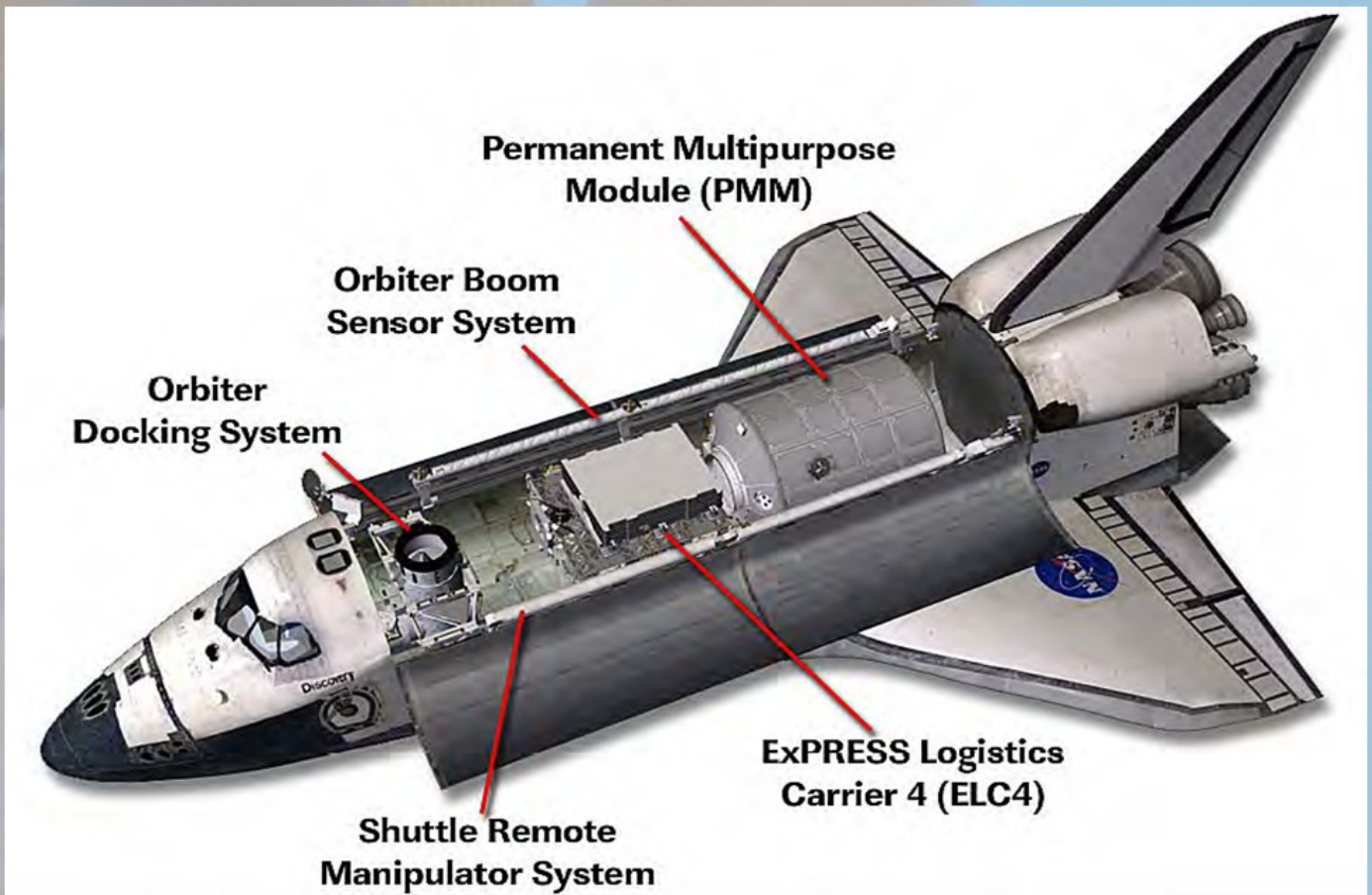
For more info about the Hubble Telescope, see:

http://www.nasa.gov/mission_pages/hubble/main/index.html

Space Shuttle Discovery - STS 133

Discovery will deliver to the International Space Station the Permanent Multipurpose Module (PMM), which was converted from the multi-purpose logistics module Leonardo. The PMM will provide additional storage for the station crew, and experiments may be conducted inside it, such as fluid physics, materials science, biology, and biotechnology. Discovery also will carry critical spare components and the Express Logistics Carrier 4 (ELC4) to the station. Express, which stands for Expedite the Processing of Experiments to the Space Station, is an external platform that holds large equipment that can only be transported using the unique capability of the shuttle. The STS-133 mission will feature two spacewalks to do maintenance work and install new components.

For more information, see: http://www.nasa.gov/pdf/484114main_STS133%20Mission%20Summary2.pdf



This graphic depicts the Space Shuttle Discovery's payload bay for STS-133, which includes the Permanent Multipurpose Module and the Express Logistics Carrier 4. The total payload weight, not counting the middeck, is 22,160 pounds. Wow!

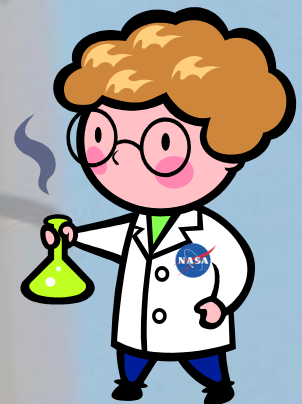
Ions in Action - A Simple Project for You to Try

Object: Make pieces of paper fly through the air and stick onto a balloon

Material: A balloon, a sheet of paper, and a hole punch

Instructions:

1. Inflate the balloon to a size that fits easily in your hand.
2. Tie a knot in the end of the balloon.
3. Use the hole punch to cut several small circles from the sheet of paper.
4. Rub the balloon back and forth gently on your hair about 10 times. Don't press too hard. Your hair should be clean, dry, and oil-free.
5. Hold the balloon close to, but not touching, the paper circles.



Where the Phones Are Always Ringing

By Susie Satellite

Howdy Space Cadets! Today finds me in the busiest, loudest room at the NSSC—the Customer Contact Center! Here, expert agents answer more than 100,000 customer calls and e-mails a year! The phones around here ring constantly with people in need of help. Every agent has a specialty. Some have trained in finance or human resources, others have degrees in IT or procurement; however, the staff is so dedicated to providing super, splendid service, that every team member has learned a good deal about every service the NSSC provides. NASA scientists, managers, and engineers are all familiar with the Contact Center's resources and often turn to the staff for assistance on a wide range of activities, like getting training or going on a work trip overseas. The team is trained on a vast number of NASA systems. I watched in amazement while they navigated multiple computer screens and applications to resolve a customer's problem, all while speaking with a smile to a customer through their high-tech headset telephones. Big screens on the wall show the incoming calls. The team rotates in shifts so that someone is available 12 hours-a-day. There's even an afterhours line for emergencies. To many NASA employees, these highly trained agents are superheroes to the rescue. There's no doubt, they handle many small problems on Earth, so NASA can keep its focus on shooting for the stars. Remember kids—a successful NASA requires many talents! If you want to help, the important thing is to study and be passionate about what you do.

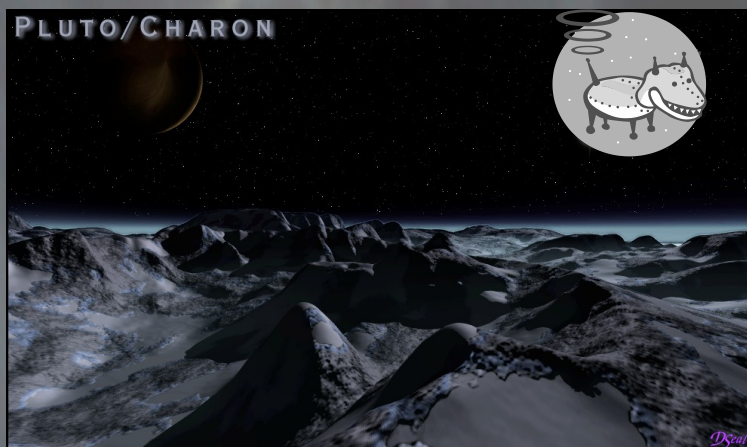


Susie Satellite is constantly visiting the NSSC and is always eager to report on the exciting things she sees. She reminds you that you can build your own NASA scientist and mission at: <http://www.jpl.nasa.gov/education/uildMissionGame.cfm>

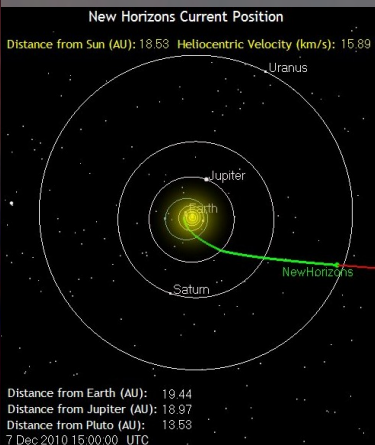
A Chilly Night on Pluto

By Sirius

More than 3.6 million miles away from our sun, the temperature reaches a frosty -375°F . An evening on the dwarf planet Pluto is enough to make even a robot dog shiver and miss home. While flying in, I was stunned by Pluto's brown color. Pluto's atmosphere is mostly methane, and a good portion of the surface is covered with frozen gas. Pluto has polar caps composed of frozen Nitrogen. The planet is as dark as it is cold. Barely visible in the night sky are three small moons: Charon, Hydra, and Nix.



Pluto is only 1/5 the size of Earth. Pluto's status as an actual planet is under debate. It's so far away from Earth, that scientists know little about it. NASA's New Horizon's spacecraft will change that. The probe left in 2006, but Pluto is so far away, it will be 2015 before it even gets here!



Learn more about Pluto: http://www.nasa.gov/worldbook/pluto_worldbook.html

New Horizons: http://www.nasa.gov/mission_pages/newhorizons/main/index.html



Sirius, the robotic dog, travels to exciting places in our Solar System. He frequently sends reports back to the NSSC in exchange for treats and a scratch behind the ear.

Meet Robonaut 2 (aka R2)...

A robot meant to work with humans and use human tools begins to look Humanlike by default. However R2's head houses not its brain, but its vision equipment.

Behind R2's visor are four visible cameras – two to provide stereo vision for the robot and its operators and two auxiliary cameras.

A fifth infrared camera is housed in the mouth area for depth perception.

R2 has three degrees of freedom in its neck, allowing it to look left, right, up or down

Each arm is 2 feet, 8 inches long, giving the R2 a total wingspan of 8 feet.

Each arm boasts seven degrees of freedom and the strength to hold 20 pounds in any pose in Earth's gravity.

Here on Earth and at the space station, R2's backpack holds its power conversion system, allowing it to basically be plugged in. On another planetary surface the backpack would hold the robot's batteries.

R2's hands have 12 degrees of freedom -- four in the thumb, three each in the index and middle fingers and one each in the ring and pinky fingers. Each finger has a grasping force of 5 pounds.

R2 thinks with its stomach – literally. With its head full of cameras, the only place with enough room for a brain is the robot's torso.

Robonaut 2 is the latest generation of Robonaut astronaut helpers and is set to launch to the space station aboard space shuttle discovery on the STS-133 mission. It will be the first humanoid robot in space, and although its primary job for now is teaching engineers how dexterous robots behave in space, the hope is that through upgrades and advancements, it could one day venture outside the station to help spacewalkers make repairs or additions to the station or perform scientific work.

R2 will launch inside the Leonardo Permanent multipurpose module, which will be packed with supplies and equipment for the station and then installed permanently on the Unity node. Once R2 is unpacked—likely several months after it arrives—it will initially be operated inside the Destiny laboratory for operational testing, but over time both its territory and its applications could expand. There are no plans to return R2 to Earth.

For Education focused information about Robonaut and robotics in general go to:
<http://www.nasa.gov/audience/foreducators/robotics/home/index.html>