Hubble Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771
(301) 286-8955

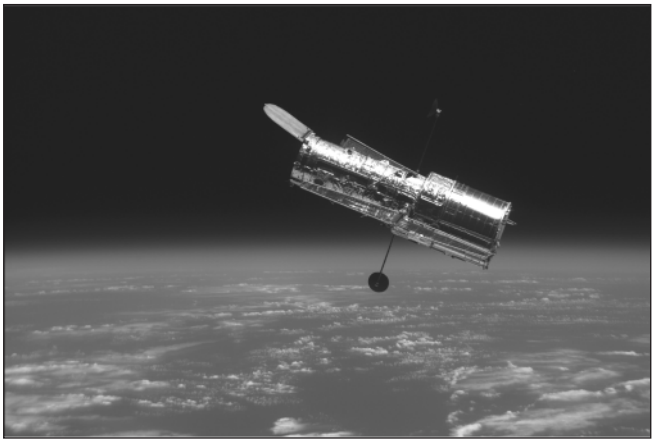
FS-2002-1-033-GSFC

Making Hubble Even Better
Servicing Mission 3B

New and Improved – that's the condition of the telescope after each servicing mission. With more than 11 years of historically astounding science already accomplished, Hubble looks to the next servicing mission to enhance its capabilities for even more exciting new discoveries.

The next 360-mile high service call, Shuttle Mission STS-109, will add a camera that will increase the imaging capability of Hubble ten times over its current capabilities. Astronauts also will fit Hubble with a smaller, more powerful set of solar arrays, a fresh power control unit, a refurbished reaction wheel assembly, and an experimental cooling system to reinvigorate Hubble's infrared vision.

When Hubble was on the drawing board, its designers knew that technology would evolve rapidly—so they built the telescope to evolve right along with it. During planned servicing missions, spacewalking astronauts install powerful new instruments and perform routine maintenance to keep Hubble healthy and on the cutting edge of technology and scientific discovery throughout its 20-year life.



Hubble free floating

Servicing Mission 3B is the fourth visit to Hubble. NASA split the original Servicing Mission 3 into two parts and conducted 3A in December of 1999. During the 3B mission, the crew of Space Shuttle Columbia will perform five spacewalks in an 11-day mission.

What's New and Improved

Advanced Camera for Surveys (ACS):

With its wide field of view, powerful detectors, and superb image quality, Hubble's newest science instrument will have 10 times more discovery potential than the telescope's current workhorse, the Wide Field Planetary Camera 2.

ACS sees in wavelengths ranging from visible to near ultraviolet. It is actually a team of three different channels with specialized capabilities. The **high resolution channel** will take extremely detailed pictures of the inner regions of galaxies and search neighboring stars for planets and planets-to-be. The **solar blind channel** blocks visible light to enhance ultraviolet sensitivity. [Among other things, it will be used to study weather on planets in our own solar system.] With a field of view twice the size of Hubble's current surveyor, ACS's **wide field channel** will conduct new surveys of the Universe. Astronomers will use it to study the nature and distribution of galaxies in order to understand how our Universe evolved.

Power Control Unit (PCU):

As Hubble's power switching station, the PCU controls and distributes electricity from the solar arrays and batteries to other parts of the telescope. Replacing the original PCU, which has been on the job for 11 years, will require Hubble to be completely powered down for the first time since its launch in 1990. Hubble's new PCU allows astronomers to take full advantage of additional power generated by the new solar arrays.

Rigid Solar Arrays:

Hubble gets a brand new look with its latest set of solar wings. Although one-third less solar cell area than the first two pairs, they produce 20 percent more power. Unlike their flexible predecessors—which could roll up like window shades—the new set is rigid. Less susceptible to damage and the extreme temperature variations of Hubble's orbit, these advanced arrays provide enough extra power to run a new generation of science instruments.

Reaction Wheel Assembly:

One of four reaction wheel assemblies (RWA), which is part of Hubble's pointing control system, will be replaced. Spin momentum in the reaction wheels moves the telescope into a commanded position and maintains it in this stable position.

NICMOS Cooling System:

Astronauts will retrofit an existing but dormant instrument called the Near Infrared Camera and Multi-Object Spectrometer (NICMOS) with a new, experimental cooling system to return it to active duty. NICMOS was placed on Hubble in 1997, but 2 years later, after depleting the coolant needed to cool its infrared detectors, it became dormant. By fitting NICMOS with the experimental cryogenic system, NASA hopes to re-cool the detectors to –334° F (-203º C or 70° K), which will revive its infrared vision, and extend its life by several years.

The super-quiet cooler uses ultra-high speed microturbines and a compressor. This turbo-machine spins at over 400,000 rpms (100 times the maximum speed of a typical car engine). Hubble's engineering team successfully demonstrated this technology in 1998 aboard STS-95 in the first on-orbit test of a high-performance, high-efficiency, mechanical cryo-cooler.

A Stellar Crew

The distinguished crew of STS-109 includes a Navy Commander, an Air Force Lieutenant Colonel, a veterinarian, and four Ph.D.s (an astrophysicist, a molecular physicist, and two engineers—one of whom is also an Army Lieutenant Colonel and Master Aviator).

Mission Commander Scott Altman, a two-time shuttle veteran, will be joined on the flight deck by pilot Duane Carey, making his first space flight, and flight engineer and robotic arm operator Nancy Currie, who has three previous missions to her credit.

Hubble servicing veteran and high-energy astrophysicist John Grunsfeld leads the spacewalking team. His three previous flights include the STS-103 mission in 1999, when he performed two spacewalks to service Hubble. Veteran astronauts James Newman and Richard Linnehan will be joined by first time flyer Michael J. Massimino. These four will work in alternating pairs to perform the five planned spacewalks.

FOR ADDITIONAL INFORMATION CONTACT:

Nancy Neal
Goddard Space Flight Center
Office of Public Affairs
(301) 286-0039

Mission Commander: Scott Altman (Cmdr., USN)
Pilot: Duane Carey (Lt. Col., USAF)
Payload Commander/Mission Specialist: John Grunsfeld (Ph.D.)
Mission Specialist: Nancy Currie (Lt., USA, Ph.D.)
Mission Specialist: James Newman (Ph.D)
Mission Specialist: Richard Linnehan (DVM)
Mission Specialist: Michael Massimino (Ph.D.)