

# Astronauts making one last house call to Hubble

May 7 2009, By MARCIA DUNN , AP Aerospace Writer

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(AP) -- The [Hubble Space Telescope](#) is about to get one last house call. And never before have the risks been higher.

On Monday, astronauts will rocket away to the most famous telescope of modern times. They'll be taking up new scientific instruments, replacement parts for broken cameras and fresh batteries that should keep Hubble running for five to 10 years.

This cosmic-scale grand finale - stalled seven months by a telescope breakdown - will be NASA's most daring overhaul yet of the 19-year-old orbiting observatory, a captivating, twinkling jewel in the sky representing \$10 billion of investment.

Never before have spacewalking astronauts attempted to fix dead science instruments on the Hubble, equipment that was never meant to be handled in orbit. Before they've just swapped out the whole thing at the telescope, which started out life shockingly nearsighted.

In all, five [spacewalks](#) will be performed in as many days by two repair teams. Two of the repairmen have visited Hubble before and, because of that, were chosen for this extraordinarily difficult job, on a par with operating-room surgery.

"Hubble needs a hug," said the chief repairman, John Grunsfeld, who will be making his third trip to the telescope.

[Space shuttle Atlantis](#) and its crew of seven will face increased danger from [space junk](#) because of Hubble's extremely high and littered orbit 350 miles up. They will need someone to come and get them - fast - if their ship sustains serious Columbia-type damage during launch or later in flight. They will not have the luxury of camping out at the [international space station](#) while awaiting rescue. The space station will be in another orbit and impossible to reach.

The mission, once canceled because it was considered too perilous, has an unprecedented safety net: another space shuttle on the launch pad. There is no guarantee, though, that NASA could pull off a rescue in time to save the Hubble crew. It would take three to seven days, at least, to launch a second shuttle.

All seven astronauts agree Hubble is worth risking their lives for.

"I'm only going to do that if I think it's for something really important, and I think Hubble is really important," said Grunsfeld, an astronaut-astrophysicist. Hubble is "worth bringing up to date and extending its vision even farther."

"It's showing us the way" to distant galaxies and, indeed, the actual edge of the universe, said the mission's commander, Scott Altman. "The next step is for us to try and go there."

Altman and his crew were just two weeks away from liftoff last fall when Hubble broke down and stopped sending pictures. NASA got the telescope working again with a backup channel on the failed command and data-handing unit, but the shuttle flight took a seven-month hit as engineers scrambled to get an old spare unit ready for launch.

No telescope ever has received as much hoo-ha or been on such a seesaw as Hubble, which has circled Earth more than 100,000 times and logged

nearly 3 billion miles.

Launched aboard the space shuttle in 1990, Hubble went "from the top of Mount Everest to the bottom of the Dead Sea" in two months flat, observed NASA's science chief, Ed Weiler. The orbiting telescope had blurred vision; its primary mirror had been improperly ground.

Astronauts fixed everything in 1993 by installing corrective lenses and returned three more times - in 1997, 1999 and 2002 - to install better cameras and make other improvements.

In the meantime, Hubble was churning out breathtaking vistas of the cosmos, including the celebrated image of Eagle Nebula, a star-forming region 6,500 light years away. The picture is often referred to as "Pillars of Creation."

Hubble has shed light on the age of the universe (13.7 billion years) and shown that the universe may be expanding quicker than ever, and proved the existence of supermassive black holes, among other things. The telescope has peered back in time to within 800 million years of the first moments of the universe. The new instruments going up will take astronomers to within 500 million to 600 million years of creation.

Ground-based telescopes might see better than Hubble "over a very, very tiny field of view," Weiler said. "But you don't see Eagle Nebulas on the cover of Time magazine taken from the ground. You see them from Hubble. Hubble still has a unique niche."

The 2003 Columbia disaster put the fifth and final Hubble servicing mission that had been scheduled for 2004 on indefinite hold and, one year later, completely knocked it off the shuttle lineup.

With the public outraged over the abandonment of Hubble, NASA

considered the idea of sending up a robot to replace the batteries and gyroscopes, plug in the latest wide-field camera, and perform some other jobs. But the robot plan never jelled, and the NASA administrator at the time, Michael Griffin, nixed it. Instead, Griffin approved one last Hubble tuneup by astronauts. He left NASA in January with the change in the White House.

Grunsfeld disagreed about the robot mission.

"I have absolutely no doubt it would have worked," Grunsfeld told The Associated Press. "I do think that we got a little too greedy and tried to propose that (a Hubble robot mission) would do a lot more than it really could."

Grunsfeld is quick to note that no robot could have tackled some chores they'll undertake - installing the new cosmic origins spectrograph for detecting faint light from faraway quasars and repairing two failed science instruments.

The spacewalkers will have to undo 117 fasteners to get to a bad electronics board inside an old imaging spectrograph, and deal with a hard-to-get-around corner to replace burned-out power supply cards in an advanced camera for surveys.

"It's right at the edge of what I think people can do, period," Grunsfeld said of the repairs.

In addition to all that, the astronauts will put in a new fine guidance sensor, part of Hubble's pointing system, add some steel skin to the telescope's blistered exterior. And they will hook up an improved capture ring so a future robot-guided craft can latch onto the Hubble and steer the observatory into a Pacific grave sometime in the early 2020s.

"I think of Hubble as a roller coaster," Weiler said late last month, referring to all its ups and downs. But the bottom line is, "Everybody loves Hubble now."

It's even won over the Twittering crowd. Astronaut Michael Massimino has been filing training updates via Twitter for the past month; he hopes to post from orbit, but is uncertain whether he'll have time.

Before tragedy struck with Columbia, Weiler envisioned a space shuttle bringing Hubble back to Earth and the telescope - "the great American comeback story" - being displayed at the Smithsonian Institution's National Air and Space Museum.

He imagined "little school kids going up to this huge four-story telescope and being able to say, 'That's what filled your textbook with pictures and traveled billions of miles in orbit.' "

Instead, the world will eventually watch as Hubble plunges from the sky.

Grunsfeld - who will have spent more time working on Hubble in space than any other human - said he will have no remorse when it comes time to leave the telescope near the end of the 11-day shuttle mission.

"The increase in Hubble's capability and the life extension is going to be so phenomenal that I'm just going to be thrilled to see it as it recedes onto the horizon as just another bright star," he said.

He's already planning a huge party for when Hubble plummets out of the sky in another decade or so, on a cruise ship somewhere in the Pacific.

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On the Net:

NASA: <http://www.nasa.gov/mission-pages/hubble/main/>

Space Telescope Science Institute: <http://www.stsci.edu/hst/>

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