

Stuck bolt, dead battery bedevil Hubble repairs

May 17 2009, By SETH BORENSTEIN , AP Science Writer



In this photo provided by NASA, astronaut Andrew Feustel, left, STS-125 mission specialist, navigates near the Hubble Space Telescope on the end of the remote manipulator system arm, controlled from inside Atlantis' crew cabin as astronaut John Grunsfeld, right, signals to his crew mate from just a few feet away, Saturday, May 16, 2009. Astronauts Feustel and Grunsfeld were continuing servicing work on the giant observatory, locked down in the cargo bay of the shuttle. (AP Photo/NASA)

(AP) -- Spacewalkers' specially designed tools couldn't dislodge a balky bolt interfering with repairs Sunday at the Hubble Space Telescope, so they took an approach more familiar to people puttering around down on Earth: use brute force.

And it worked.

[Atlantis](#) astronaut Michael Massimino couldn't remove one bolt attaching a hand rail to the outside of a scientific instrument he needed to fix. The rail had to be removed or at least bent out of the way. And that was only the beginning of a hard-luck day.

When several tries with different expensive tools couldn't remove the stripped-out bolt, Mission Control in Houston told Massimino to go for the less precise yank.

[Astronauts](#) were careful to tape pieces so they wouldn't fly away and become potential missiles.

"This is like tying branches together in Boy Scouts," fellow spacewalker Michael Good said.

And while Atlantis was out of video contact 350 miles above Earth, controllers in Houston could only listen as Massimino took a breath and pulled.

After a second of silence, Massimino calmly said: "disposal bag, please."

After nearly two hours of work on the balky bolt, astronauts went back to the plan to bring a [science instrument](#) back from the dead. They took a breather, then began working on the Space Telescope Imaging Spectrograph, disabled by a power failure five years ago.

Three of the four Hubble spacewalks so far this mission have been delayed by niggling problems, like stubborn bolts and objects that wouldn't fit. A fifth and final [spacewalk](#) is set for Monday.

Massimino then went on to start removing 111 tinier screws - the work NASA worried more about before the spacewalk began.

Massimino's run of bad luck only continued. While trying to install a special plate to capture those tiny screws, a tool's battery died. It took more than half an hour for him to go back to the shuttle, swap out batteries and recharge his oxygen supply.

Then he finally got around to the painstaking task of removing the screws one at a time, counting them as they came out.

On Saturday, two other astronauts succeeded with a similar task and revived Hubble's survey camera. Early Sunday, Mission Control told the crew that two of the three science channels on the repaired camera were working again.

When NASA planned this mission, officials said it would be a success if either of the two dead instruments could be revived. With Saturday's camera remedy, fixing the spectrograph would be a bonus.

The light-separating spectrograph is designed to make a fingerprint of cosmic objects, and has helped find black holes and examine the atmosphere of planets outside our solar system.

NASA canceled this mission after the 2003 Columbia explosion because of the dangers, and engineers developed a spectrograph repair plan using a robot. NASA ultimately decided to go with astronauts who could improvise in case of trouble.

No future repair missions are planned for the 19-year-old observatory, which NASA expects to keep operating for another five to 10 years.

Flying so high without an emergency shelter put the shuttle and astronauts at increased risk of being hit by space debris, so NASA had another shuttle on standby back at its Florida launching site in case a rescue was needed.

Besides the spectrograph work, Massimino and Good planned to install some new insulation on the telescope. The spacewalkers had a special roller tool to apply the stainless steel foil covers, which look like large cookie sheets.

On the Net:

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

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