SPACE CENTER
Roundup

February 9, 2001

VOL. 40, NO. 3 LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEXAS

New helmet camera system makes stellar debut

A new camera system is allowing space-walking astronauts to work and take still photos simultaneously and providing flight operations personnel and engineers on the ground real-time views of what space walkers are seeing. First used during the STS-97 mission (International Space Station Assembly Flight 4A) last December, the new camera equipment, called the Wireless Video System, has met with rave reviews.

"The system performed great during the 4A mission," said Irene Piatek, NASA WVS project manager. "All of the comments we've heard have included words like 'awesome,' 'fantastic,' and 'way cool.' It performed very well."

As STS-97 astronauts Joe Tanner and Carlos Noriega installed the ISS's massive solar array last December, video cameras embedded in their helmets provided real-time footage that enabled crewmembers inside the space shuttle and personnel on the ground to see precisely what the space walkers were seeing. For all participants, the unprecedented view, made possible by the WVS, was spectacular.

"The Wireless Video System is an incredible situational awareness tool for space walks," said Tanner. "It enables the crewmembers inside the shuttle to see our activities on the outside and it keeps ground personnel informed of on-orbit activities. It is an invaluable tool that should be used on every flight."

The system was developed to enable Extravehicular Activity (EVA) crewmembers to work and take still photos simultaneously. Previously space walkers had to use heavy handheld cameras to take photos. In addition, by allowing EVA crewmembers to work and take photos at the same time, EVA time is saved.

The first flight of the WVS was always targeted for 4A due to the mission's busy EVA schedule principally involving installation of the solar array. EVA timelines for the flight were very tight and did not allow for photo documentation using handheld cameras.

Embedded in the EVA helmet are three fixed-focus, variable aperture cameras: a 3.5-millimeter lens, located just left of center on top of the helmet shell, providing a wide-angle view; a 6-millimeter lens mounted above the light on the left side of the helmet, providing a medium-angle view; and a 12-millimeter lens mounted above the light on the right side of the helmet, providing a narrow-angle view. The cameras get their power from a new battery system that was developed for heater gloves, the WVS and an electronic wrist display.

A crewmember operating the WVS from inside the orbiter controls the cameras, determining which one is on at any given time. A UHF antenna in the payload bay is used to send commands. A flat antenna on top of the helmet shell receives them.

Antennas on the helmet send the video to seven receiving S-Band antennas in the shuttle's payload bay. Underneath the payload bay liner are two transceivers that send commands, receive the video, and then send the video to a panel in the cabin. The video is displayed on two monitors inside the shuttle.

An Intravehicular Activity crewmember can see video from two EVA crewmembers at the same time displayed on two monitors inside the shuttle, but only one can be downlinked at a time. At this time, there is no way to distinguish which video feed is coming from which EVA crewmember. Enhancements to be added in the future will provide for this capability.

The WVS replaces the old Extravehicular Mobility Unit TV system previously used by space walkers.

"With the original EMU TV, video was received via one of the orbiter's hemispherical S-Band antennas," said Piatek. "With just one antenna, if you weren't in the right location, you didn't get the signal. So the coverage was not as good as it is with this new system. With the array of seven antennas we have in the payload bay, we have much better coverage. In addition, in the twenty years or so between EMU TV and this new system, the technology has improved significantly. Plus we have three different lenses so that you can choose a wide angle, mid-range or close-up view whereas the previous system had only one lens. So several factors show that this system has taken us a giant leap forward."

But the WVS built upon the previous system. The helmet shell design was based on the original EMU TV. Even the placement of the switch and the lights on the helmet was based on the original EMU TV. "We took the old EMU TV as a basis and tailored it for our needs," said Wayne Wondra, Lockheed Martin Space Operations (LMSO) WVS project engineer. "Positioning of the camera lenses was dictated by how we thought the astronauts would use them."

The WVS has been well received by space walkers and ground personnel alike. When a problem with the solar array occurred during STS-97–when tensioning cables came off their pulleys–ground engineers were able to see and diagnose the problem. Using the WVS, Noriega was able to point to the problem for all to see rather than having to explain it.

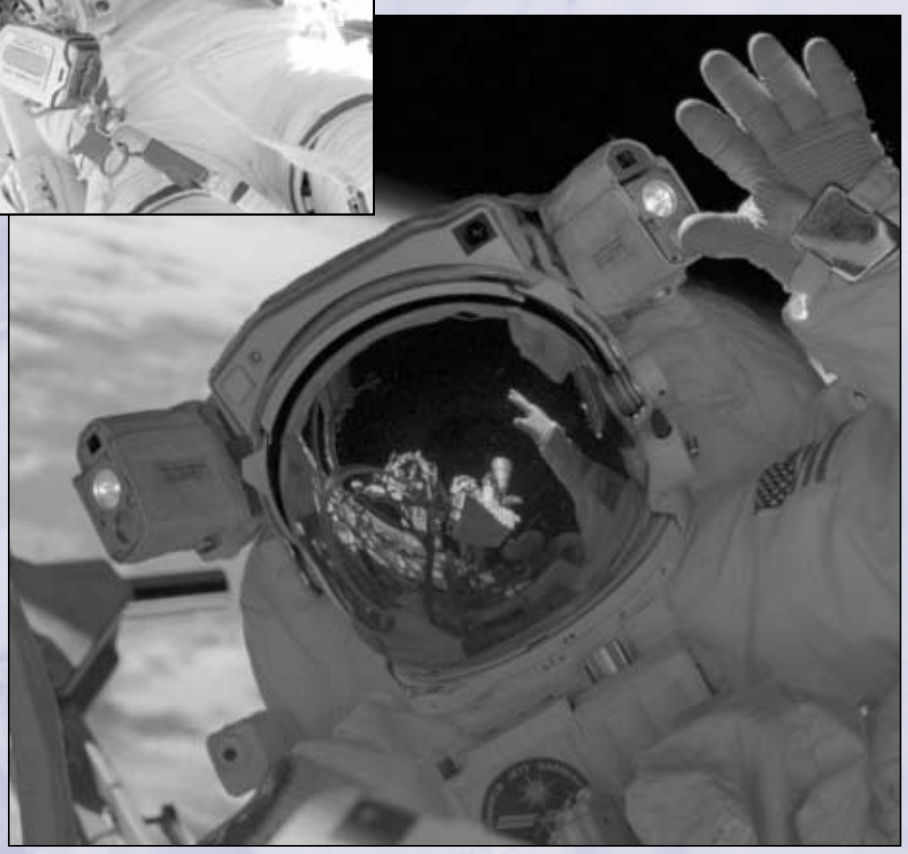
"The Wireless Video System was a tremendous asset to us," said Noriega. "It cut down on the amount of communication needed to inform ground personnel of on-orbit activities and problems, and it added a measure of safety to our space walks knowing that Marc Garneau and others were watching over our shoulders."

Begun in 1997, the WVS project involved a team of government, contractor and subcontractor personnel. NASA, LMSO, Boeing, Broadcast Sports Technology and Litton played key roles in

Please see **HELMET CAMERA**, Page 4

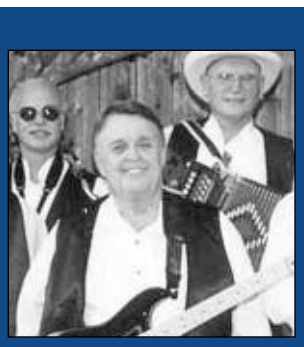
NASA JSC STS-097e5034

Astronaut Joe Tanner, during the second of three space walks.



NASA JSC STS-097-375-012

Wearing the new Wireless Video System on his helmet, STS-97 Astronaut Carlos Noriega waves toward his space-walk partner, Astronaut Joe Tanner, during the second of three space walks.



JSC guitarist becomes Hall of Famer, again.
Page 3

Hawaiian breeze sweeps through Teague.
Page 4

Texas Aerospace Scholars needs you!
Page 6