NASA's robotic 'sniffer' confirms space station leak, repair

September 14 2017, by Peter Sooy

The Robotic External Leak Locator on the end of the Dextre robot in February 2017. Credit: NASA

In recent operations on the International Space Station, robotic operators were twice able to test and confirm the ability of the Robotic External

Leak Locator (RELL) to "smell" in space.

Using the RELL instruments, operators successfully located a small leak from the station's ammonia coolant loop, and confirmed that it was not a safety concern. Later they were able to return and more precisely characterize the leak. This valuable data helped station operators vent and isolate the leaking line from the coolant loop and successfully stop the leak.

"By locating and monitoring this ammonia leak, RELL verified station's safety status and avoided a risky spacewalk to find the leak," said Adam Naids, RELL project manager at NASA's Johnson Space Center in Houston. "RELL performed spectacularly and successfully carried out the job it was built to do."

RELL was launched to the space station aboard a SpaceX resupply mission in 2015. It was stowed aboard the space station for several months before NASA astronaut Kate Rubins loaded it onto the Japanese Experiment Module slide table. The slide table was extended into space where robotic operators from NASA Johnson controlled the Dextre robot to grab RELL and run it through initial testing. Engineers on the ground verified RELL was functioning properly and effectively communicating back to Johnson.

Astronaut Kate Rubins loading the Robotic External Leak Locator for deployment into space. Credit: NASA

RELL's instruments provide directionally sensitive measurements of the amount and kind of gases present. By taking samples, RELL established baseline readings for amounts and kinds of gases which are normally present outside the station. These baseline readings matched what engineers expected, but RELL detected an ammonia signature during the final portion of testing.

Operators were able to identify the ammonia source, an isolation valve for the ammonia cooling loop on the station. Robot operators maneuvered Dextre to position RELL within 12 inches of the leak to collect measurements for several days. With the data gathered, personnel

on the ground were able to determine the leak posed no risk to the station or astronauts on board.

Later, ground controllers returned RELL to take high resolution scans from a variety of angles to identify the specific location of the leak. Assisted by RELL's precise data, station managers choreographed a spacewalk which saw astronauts perform tests to gather additional data that would inform a plan to solve the leak issue. Afterwards, station operators successfully vented and isolated the leaking hose connection from the rest of the cooling system. The station team was able to confirm the leak had stopped and the ammonia coolant loop was intact.

To date, RELL has logged nearly 190 total hours in space, completed thousands of scans, and continuously demonstrated its value aboard the space station. RELL is currently inside station, ready to return outside when needed.

"Robotic tools apply to many areas of space exploration," said Benjamin Reed, deputy division director for the Satellite Servicing Projects Division (SSPD) at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "RELL is at the forefront of the great work being done with robotic tools on space station, and we couldn't be more pleased with its successes."

Provided by NASA

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