Thomas adapting to work in microgravity environment

U.S. Astronaut Andy Thomas is continuing his work on the Mir Space Station with the Biotechnology System Co-Culture experiment as it attempts to grow two different cell types and form three-dimensional tissue samples.

Thomas has been performing visual inspections, photographing the cultures, sampling the cells and replenishing nutrients and ensuring the chamber is rotating as it should.

In a televised interview, Thomas talked about the difficulty of performing the work in microgravity.

"When you're doing work with tools and instruments it can be very difficult because everything floats away," he said. "So the simple act, for example, of undoing a screw, can be quite complicated, because as soon as the screw comes free it will float away, the screwdriver in your hand will float away. So everything has to be tethered down, and it can be difficult to work under those circumstances. You need extra pairs of hands always to grab these things that are floating around.

After nearly 100 days in space, Thomas said he is getting better at working in the space environment.

"You get accustomed to it after a while, though," he said. "There's a learning curve you go through and then you become quite adept at it."

The science investigations are part of 27 studies in the areas of Advanced Technology, Earth Sciences, Human Life Sciences, Microgravity Research, and International Space Station Risk Mitigation.

MIR-25 THOMAS

Commander Talgat Musabayev and Flight Engineer Nikolai Budarin completed their fourth space walk April 17, preparing a new thruster jet assembly for last week's installation atop the Sofora truss.

The first task was to dismantle and stow the 'Rapana' truss segment once used as a support fixture for external scientific experiments. Though the flight control team originally had planned for the truss to be jettisoned during the space walk, it was decided instead to stow it for possible future use.

Next, the new boom jet assembly was raised by ground command from the side of the specially modified Progress resupply ship. The crew set the boom jet to the proper angle, and locked it in place where it will remain until the next space walk Wednesday. The angle provides for easier transfer to the Sofora truss.

This was the fourth space walk scheduled during the Mir 25 crew's six-month tour on the station that began in late January. Thus far, Musabayev and Budarin have spent 23 hours, 47 minutes outside the station. The fifth and final space walk was targeted for Wednesday.

Previous space walks saw the two cosmonauts remove and jettison the nearly spent boom jet used for roll control of the station in pointing Mir's solar arrays at the Sun. The 14-meter-long Sofora truss is projected to re-enter the Earth's atmosphere and burn up within a year. Next the crew removed the old boom jet adapter plate and installed a new one.

Throughout all of the space walks, Thomas documented his colleagues movements with video and still photography and provided the flight control team with routine systems data.

Thomas said he isn't scheduled to make a space walk with his Mir crew mates, but that he'd be ready if called upon.

"There's not a piece of U.S. equipment that really requires a U.S. crew person's presence. The space walks all require the cosmonauts because they're very labor intensive on the apparatus of the station and they've been trained for many hours in those activities. Should one ever present itself as, perhaps, one day it might, though I don't think during this flight, I'd like to step up to it," he said.

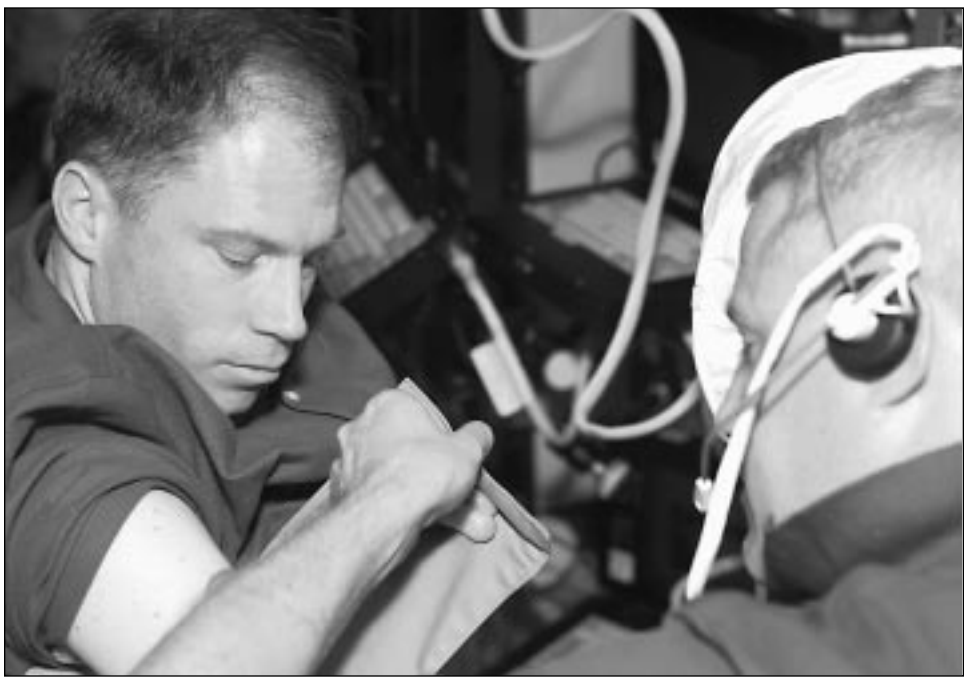
Today marks Thomas' 92nd day in space. He will return to Earth in early June following the STS-91 mission. Thomas is the seventh and final NASA astronaut scheduled to live and work aboard Mir.

Station node receives new name, 'Unity'

The first International Space Station node, a connecting module that will be the first United States-built component to reach orbit, has been named "Unity."

The name honors the spirit of international cooperation reflected worldwide in the work of those building the station. As a building block, the node will unite station modules from Russia and the U.S. The Unity node lays a foundation for the station that will combine contributions from 16 nations in a scientific effort unparalleled in history. The spirit of the International Space Station has crossed barriers of language, culture and distance and brought together the world's best and brightest to join hands in the exploration of space.

Unity will be a passageway for station crews as they move through modules built at locations across the globe. It also may serve as a future passageway to even grander peaceful alliances both on Earth and in space.



JSC Photo 98-03937 by Steve Candler

Payload Specialist Jay Buckey (right) applies a pressure cuff to the arm of Commander Rick Searfoss. The photo, one of the first documenting Neurolab activity on the scheduled 16-day mission, was taken with an electronic still camera. Investigations during the Neurolab mission will focus on the effects of microgravity on the nervous system through studies of blood pressure, balance, coordination and sleep patterns, and all have potential benefit to researchers on Earth studying a variety of illnesses.

Long Spacer arrives at KSC

(Continued from Page 1)

and Brent Adams, have been instrumental in overseeing the fabrication and delivery of the long spacer," said Ron Torcivia, launch package manager for station assembly flight 4A, which has the first photovoltaic module as the primary cargo for STS-97 next year.

"Steve and Brent, working closely with Nanette Brouchard and Kevin O'Hara of Boeing-Canoga Park, should be congratulated for their efforts in securing a timely delivery to KSC," Torcivia added.

The long spacer immediately began processing after its arrival at KSC as it was removed from the shipping container and installed into a test stand located in the northeast corner of the Space Station Processing Facility high bay.

The long spacer will be equipped with radiators and the two Pump and Flow Control subassemblies that will circulate ammonia to cool the solar array electronics. Also to be mounted to the long spacer are ammonia fluid lines as part of the cooling system, and the cabling necessary for power and control of the station. When it is mated to the integrated electronics assembly, the long spacer will become an integral part of a station truss segment. The IEA will include the batteries and associated electronics to store the electrical power generated by the solar arrays for use by the station modules. The IEA and long spacer are scheduled to be fully outfitted and begin integrated testing later this spring.

When the solar arrays arrive this fall, all major equipment for launch on assembly flight 4A, aboard *Discovery* on STS-97, will be at KSC. The entire photovoltaic module package will be assembled by this winter for the start of launch preparation.

Elsewhere in the Space Station Processing Facility, work is progressing on the Unity node, or Node 1. The first connecting module for the station and the first U.S.-built station element, Node 1 has been named Unity in honor of the spirit of international cooperation that has made the International Space Station possible. In function, the first node will unify modules built by the U.S. and Russia while it also unites former Cold War adversaries as allies working together to explore space.

A four-day leak-check test of the Unity node concluded early this month with the flight hardware displaying virtually no signs of leakage.

For the test, Unity and the attached docking adapter, technically known as Pressurized Mating Adapter-1, were installed in the payload canister. The canister was then pressurized with a partial mixture of helium and air. Helium sensors installed in the canister monitored the hardware for signs of helium leakage.

Ensuring that the hardware is sealed against exposure to the vacuum of space is a key aspect of preparing the International Space Station hardware for flight. Payload engineers were delighted with the results, which confirmed the integrity of the U.S.-built hardware.

"The leak test was very successful," said STS-88 KSC Payload Manager Steve Ernest, adding that one more pressurization test will be conducted prior to being transported to the launch pad.

Air turbulence sensor may make air travel safer for commercial flights

NASA is testing a new sensor that may make air travel safer by detecting previously invisible forms of clear air turbulence and giving pilots time to take safety precautions. Early tests of the new clear air turbulence sensor are promising, officials say.

Clear air turbulence is an invisible safety hazard for aircraft. Though seldom damaging to modern aircraft, which are designed to withstand its stresses, it is the leading cause of in-flight injuries among the flying public.

Currently there are no effective warning systems for clear air turbulence. It's been referred to as "rough air" or "air pockets," that can be felt, but not seen.

"During the tests, the system observed turbulent regions of air ahead of the aircraft as it moved forward. The aircraft experienced disturbances as it penetrated the turbulence. In that scenario, if an alarm were sounded when turbulence was first detected, passengers could have quickly returned to their seats and fastened their seat belts before the encounter," said project manager Rod Bogue of Dryden Flight Research Center.

Flights of the detector originated from Jefferson County Airport, near Broomfield, Colo. The experiment was flown on three separate flights for a total of more than seven hours at altitudes as high as 25,000 feet. Additional flights are slated to add to the turbulence database and to fine-tune the sensor for better measurements.

The sensor device, called Airborne Coherent LiDAR for Advanced In-flight Measurement, relies on a form of laser technology called Light Detection and Ranging, to detect changing velocities of tiny particles in turbulent air. As long as the wind velocity remains uniform, no turbulence exists. But if the laser beam detects changes in the wind speed, it's a clear indication of turbulence ahead.

During its first flight, the flight crew located turbulent conditions and used the infrared radar to measure the changes in wind speed, before flying through the disturbed air. Once the aircraft reached the turbulence, the crew compared the pre-encounter measurements with the effects of the turbulence they experienced. In this way, the team is exploring the relationship between the laser radar-measured turbulence characteristics and the actual turbulence experienced by the aircraft. These tests are designed to provide an efficient checkout of the flight hardware and to help characterize turbulence measurements.

"Not much is known about accurately detecting and forecasting turbulence," said Larry Cornman, scientist for the National Center for Atmospheric Research, Boulder, Colo. "Through this new device and turbulence research conducted at NCAR, we expect a clearer picture to emerge to make flying safer."

Langley is the Agency's lead center for the NASA Aviation Safety program. Other participating NASA centers include Dryden, Ames Research Center and Lewis Research Center.

Students observe effects of gravity on nervous system

Students from around the world are learning about the upcoming Neurolab mission by logging onto the Internet.

They are learning how scientists, technicians and astronauts are preparing for the STS-90 mission, which lifted off Friday. Neurolab is studying the effects of weightlessness on the nervous system.

"NASA is breaking a time barrier by enabling students to interact with Neurolab researchers via the Internet long before any new information is printed in textbooks," said Linda Conrad, NeurOn (Neurolab Online) Project Manager at Ames Research Center. "About 50 scientists, engineers and the shuttle and ground crews are working with students and educators through the Internet project."

The NASA on-line mentors upload biographies and field journals to the NeurOn Internet pages. NASA employees from Ames, Johnson Space Center and Kennedy Space Center will answer students' e-mail questions and will participate in "Web chats" with youngsters and teachers. During Internet chats, students use computers to converse with mentors by typing questions and reading responses and dialogue via the World Wide Web.

NASA scientists note that, even after 50 years, they know very little about the way the brain and nervous system are affected by space flight. The STS-90 Neurolab mission is expected to answer many questions about the way the nervous system reacts to microgravity.

There are 26 experiments scheduled for Neurolab. "Lesson plans for teachers are available on the website so they can more easily integrate NeurOn activities related to the experiments into the classroom," Conrad said.

The young students may monitor activities of ground crew members as they assemble hardware and prepare provisions such as food and water, for the 16-day mission aboard the Space Shuttle *Columbia*. The seven-member crew will conduct the experiments.

In their classrooms, students simulate mission activities to better understand the Neurolab mission. The NeurOn website includes a section that displays projects for youngsters and galleries of student work.

These interactive projects connect students with NASA employees and are designed to inspire young people to pursue careers in high technology.

The NeurOn website may be found on the Internet at:

http://quest.arc.nasa.gov/neuron