ISS PAYLOADS NEWS

February 2003
Volume 2, Issue 1

In Memorium

The Columbia tragedy occurred two days before the planned release of this newsletter. We are all grieving for the crew, their family and friends. We are following the lead of our President who said "America's space program will go on". Consequently, we are proceeding with the same newsletter articles as written before the tragedy. The replan of the ISS research program is in progress and will be reported in the next issue.

What's Inside

Payloads Office Initiates Integration Process Improvement

by Doug Sander

In September, the Payloads Office, with implementing NASA organizations at Marshall Space Flight Center and Kennedy Space Center, began an ambitious project to overhaul how payloads are integrated into the International Space Station (ISS). The strategy focus was to bring payload customer issues to the forefront of a detailed process improvement effort in all aspects of payload integration including manifesting, tactical planning, increment/flight mission integration, engineering integration, operations integration and launch site integration.

Using Six-Sigma/LEAN techniques, representatives from all technical disciplines met in three separate week-long sessions from September through December. Fifty-five different individuals participated and over 4600 man-hours were devoted to define, measure, analyze, and improve our current processes. Facilitated by Dr. Richard Stuart, President of ARES Corp., the team mapped program processes into detailed process flows, splintered into focus groups, had numerous sometimes heated discussions over very difficult problems and finally produced over 70 separate improvement initiatives. The initiatives were then prioritized for work over the next year. Those with direct, visible impact to the customer were given the highest priority.

The key improvements from a customer point of view are expanded and enhanced Payload Integration Manager (PIM) services to the customer, a vastly improved communications infrastructure between the customer and the ISS Program, a streamlined data requirements collection process, and short-cuts for re-flight payloads. Many of the improvement initiatives will be transparent to the customer much like improvements on an automobile assembly line are transparent to the driver but manifest themselves in higher quality products at lower cost. Our intent is the same, higher quality products and services within a minimized schedule template.

From the desk of Lesa Roe

Since the November issue of the "ISS Payloads News" was published, we have made significant steps in our effort to make ISS Research facilities more user-friendly. The second and third sessions of the six sigma analysis of payload integration processes were successfully completed. (*Payload Office Initiates Integration Process Improvement*) An outbriefing of our plans for implementing the resulting initiatives was attended by many of you in early January. Your comments were perceived as supportive and encouraging. We plan to status our effort again in March.

The operations team at Marshall Space Flight Center (MSFC) is also continuing to do its part in improving their interface with telescience practitioners and reducing the cost of doing business. (*Payload Operations*) The Huntsville Operations Support Center is changing-out UNIX workstations for more accessible Windows 2000 PCs. The Payload Planning System is being re-engineered to focus on better-defined user needs and sustaining engineering cost reduction. Special initiative in the new design of downlink architecture will improve our ability to get science information to the Investigators more efficiently. (*The ISS Downlink Enhancement)* All of these changes are focused on improved user interface and reduced cost.

Science is being accommodated onboard ISS at the greatest rate possible within the constraints of Shuttle and Station resources (Shuttle upmass, middeck space and power, and ISS volume, power and crew time). We are continuously seeking avenues that reduce these constraints and maximize the science on orbit. A great improvement was gained at the ISS Program Manager's Control Board in December, as an agreement was reached to change the Program commitment for middecks available for research on ISS support missions from 5 to 20. This greatly enhances our capability to fly payload hardware that require power during ascent/descent. (*Research Improvements to Shuttle and Station*)

Not all research runs smoothly when we get to orbit, but with the help of dedicated ISS crews, our operations team, researchers and hardware developers, we are usually able to debug problems and carry on. Recently, we have had some hardware failures on orbit that were not recoverable. The Microgravity Sciences Glovebox (MSG) and ARCTIC freezer failures disrupted planned research for Increment 6. Onorbit troubleshooting detected the failed parts, our manifesting team at Johnson Space Center (JSC), Operations folks at MSFC, and onboard crew got the defective parts removed to the Shuttle and returned to Earth. A redesigned part for the MSG is being prepared to return it to action (Increment Six) and the freezer repair is in progress at JSC. Plans are in place to have both systems repaired and active during the later stages of Increments 6 and 7.

Though we never want to see such failures, some are inevitable and the flexibility and tenacity of our support team is never more clearly demonstrated than during these times of duress. I am so proud of the way our team reacted: identifying the problems, determining solutions, rearranging manifests and timelines to maximize our production and maintaining a professional demeanor through these difficult days. My personal thanks to all involved.

Research Improvements to Shuttle and Station

by Ned Penley

The transport of research hardware in the shuttle middeck is crucial to implementing a robust research program. Compared to transport in the Shuttle payload bay, the Shuttle middeck provides power for payloads during launch and landing phases and ground crew access to load samples nearer to launch and retrieve samples sooner after landing. At the ISS Program Manager's Control Board on December 10, we made great strides, improving the capability for research transportation in the middeck.

Three different items limit the middeck locker capability. 1) Volume within the middeck, 2) power availability and the associated thermal cooling capability for powered payloads within the middeck, and 3) total available energy for the mission (including energy for the middeck payloads).

Currently, the research community has a so-called "fenced" allocation of middeck volume of 5 middeck locker equivalents. They are "equivalents" because the items we fly in the middeck are not always in the hard-shelled, middeck lockers. We have usually pressed hard on this number, and increased the actual volume flown to around 7-9 middeck locker equivalents per flight.

Starting with flight ULF2 in July 2004, critical middeck volume for research will be freed up. The ISS commitment to research for middeck volume is increased to 20 middeck locker equivalents per flight (a 400% increase). This will be accomplished through placement of crew rotation

See **RESEARCH** page 3

Research Improvements

(continued from Page 2)
items, such as food and clothes, in the Multi-Purpose Logistics Module (MPLM) rather than in the middeck, and through offloading the Soyuz seat liners from the middeck to the MPLM.

Why now? This can be done now in planning because experience flying the MPLM has given us confidence in our ability to successfully berth the MPLM. Also, flight ULF2 is the first flight after the delivery of Node 2, providing an alternate docking port for the MPLM should something be amiss with the primary docking port. This reduces the risk of putting critical crew rotation items in the MPLM and counting on docking it to effect a crew rotation.

Payload power in the middeck has been restricted to 500 watts per flight in the past. In many cases, it was difficult for the Shuttle to meet this level and provide the required cooling for the crewmembers during landing. However, the shuttle middeck is being modified to provide a dramatic increase in capability. We now have the capacity to plan to 1100 watts of payload power and cooling on a flight. The modification uses available cooling behind the middecks in the shuttle avionics bay and provides it via rear-mounted ducts on the payloads. The increased planning number of 1100 watts will allow many more powered payloads to be manifested in the middeck. One of the three orbiters planned for ISS visits is already modified. A second, in modification now, will be complete by the ULF2 flight. The third will be modified by 2007. Further modifications will be made to increase the capability to 1600 watts on all orbiters.

The last hurdle is to increase the available energy for the middeck payloads. Currently, shuttle flight durations for the ISS are limited by the energy available. The energy is provided by hydrogen and oxygen carried to orbit in cryogenic tanks in the rear of the orbiter. The energy for the middeck payloads comes from the same source, thus pitting middeck payload energy requirements against shuttle flight duration. Since the complexity of the assembly tasks often drives longer missions, the trade has been made to limit the number of powered middeck payloads to allow longer flights.

At the December 10 meeting, Mr. Gerstenmaier directed that we specify requirements for a study of an Orbiter Power Conditioning Unit. This is an item that would provide power from the ISS power system to the orbiter, thus reducing the demand on the cryosystem in the orbiter, and increasing the total energy to the payloads. A secondary effect of this is to allow longer durations of orbiter stays, allowing ExtraVehiclular Activities (EVAs) and maintenance to be done while the shuttle is present. The crew that remains on the ISS after the shuttle leaves will have less maintenance work to do, and thus their available time to conduct research could be increased. The study will be conducted and the cost weighed against other critically needed items for increasing research capability.

These steps to increase the capability in the middeck transportation represent a huge increase in the overall research capability. We are already implementing planning for 20 middeck lockers/flight starting at ULF2, and are building that manifest based on the 1100 watt planning number. As experience is gained in ISS operations, I believe we will continue to see improvements in the system to take advantage of all of the available margin and make it available for conducting research.

Astronaut Sandra H. Magnus, washes her hair near a wall of middeck lockers, Shuttle middeck compartment.

Customer Corner

with Doug Sander

One of the great aspects of the International Space Station (ISS) is that it offers greater flexibility for research teams on the ground. Past research conducted on the Space Shuttle via Spacelab and other platforms required in most cases that the entire team travel to Johnson Space Center or Marshall Space Flight Center, set up "camp" and man their console in 24x7 shift work for two weeks or more. For many of the smaller research teams, the cost impact of those travel expenses were significant—not to mention the inconvenience and burden for families.

Telescience on the ISS is changing all that. The telecommunications technology explosion has enabled the ISS Program and its customers to take advantage of low-cost, tailored applications of Commercial-Off-The-Shelf (COTS) hardware and software for remote science operations support at most any location with network access. NASA is now providing ISS customers with Telescience Resource Kit (TReK) workstation software, Internet Voice Distribution, Internet2/Abilene data and video distribution and data storage services that provide remote users with access to telemetry, command, voice and video communications at their lab or office with low cost hardware and software.

Telescience at the Extremes

It doesn't necessarily stop there! Some ISS researchers have extended telescience to even further extremes. BioServe Space Technologies working with University of Colorado researchers has added wireless communications into the mix. The brainchild of Kevin Gifford and product of Sebastian Kuzminsky gives their operations teams the ability to leave their consoles and still monitor potential out-of-limit telemetry readings.

Operations Engineer Don Isham views telemetry and live video from the ADVASC payload at the WCSAR Payload Operations Center.

Using a Dell PC with a Debian GNU/Linux operating system, and a 7-year-old voice modem (they bought three for $20 on eBay, two for spares), Sebastian wrote a small software program to mate up with off-the-shelf Mgetti software that monitors selected parameters for defined out-of-limits conditions. When and if such a condition occurs the software will automatically call six selected phone numbers (cell phones and/or home phones) and provide a pre-recorded voice message that an out-of-limits condition exists and requires attention. The parameters selected can include system performance such as power consumption or temperature, or experiment conditions such as humidity or CO_2 levels. The University of Colorado team has been using this set-up for some time including support for the PGBA and CGBA experiments, both flown on Increment 5.

Similarly, the Wisconsin Center for Space Automation and Robotics/Advanced Astroculture (WCSAR/ADVASC) team at the University of Wisconsin has also devised an extension of the remote operations capability. Matt DeMars developed the ADVASC Health and Status Visual C++ application that uses the NASA TReK Telemetry Processing application's Exception Monitoring capability to discover if any sensor data is out of limits. From the Health and Status application, the user selects which plant growth chamber and support system sensors to monitor. If a sensor goes out of limits, the Health and Status program creates a pager file containing the time stamp, sensor name, and sensor reading. A COTS program called Win Beep "picks up" the pager file and delivers the page message via modem to an operator wearing a Motorola text pager. If the operator receiving the page is at home (or wherever) he or she can then access their data from their

See **TELESCIENCE** page 5

New Space Experiment Research and Processing Laboratory

by Barbra Calvert (NASA/KSC)

Construction is currently underway at Kennedy Space Center (KSC) for the new Space Experiment Research and Processing Laboratory (SERPL). This 104,000 square foot building will replace the outdated buildings on Cape Canaveral Air Force Station (Hangar L, Little L and the Outback), currently used to house the Payload Processing, Experiment Support Labs, Animal Care Facility, Flight Experiment Development, and Ground Research. The SERPL is a joint venture between the State of Florida and NASA wherein NASA has furnished the land and State of Florida is providing the funds for construction. Once completed the SERPL Facility will be leased by NASA to support its programs.

Space Experiment Research and Processing Laboratory at KSC.

SERPL will serve as the first project and cornerstone of the planned International Space Research Park (ISRP). The SERPL facility will serve as the primary facility for processing specialized science experiments flown on Shuttle and to the International Space Station. SERPL will remain within the confines of the KSC secured area however ISRP, a short distance away will be "outside the gate" allowing for un-badged access 24 hours a day.

In an effort to grow the utilization of SERPL, NASA has created a mechanism for the Life Sciences Services Contractor (LSSC) to offer their services and space within the facility at fair market value. NASA has encouraged LSSC to acquire commercial ventures using this clause.

The SERPL facility will include a state-of-the-art animal care facility at approximately 19,000 square feet with six separate animal holding rooms, surgery rooms, and both clean and dirty corridors to manage the flow of animals more effectively. The Payload Processing Area, 6500 square feet, and Experiment Support Labs, 5000 square feet, will include ten Experiment Support Labs, six Experiment Hardware Labs, and three Experiment Development Labs. The Ground Research Areas encompass 10,500 square feet of the building and will include 17 Controlled Environment Chambers, 2 designated as Orbiter Environmental Simulators to support the research. General Support Labs will be housed in 2000 square feet of space with the remainder of the building for Personnel Space, Facility Management and Common Areas. The new facility will be opened and occupied in October 2003 with full capabilities planned for December 2003. Flight Experiment Processing should be unaffected by the transition.

Telescience at the Extremes

(continued from Page 4)

home computer to log into their TReK FTP server over public Internet and download a telemetry file into an Excel spreadsheet. Based on that data, the operator can make the decision whether a trip to the office is necessary. Pajama operations is here!

The flexibility these innovations provide means a limited size team on a shoestring budget can maintain a 24x7 presence, but reduce console duty to something closer to 8x5. As Matt De Mars put it, "it allows us to have our lives."

If you want more details on these and other remote site set-ups you can call Donna Sellers, the POIC Remote Operations Lead at Marshall Space Flight Center, 256-544-6557.

Next time at the Customer Corner: Increment 5 Customer Feedback results.

ADVASC display used to monitor telemetry and activate automatic paging.

Increment 7 Preview - Enhancing Research Capabilities

by Rodney Lofton, ISS Increment 7 Payloads Manager

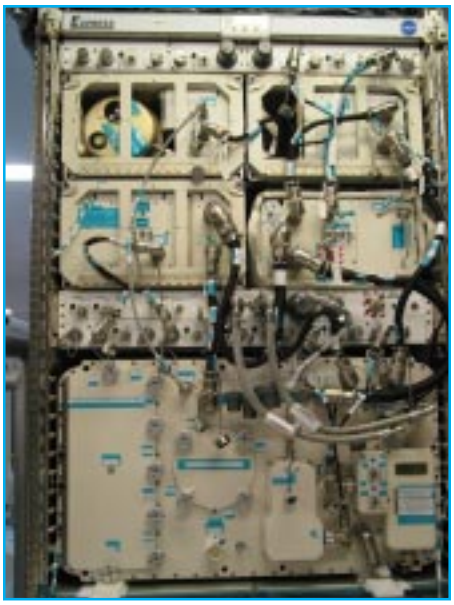
ISS Increment 7 is undoubtedly slated to be the busiest payload facility outfitting and utilization increment flown to date. During this 154-day, two stage increment, three new facilities will be delivered to the ISS, installed and checked-out. A dedicated utilization transport rack will be flown for the first time. Three new International Partner/Participant payloads from the Canadian Space Agency (CSA), European Space Agency (ESA), and Italian Space Agency (ASI) will also be flown for the first time. Over 3100 kilograms of payload hardware will be taken to ISS to support the 26 research investigations scheduled to be performed during this increment. Approximately 300 hours of crew time will be needed to accomplish this research.

The initial flight and stage of the increment, ULF1, will include the transport and operational verification of the Minus Eighty degree Laboratory Freezer for ISS (MELFI), Human Research Facility (HRF) Rack 2, and the Window Observational Research Facility (WORF). The Materials ISS Experiment (MISSE) Passive Experiment Carriers (PECs) will be swapped during a ULF1 extravehicular activity (EVA). The second half of the increment, flight and stage 12A, will be highlighted by the Shuttle crew's performance of the Perceptual-Motor Deficits in Space (PMDIS) investigation and the Expedition 7 crew's performance of the Test of Reaction and Adaptation Capabilities (TRAC) investigation. Both investigations are sponsored by CSA.

HRF-2

Preflight Preparation Challenges

The delivery of the three new research facilities to KSC presented the Payload Developers and the KSC payload utilization processing team with many challenges. Processing of the Space Dynamically Responding Ultrasonic Matrix System (SpaceDRUMS) payload components kept these teams busy throughout the entire delivery through Multi-Purpose Logistics Module (MPLM) installation period. The four single middeck locker size modules and the quad locker size Processing Module (PM), that make up the active part of the SpaceDRUMS complement, went through extensive integrated testing and fit checks within EXPRESS Rack #6. Initial hardware problems necessitated adjustments to the turnover schedules on a couple of occasions. However, these changes were accommodated through thoughtful activity management by the KSC payload utilization processing team.



SpaceDRUMS

MISSE PEC installation during a 7A.1 EVA.

An EXPRESS Transportation Rack (ETR) was processed at KSC for its first time use on an ISS mission. The ETR provides structural support for EXPRESS Rack payloads and other hardware when they are being transported in the MPLM. During the ULF1 flight, the ETR will contain a full complement of utilization hardware in its six drawers and six locker locations. Fit check of the SpaceDRUMS PM in the ETR helped refine the procedural technique for large mass installation within the rack.

Installing the WORF rack in the Rack Insertion Device in preparation for MPLM installation, revealed areas

Increment 7 Preview - Enhancing Research Capabilities (continued)

where modifications to the rack were needed to alleviate structural interferences. Incorporation of these modifications will make for a smoother installation of the rack on-orbit in the ISS Laboratory.

Though a number of problems arose in the processing of the payload racks, the level of concern was not unexpected, considering that these were new and unique racks undergoing first time processing at KSC. The ETR, MELFI, WORF, and HRF Rack 2, are installed in the MPLM awaiting launch.

Getting Ready for Research

The ULF1 flight docked phase will include many payload activities, notably the transfer of the three new racks, powered payload transfers and the retrieval of MISSE PECs 1 & 2. These PECs will have been in orbit for 20 months and will be exchanged with PECs 3 & 4.

The real-time payloads mission management team will be performing a unique function during the ULF1 docked mission. This entails managing the return stowage configuration of the ETR, to keep it within proper mass and center-of-gravity limits for the Shuttle's reentry. This will be an "interesting effort" as stated by Welby Redwine, the ULF1 Flight Payload Manager. The ISS Cargo Integration Office does this job for the resupply platforms and racks flown in the MPLM. ISS program management has tasked the payload mission management team to perform this function on each flight of an ETR.

The first month of stage ULF1 will be especially busy with a mixture of rack checkout activities and crew assisted payload operations from each of the research disciplines. HRF Rack 1 & 2 drawers will be rearranged between the two racks to allow related hardware to be co-located within a single rack. SpaceDRUMS modules will be setup within EXPRESS Rack #5 and processing of carousel pellets will commence. The WORF rack will be activated in preparation for Earth observation operations. The WORF has been designed to provide very stable mounting surfaces for payloads using the high quality laboratory window. MELFI On-Orbit Commissioning Experiment operations will be started and extend for a period of about a month. The MELFI is a high performance system, modular in design, which provides low temperature stowage of biological materials, reagents and perishable items.

ASI's Hand Posture Analyzer (HPA) experiment runs will be started. It is designed to investigate the role of microgravity as humans reach, grasp, and manipulate objects in space. Other physical sciences, Space Product Development, and Human Life Sciences investigations will be conducted throughout the stage and the majority of these will be continued into the 12A stage. New activities scheduled to start in the 12A stage include the Glovebox Integrated Microgravity Isolation Technology (g-LIMIT) system demonstration and the Coarsening In Solid Liquid Mixtures-2 (CSLM-2) glovebox investigation. However, these investigations may ultimately begin during the ULF1 stage if crew-time becomes available.

The successful delivery and installation of the new racks into the Laboratory during Increment 7 will be a large step forward for long-term research capability. Principle Investigators, hardware developers, Increment crew, operations personnel, and the payload mission management team will have their hands full with these and the other Increment activities but look forward to the challenge.

The MELFI at KSC for pre-launch processing

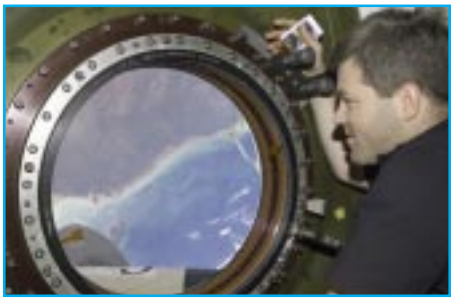
HPA sensored glove.

CSLM-2 and g-LIMIT in the Microgravity Sciences Glovebox work volume.

Research Window of Opportunity

by Tony Boatright/SAIC

The Window Observational Research Facility (WORF) was loaded into the Multi Purpose Logistics Module (MPLM) at the Kennedy Space Center on December 13, 2002. As the rack crossed the threshold of the MPLM's Aft Access Closure at 2:00 pm EST, it represented the culmination of seven years of study, design, fabrication and testing aimed at producing a state-of-the-art host system for advanced earth observation payloads on the International Space Station.



Astronaut Steve Frick at Destiny's science window.

The WORF rack will be launched on STS-114 and installed in the US Laboratory Module at the nadir-pointing research window. The WORF will provide power, data, cooling, passive stabilization and structural accommodations for earth-viewing cameras and sensors. The payload volume located in the central portion of the rack provides approximately a cubic meter of space for the attachment of experiment equipment in front of the 20-inch diameter laboratory research window. The WORF also provides physical protection and a condensation prevention system for the window.

Multiple sensors and other payload equipment can be set up for autonomous operation from the ground, for crew-tended operation from laptop computers in the lab aisle, or for hands-on operation by crew members. During hands-on operation where light levels and stray light reflections are a concern, the WORF provides a kayak-style flexible skirt and interior environmental controls that allow crew members to operate with their upper torso inside the payload volume (see sketch below) and still maintain an effective light barrier to the Laboratory aisle.

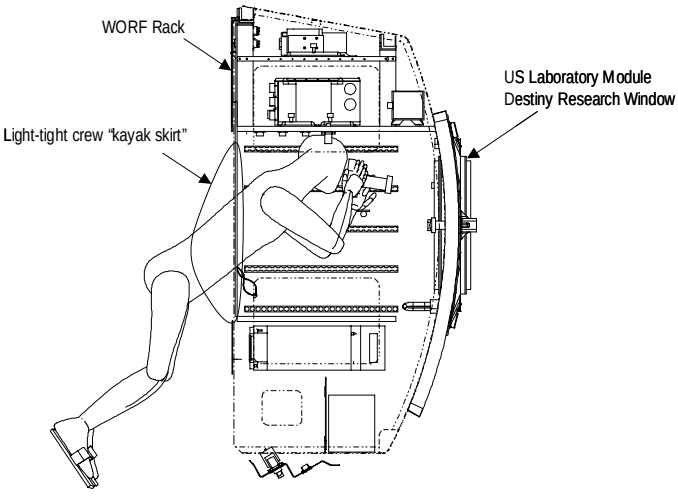
The laboratory module research window is the largest and highest optical quality window ever flown in space. The window assembly contains 3 fused silica panes, including a replaceable outer debris pane and fourth, removable inner heater and scratch pane subassembly. Controls on the WORF rack will operate a metal shutter over the window on the exterior of the laboratory module. The research window provides better than 95% transmittance in the visible spectrum, with gradual drop-off in the near infrared and steep drop-off in the ultraviolet (designed specifically to protect human eyesight during extended viewing). Wavefront variations measured through the window assembly exceeded performance specifications (ultimately 1/15 peak-to-valley over a 6-inch diameter for a wavelength of 632.8 nm), making it possible to fly a system with 16-inch diameter optics.

The 52-degree inclination of the ISS carries the WORF over 75% of the inhabited land surface of the Earth, and 95% of the population. WORF will fly over the same spot approximately every three days, and will fly over the same spot with the same solar lighting angles approximately every three months.

Currently, ten optical and hyperspectral payloads are in various stages of development for use in the WORF over the next five years, representing commercial, scientific, educational and Department of Defense users. A medium fidelity WORF ground rack and lab window simulator at JSC will be available as a payload development and training facility.

WORF prepared for testing at KSC.

The first face-to-face meeting of a WORF users group for selected, potential, and interested payload developers will be held at JSC in mid March. For further information contact Tony Boatright at tony.boatright1@jsc.nasa.gov



Window Observational Research Facility (WORF) Crew-Tended Operational Mode

The ISS Downlink Enhancement

By Jimmy Whitaker and Jeff Durham

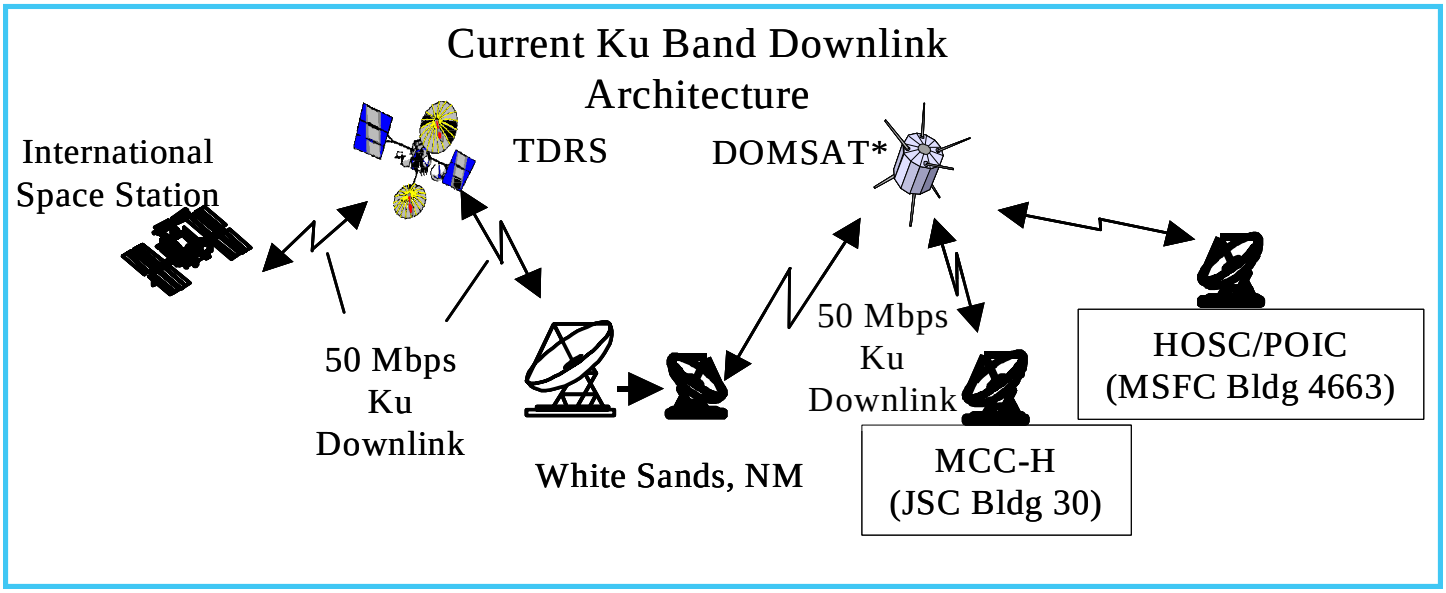
The ISS Program Office, JSC, and MSFC are jointly developing the ISS Downlink Enhancement Architecture (IDEA). Employing many of the tenets of the agency-wide "OneNASA" vision, the main objectives of IDEA are:

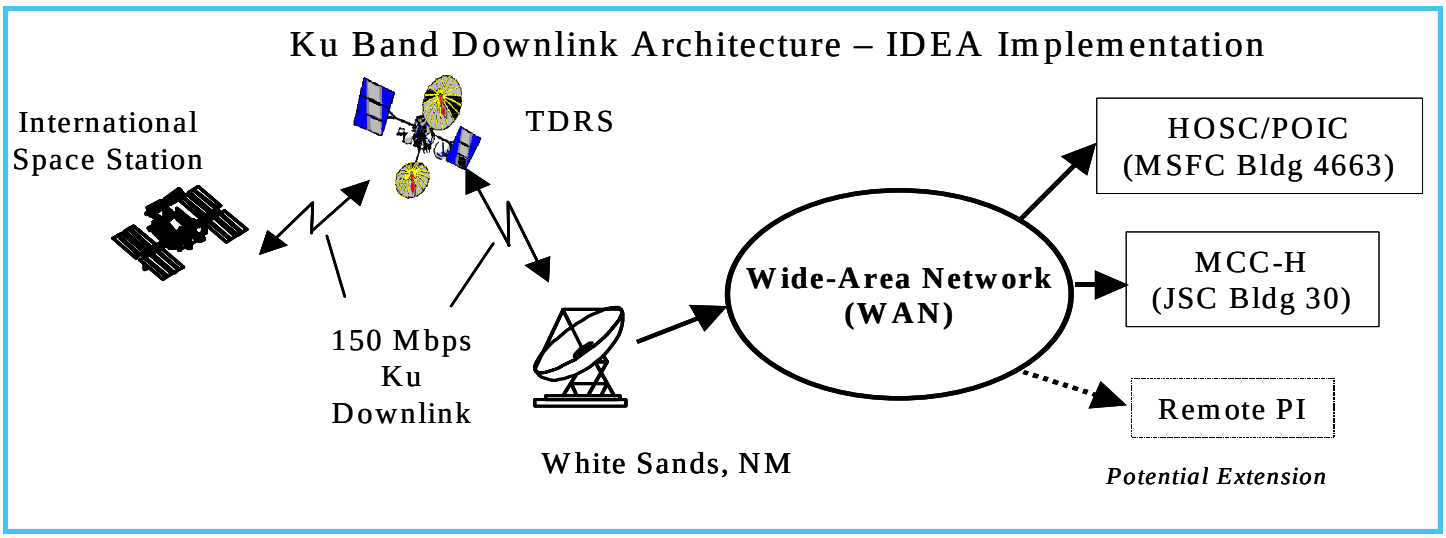
(1) Enhance the ISS science return by establishing a ground systems architecture that can easily support the growth of the Ku band downlink from 50Mbps to 150Mbps;
(2) Significantly reduce operations and sustaining engineering infrastructure costs.

IDEA will accomplish these goals in a two-phase project [See Figure]:

(1) Phase 1: Replace the existing commercial domestic communications satellite (DOMSAT) transponder service that distributes the Ku band downlink from White Sands to both JSC and MSFC with a terrestrial fiber communications network. Terrestrial networks offer higher data transmission rates at lower cost, as well as reduced data latencies (which may allow improved telescience support). Phase 1 is scheduled to be completed by October 2003.

(2) Phase 2: Centralize initial Ku band downlink processing at White Sands and upgrade end-to-end ISS ground systems data handling capabilities to process the full, existing 150 Mbps capability of the ISS vehicle. By exploiting the design of the existing Payload Data Services System (PDSS) redesign being developed at MSFC, and jointly (i.e., with JSC) developing data processing and interface hardware and software, IDEA both increases system capability and reduces cost. Phase 2 is scheduled to be completed by December 2004.





Payload Operations

Increment 6
by Lamar Stacy

Our planned payload operations for Increment 6 were significantly reduced by the failure of the Microgravity Science Glovebox (MSG) prior to 11A. The crew ran diagnostic procedures and determined that the Power Distribution and Conversion box within MSG had failed. This component was returned on 11A and a redesigned unit is being manufactured by the European Space Agency for delivery on a Progress vehicle in February. Once MSG is recovered, we'll perform as many MSG payloads as possible before Utilization Logistics Flight 1 (ULF-1). To accommodate this, many activities previously scheduled later in Increment 6 were moved earlier into December and January. These included the installation of the Active Rack Isolation System (ARIS) plus checkout of EXPRESS Rack 3, installation and checkout of the High Rate Communications Outage Recorder (HCOR), and the relocation of the Advanced Astroculture (ADVASC), Biotechnology Specimen Temperature Controller (BSTC), and Gas Supply Module (GSM) payload hardware in preparation for new payloads on ULF-1.

Commander Ken Bowersox successfully completed the first HRF FOOT run on Christmas Eve. All other HRF payload operations scheduled to date including Pulmonary Function Facility (PuFF), Renal Stone, and Ultrasound have been successfully completed. For the Zeolite Crystal Growth (ZCG) experiment, Increment 6 marked the first use of clear autoclaves to provide visual insight into the mixing process of the zeolite solutions in microgravity. Crew feedback has resulted in a new procedure that will reduce the number of bubbles and subsequent nucleation points in the samples. The first ZCG furnace run was completed on New Year's Day, and a second bonus run was completed on January 18 using spare autoclaves. Other late Increment 6 activities include EarthKAM operations and installing upgraded software for all five EXPRESS racks.

Increment 7 Status
by Carmen Price

Increment 7 is starting out the New Year with the completion of several months of hard work! Increment 7 encompasses two flights: ULF-1 and 12A. The launch of ULF-1 is currently scheduled for March 1, with 12A scheduled for May 23. The increment concludes with the crew exhange on 12A.1, currently scheduled for a July 24 launch. The MPLM is loaded with three new racks flying on ULF-1 (MELFI, WORF, HRF2), with hatch closure as scheduled, January 31. Crew training is almost complete.

We expect to quickly finalize the On-orbit Operations Summary, as our payload planning team travels to Houston to complete discussions with MOD and Russian planners. The baseline of crew procedures is in progress and is also scheduled for completion this month. We're almost ready to go, and excited about the new capabilities and science Increment 7 is bringing to ISS!

Increment 8 Status
by Eric Melkerson

Increment 8 preparation activities are coming into full swing with the first of the year. We're preparing for 12A.1 launch on July 24 of this year, 13A launch on October 2, and 13A.1 scheduled for November 13. We look forward to continued work with previously-flown payload teams and welcome the following new payloads to ISS: DOME – Development of Organic Materials for Electroluminescence, FSDC – Fiber Supported Droplet Combustion, SHERES – Synchronized Position Hold, Engage Reorient, Experimental Satellites, and OPCGA - Observable Protein Crystal Growth Apparatus.

Near term milestones for Increment 8 include reviewing our products at the Integrated Payload Flight Operations Readiness (IPL-FOR) review, completing our collection of payload planning requirements (iURC) on February 24, and baselining the crew procedures at the end of March. Our biggest remaining challenge is to meet our early increment planning requirements due to the limited amount of available crew time plus the power perturbations as a result of the 12A.1 power reconfiguration.

ISS Payload Academy
by Alice Dorries and Alan Johnston

The Training and Crew Operations Group has developed a Payload Academy to meet many of the requirements for ground personnel training. This Academy provides a basic understanding and background of the current ISS program and some of its history. Emphasis is on the structure and function of the infrastructure supporting payloads on the ISS. Specific topics include but are not limited to: members of the operations teams including their functions and interfaces; payload support systems; ISS data and video systems; console protocol including voice protocol; and beginning courses on the Payload Operations Integration Center (POIC's) computer systems.

Payload Academy is required for our POIC flight controllers' certification. These students must pass a comprehensive examination at the end of the two-week class. Other POIC operations personnel are also required to attend and complete Payload Academy. Additionally, a subset of Payload Academy is available to members of the payload developer teams to help meet training requirements. This abridged version focuses on a subset of courses most applicable to PD teams' operations functions and interfaces.

The development and implementation of the Payload Academy represents one of the latest innovative and most effective process improvements within the area of training, and has received high praise from both trainees and their management. For more information, contact Alice Dorries, Alan Johnston, or anyone on the POD contact list.

Payload Operations

Ground Systems Status
by Donna Sellers

The POIC will continue to support ISS payload operations with the Build 6 software Series release through 12A Flight Operations.

The Telescience Resource Kit (TReK) Release 2 Service Pack 1 will be released in the January/February 2003 timeframe. This service pack contains several performance enhancements, commanding updates that correspond to changes in EHS Build 7.0, and a data playback enhancement.

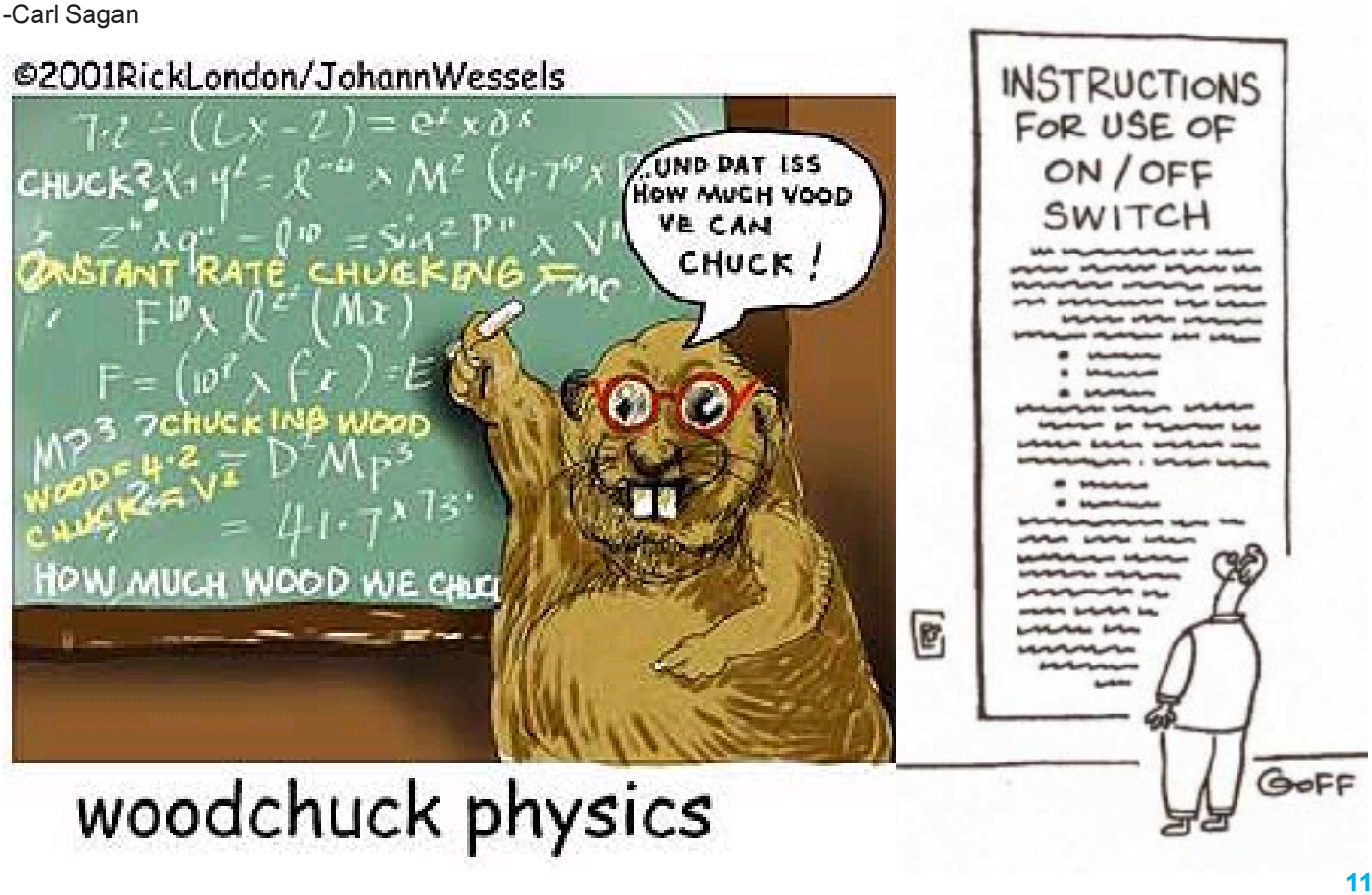
The TReK team, working with the POIC and ISS High Definition Television (HDTV) development personnel, will support an upcoming ISS HDTV demonstration test using standard TReK software, with commercially available hardware, downlink HDTV images will be provided to Japan/NASDA and the Discovery Channel for distribution.

The Ground Systems Department has initiated several POIC Ground System changes to better serve the payload community and provides costs savings that can be passed back to the user community.

- Further augmentations and performance enhancements related to the replacement of the UNIX workstations in the Huntsville Operations Support Center (HOSC) with Windows 2000 PCs will occur with the release of Build 7 and EPC 2.0. Aside from the obvious benefit to the remote user community of replacing the X-Window telemetry processing capabilities, with enhanced native PC telemetry display functions, the processing capacities of the user LOGIN servers will be almost doubled.
- In conjunction, the UNIX based EHS server software is being ported to a LINUX platform-using commodity based PCs and is expected to be available for initial user testing by mid 2004.
- A re-engineering of the Payload Planning System (PPS) is now underway to better meet the needs of the PPS users, as well as to reduce long term operations and maintenance costs for the system. A Critical Design Review, to evaluate the detailed software requirements and system design, was held beginning on January 31, 2003. The re-engineering effort is scheduled to be completed by the Fall of 2004.

Humor sent up to the Crew:

"If you want to make an apple pie from scratch, you must first create the universe."
-Carl Sagan



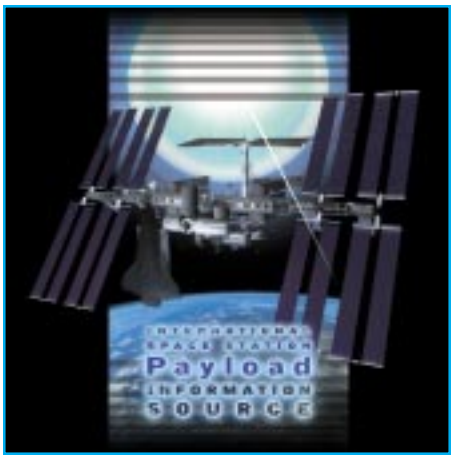
Mick Culp, Editor
ISS Payloads News

Letter from the Editor

Of the dozen e-mails that poured in since the inaugural issue of the Newsletter was sent out, nearly all were requests to add names to the distribution list. Though I am still looking for your critique of our publication, I appreciate the help in bringing our mailing list up to date. If you know of others who should be receiving the ISS Payloads News, please send me their name, address and payload responsibility. PIs who intend to perform research on ISS but have not yet had an experiment selected for flight may have an interest in the information in these newsletters and are welcome to the distribution.

It has come to my attention that we have not reached the entire ISS user community with our CD-based ISS users' guide, depicted to the right. The "International Space Station Payload Information Source" is an informational CD-ROM containing facts about the Station, its research capabilities, and the services available to the payloads it carries. You may request copies from Jana Schultz; 281-244-7913, jana.t.schultz@nasa.gov.

Special articles chosen for this issue include a discussion of the new biology processing facility at KSC (SERPL) and the introduction of the window facility (WORF) over the high quality, earth-facing window in the US Lab. In "Customer Corner", Doug shows how some PIs are utilizing telescience monitoring to reduce staffing costs during operation of their experiments. We hope these expansions of ISS research capabilities are of interest to many. Please let us know.



Do you have your copy of this CD?

Research Accommodations

Data through January 31, 2003

All planned Investigations have been executed through Increment 5.
99 percent of the research objectives of the investigations have been accommodated through Increment 5.

Status: Green

Total Number of Investigations to Date = **70**
Research Objectives Accommodated (Cumulative) through Increment 5 = **99%**
Research Objectives Accomplished (Cumulative) through Increment 5 = **95%**
Continuous U.S. Research Time to Date = **23 Months**
Crew-Tended U.S. Research Time to Date = **1218 Hours**