ISS PAYLOADS NEWS

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Customer Service Hot Line: 281-244-6187

Payload Data Library Enhancements Promise To Be More User Friendly

By Gerald Esquivel & Doug Craig

Some Payload Developers (PDs), payload integration team members, and Payload Data Library (PDL) data set owners have recommended enhancements to be provided in the PDL. Recent Lean Six Sigma efforts converted those desires into action. Action items were generated to pursue improvements to PDL and its image. A series of PDL Summit Meetings were initiated in an effort to capture those improvements.

The primary focus in the PDL Summit Meetings is the requirements of the Payload Developers (PDs) since they are our primary customers. Suggestions for PDL improvements in any area are being considered, but the emphasis is on making utilization by our PDs easier, and making PDL more user-friendly.

The Action items, upon which the PDL Summit Meetings were based, are threefold. First, the team reviews existing PDL requirements to determine if they can be scrubbed to simplify PD interfaces or user data collection and management. If so, the team provides suggestions for improvements.

Second, the team reviews additional PDL tool improvements that can simplify PD and data user interfaces. Two specific suggestions for improvement as a result of previous Lean Six Sigma activities to be considered include:

- Improve data set output and report capabilities
- Enable payload data to be applicable to multiple flights, thus eliminating the need for multiple copies of PD data within PDL.

Third, the team develops a plan for PDL updates in conjunction with, and coordinated with, the ongoing ISS Data Dictionary scrub activities. Once the plan is developed, the team coordinates it with the PDs.

PDL Summit 1 was conducted on April 2-3, 2003, at the Boeing Jetplex in Huntsville, Alabama. Prior to the meeting, a kickoff package containing the strategy for completing the action items and a list of objectives was distributed to all prospective attendees. Members from the following teams attended the Summit: Action item leads; PDL development team members; facility integrators; PDs; Payload Integration Managers; Payload Engineering Integration team members; PDL data set managers; and the ISS "data czar." Presentation material and meeting minutes can be found at the Payloads Software Control Panel (PSCP) Web page via the following link.

http://iss-www.jsc.nasa.gov/ss/issapt/payofc/PDLmeetings.html

The PDL Summit Meetings began in an environment that was open to all interested personnel. The premise was that the team would begin with many attendees and then get gradually smaller as it migrates into the decision-making and implementation phases. Initial PDL Change Requests are anticipated at the Payload Software Control Board in September of this year with additional change proposals to follow.

Improvement suggestions brought forth in Summit 1 ranged from as simple as minor changes to existing data sets to as complex as a total redesign of those data sets. As the merits of each improvement suggestion were evaluated, the group reached consensus on a list of 33 items to be carried forward for future consideration. It was interesting to

(see **PDL** page 11)

What is the most anticipated improvement to the ISS Payloads Program?

Answer on page 2

What's Inside

From the desk of Lesa Roe

A transition of the leadership of the Research Planning Office took place in April. Ned Penley, who had been with the ISS Payloads Office since 1996 has left to accept a 1-2 year NASA assignment to the Sate of Montana. Montana and the entire region of the inland Northwest has traditionally been underserved by NASA and the agency has asked Ned to help establish NASA in this region. He will be establishing the technical infrastructure that serves the interests of NASA's mission throughout the inland Northwest. This will build the technical basis in the region as well as enhancing the pipeline of NASA talent in the nation. We cannot substantiate the rumor that Ned just found a way to return to the mountains he loves. You can still reach Ned on his old email address to join us in wishing him well in this new challenge.

Succeeding Ned as the Acting Manager of the Research Planning Office and as Chairman of the Research Planning Working Group (RPWG) is Mr. John Uri. John has been with the Payloads Office since 2000 as the Lead Increment Scientist for Increments 0-4 and 8-9. Prior to joining ISS Payloads, John served as the Mission Scientist for the NASA/ Mir Phase I Program. Those of you who have met John professionally will know why we are confident that there will be no lapse during this transition.

Since the Columbia accident we have been extra busy looking at all manner of contingency scenarios. Through it all we have continued our drive for process reform. The Six Sigma meetings have been fruitful, agreements have been made on changes in many areas, and document upgrades to reflect the changes are now being prepared. Eleven Change Requests resulting in data requirement reductions for Payload Developers are scheduled to reach the Payload Control Board for final community approval in July and August.

Gerald Esquivel, Manager for Payload Software, is leading the charge on a thorough review of the Payload Data Library capabilities and interfaces (Payload Data Library Enhancements). He expects to implement changes as early as September.

The effort to maintain four research racks on ULF-1 is impacted by the loss of 400 pounds of utilization hardware from the manifest to accommodate the ISS logistics backlog. The ISS program is struggling to manifest its required logistics to support the vehicle and crew in the aftermath of the Shuttle grounding and this threatens the research logistics support. One ULF1 rack may be traded for research hardware upmass that would support continued onboard research through the ULF1 increment. HQ has prioritized the racks for flight and OZ will press for an MPLM on 13A.1 to recover the launch of any rack removed from ULF1. In addition, the delay of this flight has required changes to the manifested research hardware (i.e., battery changes, etc.). We appreciate the considerable effort that has been expended at KSC to remove all research racks from the MPLM and perform some 30 maintenance items.

John Uri

I want to express a special thank you to all who participated in the Increment 5 customer surveys (Customer Corner). We believe it is a useful tool to monitor our success in accommodating our Principle Investigators and Payload Developers. Doug's team has worked tirelessly to assess your comments and we are comparing them to our process improvement initiatives to determine that we are working those areas about which you care the most.

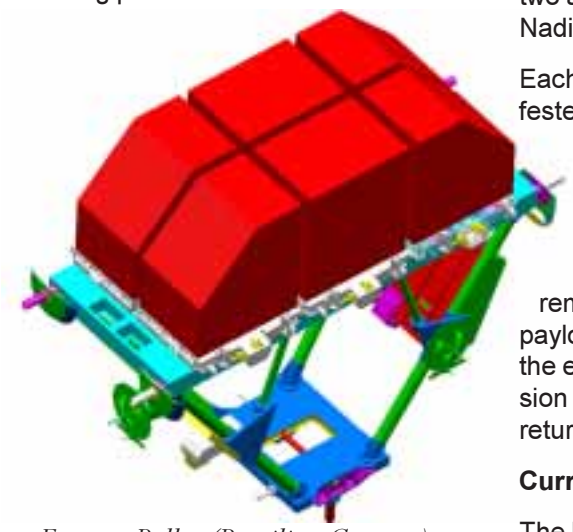
Answer from Page 1

Shuttle Return to Flight

EXPRESS Pallet Production Alternatives Pursued

By Gene Cook

The EXPRESS Pallet is a system planned by the ISS Program that will allow multiple external payloads to be deployed on a platform that will be attached to the ISS truss segment attach sites. Each EXPRESS Pallet will have the capability to carry six (6) individual payload adapters. The pallet system routes two (2) sets of data services, on 28 Vdc and 120 Vdc power feeds to each adapter so two (2) payloads per adapter can be accommodated, if required, by sharing power feeds.



Express Pallet (Brazilian Concept)

EXPRESS Pallet Services

The power and data capability of the pallet are summarized as follows:

- Payload volume - 46 (l) x 34 (w) x 49 (h) inches (1.1m x 0.86m x 1.2m)
- Payload weight - up to 500 pounds (227 kg)
  - 3000 pounds total for the 6 adapter payload systems
- Power - up to 750W @ 120 VDC, up to 500 W @ 28 VDC
  - 2.5 kW is the maximum available power to any one pallet and can be divided as desired between the 6 adapter payloads within these constraints. In practice, there will be less than 2.5 kW of power available to each ExP, due to overall power limitations on the truss.

Operations Scenario

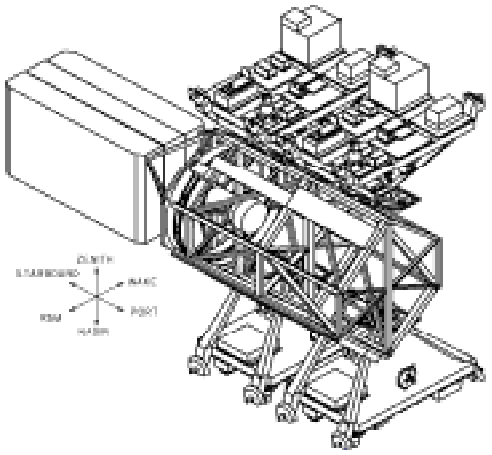
There are four (4) truss segment attach sites located on the ISS that are scheduled for Attached Payload use. These attach sites are located on S3 (starboard) Integrated Truss Assembly. The ISS plans to use three (3) of these sites for EXPRESS Pallet operations and the fourth attach site for other experiments such as the Alpha Magnetic Spectrometer-02 (AMS-02).

Of the four (4) S3 Truss Attach Sites two are Zenith facing and two are Nadir facing.

Each EXPRESS Pallet will be manifested with six (6) individual adapter payloads prior to launch. This payload complement will remain with the pallet as it is placed on one of the S3 truss segment attach sites. Each pallet will remain on orbit and the individual payloads will be replaced robotically at the end of the adapter payload mission duration. The adapter payload is returned via an unpressurized carrier.

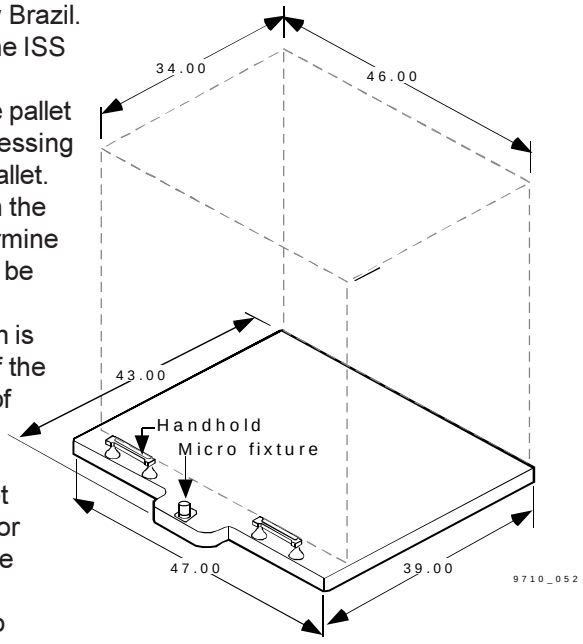
Current Status

The EXPRESS Pallet System was one of the deliverables that was to be supplied to the ISS Program by Brazil. Brazil subsequently informed the ISS program that they did not have sufficient budget to produce the pallet system. The ISS has been assessing alternatives for producing the pallet. Discussions are being held with the Department of Defense to determine if a cooperative agreement can be reached to produce the pallet. Additionally, a budget evaluation is being performed to determine if the pallet can be funded as a part of the ISS budget. If funding issues are resolved, the pallet system should be able to accept adapter payloads in mid 2007 for a first launch in early 2008. The ISS program currently has the Boeing Company on contract to complete a critical design review (CDR) level design of the adapters that will be used as the payload interface to the EXPRESS Pallet.



Four EXPRESS pallets attached to the S3 truss segment

[Editor's note: Developers of Attached Payloads may follow EXPRESS Pallet design progress with Gene's Attached Payload Forum. Contact JoEllen Riley 281-244-7712 for meeting notice distriubution].



Maximum Payload Volume on EXPRESS Pallet Adapter

Customer Corner

with Doug Sander

The Customer Service Team has been hard at work to produce the first-ever ISS Customer Increment Feedback Report since we started the interviews in February. The time to get this first report out the door was longer than expected. Roy Christoffersen and Roger Weiss conducted each of the 34 separate interview/surveys and found that our biggest challenge to data collection is securing an appointment with the participating customers. Once the interview was arranged the execution went well. Many of our customers were so enthusiastic about providing feedback that they exceeded the hour scheduled for the session. Another challenge for us has been the development of the data analysis plan. We were told going in to this effort that one should know the metrics and analysis to be used before starting. That's easier said than done. In many ways we are learning this business as we go along and we are leaning heavily on some key experts from other Centers and private corporations. The final data analysis plan has come together, however, and we are getting some interesting and useful data. We have published our written report and provided a briefing to the Payload Control Board on May 30th.

In general, the results are not far from what we expected. Our Increment 5 customers indicate an overall satisfaction with the ISS Utilization Program at 7.2 out of 10. The group had high consensus that the effort expended to get their raw science data was worth it, a 4.4 average out of 5. On the other hand, the Increment 5 group rated their level of satisfaction with the amount of data and documentation required to fly at 3.2 out of 5 with a wide frequency distribution (meaning no consensus on this opinion). Subsequent increment data on this measurement will hopefully show an upward trend.

Increment 5 Customer Feedback

One special metric we are using is the American Customer Satisfaction Index (ACSI). The ACSI is a long-standing organizational cross-comparison index developed by the American Quality Institute at the University of Michigan. It allows us to benchmark our customers' overall satisfaction against the customer satisfaction of other organizations and that of an "ideal organization". The ACSI uses three questions on a 1-10 rating scale to calculate the 0-100 index score. The three questions are:

- What is your overall satisfaction with the ISS Utilization Program?
- To what degree did the ISS Utilization Program meet your expectations?
- How close to your ideal organization for ISS Utilization management would you rate the ISS Utilization Program?

The Increment 5 customer group responses to these questions resulted in average scores of 7.2, 6.6, and 5.1, respectively. Using the ACSI algorithm to calculate the index score, Increment 5 results in an ISS ACSI score of 60.

To appreciate this score we compared ourselves to a sample of scores of individual corporations, government agencies and aggregate industry averages. The table illustrates that ISS has some room for improvement. We also noted that while low, ISS is just above the National Science Foundation score of 58. Hmmm.

ISS Utilization Program Score 60

Like you, we take this measurement with a grain of salt. It's not clear whether our situation as a one-of-a-kind facility in space affects our score significantly. The most important message from this metric will come over time as we start to develop trend data. This is also clearly true for the other measurements in the survey.

I will not attempt to provide you with the details of the Increment feedback here in the Customer Corner since there is so much data. The full report and the summary briefing are provided to participants via e-mail and are available for the greater ISS customer community via the ISS Customer Web site at: http://stationpayload.jsc.nasa.gov/pd/custfb.htm .

A special hat's off to Roy Christoffersen, Roger Weiss and the other SAIC team members for their excellent work on the survey formulation, interviews and data analysis and our thanks to all the customers who took the time to participate in our survey.

INDUSTRY RANKING	Score*
Retail Industry (aggregate)	75
Federal Government (aggregate)	70
Kmart	70
NASA/Glenn Research Ctr	67
Internal Revenue Service (tax filers)	62
McDonalds	61
ISS Utilization Program	**60**
National Science Foundation (grantees & applicants)	58
Federal Aviation Agency (commercial pilots)	56

*Source: American Customer Satisfaction Index (ACSI) 2003

Space Research is Highlight of OBPR Web site

The Office of Biological and Physical Research (OBPR) maintains an Enterprise Web site at http://SpaceResearch.nasa.gov. The site has two primary audiences, (a) the general public that is interested in articles on research we conduct and the workings of the Enterprise and (b) the research community that is looking for detailed information about our research and projects. The mission of the site is to communicate the goals and results of our research in a timely manner. The main site point of contact is Alex Pline (apline@mail.hq.nasa.gov).

On the main page, information about OBPR major research missions (Shuttle and ISS) is featured. "Articles" is for the general public and "Research Updates" is for the technical audience. Highlights of Enterprise activities such as the ReMaP Task Force, STS-107, and the proposed ISS Utilization Institute ("NGO") are also featured. To keep abreast of all the Enterprise news, the "News" Section lists research news, research updates and other Enterprise news in a categorized, chronological format. You can also sign up to receive e-mail updates (approximately every two weeks) of new items on the site.

Since OBPR's main research mission is the International Space Station (ISS), "Research On Station" (ROS) is also featured and presents in-depth information on all ISS research and facility payloads and experiments. These are categorized chronologically as well as by research discipline and ISS flight increment. User selection options are shown above. Each experiment is described at three levels, (a) research objectives and overviews, (b) operations, hardware, protocols and flight schedule, and (3) research results and additional Web links. ROS points of contact are Dave Larson (dlarson@hq.nasa.gov) and Anne Simmons (asimmons@futron.com).

Other Important URLs

ISS Payloads Office Home Page:
http://iss-www.jsc.nasa.gov/ss/issapt/payofc/payoff.html
Research in Physical Sciences and Space Product Development (commercial):
http://microgravity.nasa.gov/
Fundamental Biology
http://fundamentalbiology.arc.nasa.gov/
Microgravity Environment Measurements on ISS:
http://pims.grc.nasa.gov/

Contact the Editor with Websties you have found useful that might be of interest to other Payload Developers.

Commander Yuri Malenchenko and Science Offier Ed Lu

Expedition

By John Uri

The loss of Columbia and her crew on February 1 was a great tragedy. As a result of the accident, Shuttle flights are temporarily suspended, and ISS is relying on Russian Soyuz and Progress vehicles for crew and cargo transport. In an effort to keep ISS safely crewed until Shuttle flights resume, virtually all upmass and volume on the Russian vehicles will be devoted to logistics such as food, water, fuel and critical spares for the station, with little to no space available for research equipment. Compared to the more than 3,000 kg of research hardware that two Shuttle flights (ULF1 and 12A) would have delivered to ISS to support the original Expedition 7, the total research upmass is now limited to about 15 kg on the 6Soyuz, and 12Progress vehicles. Clearly, a different research program had to be developed to fit within this constraint.

The long-duration crew size is reduced from 3 to 2 during this interim period to minimize logistics requirements. The Expedition 6 to 7 crew rotation that had been planned for the ULF1 mission in March took place via Soyuz in late April, thus extending Expedition 6 by nearly two months. The Expedition 7 crew consists of Russian Commander Yuri Malenchenko and U.S. Flight Engineer and Science Officer Ed Lu. They will return to Earth in October after a 6-month mission, landing their Soyuz spacecraft in Kazakhstan. The limited volume of the Soyuz Descent Module limits the amount of research material that can be returned to Earth to just a few kilograms.

In the previous *"ISS Payloads News"*, Mr. Rodney Lofton presented the research program that had been planned for Expedition 7 prior to the Columbia accident. That research program, highly dependent on the facilities planned for ULF1, will now be delayed until Shuttle flights resume. A research program for the revised Expedition 7 was developed rapidly, depending heavily on hardware and other materials already on board ISS, and supplemented by experiments launched on the 6Soyuz flight in late April and any that may be launced on 12Progress in late August. Some of the payloads to launch on 12Progress may be conducted by the Expedition 8 crew, arriving on the 7Soyuz in October. In addition to the challenge of limited research logistics on Russian vehicles, Soyuz-based crew rotation dictated that a large portion of the Expedition 7 preflight and the Expedition 6 postflight human research data collection on the crewmembers took place in Russia.

Human Life Sciences Investigations

The Human Research Facility (HRF), on board ISS since March 2001, will continue to operate during Expedition 7. Subcomponents of the HRF, such as the Gas Analysis System for Metabolic Analysis Physiology (GASMAP) and the Ultrasound, will require regular health checks to ensure proper functioning for future experiments. During the six-month expedition, the Crewmember and Crew-Ground Interactions During ISS Missions (Interactions) experiment will monitor the crew's mood and work performance, as well as their interaction with ground controllers in Russia and the U.S. using standard weekly questionnaires. Three additional human life sciences investigations consist of data collection only before and after the mission. The Subregional Assessment of Bone Loss in the Axial Skeleton in Long-term Space Flight (Subregional Bone) studies changes in bone mineral density using several methodologies. An experiment called Promoting Sensorimotor Response Generalizability: A Countermeasure to Mitigate Locomotor Dysfunction After Long-Duration Space Flight (Mobility) monitors changes in crewmembers' posture and locomotion. The effects of ionizing radiation is studied by an experiment called Chromosomal Aberrations in Blood Lymphocytes of Astronauts (Chromosome). Changes in muscle mass, tone and function are measured in the Effect of Prolonged Spaceflight on Human Skeletal Muscle (Biopsy) experiment.

Physical Sciences Investigations

The Microgravity Sciences Glovebox, which had been idle since a failure in late November 2002, was declared open for science again in late March 2003, following extensive troubleshooting by Expedition 6 Science Officer Don Pettit. Pettit then began to run samples of the Investigating the Structure of Paramagnetic Aggregates from Colloidal Emulsions (InSPACE) experiment, which will operate well into Expedition 7. This experiment studies the behavior of rheomagnetic fluids. Following completion of InSPACE, Lu will turn his attention to the two engineering samples for the Coarsening of Solid-Liquid Mixtures (CSLM) experiment. The third experiment, called Pore Formation and Mobility Investigation (PFMI), was begun during Expedition 5, and seven

InSPACE experiment hardware in the Microgravity Science Glovebox

7 Research

samples were processed before the MSG failed. The remaining samples will be processed during Expedition 7, and then all the samples will be reprocessed using different protocols to obtain additional science.

As part of the effort to pursue additional science during this interim period of limited upmass capability, two investigations have been selected that will take advantage of equipment already on board ISS. The InSPACE Soldering Investigation (ISSI) will examine the effects of wetting and convection on soldering, while the Miscibility of Fluids in Microgravity-Thermal (MFMG-T) experiment will study the mixing behavior of two fluids of different densities. An additional activity will involve performing a functional checkout of the Biotechnology Specimen Temperature Controller (BSTC), a unit designed for tissue culture experiments. The checkout will verify proper functioning of the unit for use on future expeditions. The unit has not been used since Expedition 5.

Monitoring of the station's microgravity environment will continue. The Microgravity Acceleration Measurement System (MAMS) measures the quasi-steady state environment, while the Space Acceleration Measurement System (SAMS) measures higher frequency disturbances.

The Cellular Biotechnology Operations Support System (CBOSS) successfully supports several cell growth investigations during Expeditions 3, 4 and 5. One of the challenges of this type of research is thorough understanding of the behavior of the liquid media and the cell cultures in microgravity. The CBOSS Fluid Dynamics Investigation (CBOSS FDI), a candidate payload, will study this behavior. The Capillary Flow Experiment (CFE), another candidate, will provide fundamental insight into the behavior of fluids in capillary systems in microgravity.

Expedition 7 crew aboard 6Soyuz

Fundamental Biology investigations
Currently planned as a candidate for a Progress mission, the experiment S. pneumoniae Expression of Genes in Space (SPEGIS) will study gene expression, genomics and proteomics of bacteria cultured in space. The experiment uses a cassette from the Advanced Separation (ADSEP) payload.

Earth observations
Earth observations will continue during Expedition 7, as they have on every human space flight in NASA's history, adding to the more than 400,000 images of our planet obtained over the past four decades. For Crew Earth Observations (CEO), crewmembers use onboard cameras to image preselected sites as well as targets of opportunity. The Earth Science Toward Exploration Research (ESTER) experiment will utilize the Window Observational Research Facility (WORF), which will be delivered during the ULF1 mission. During Expedition 7, the electronic still cameras and lenses to be used with ESTER will be tested. Both CEO and ESTER use the optical quality 50-cm window in the U.S. Lab to obtain high-quality imagery.

Education and outreach activities
The Earth Knowledge Acquired by Middle schools (EarthKAM) payload involves students selecting specific Earth targets, which are imaged by an electronic still camera and the pictures downlinked for posting on a Web site. The Education Payload Operations (EPO) payload includes diverse activities to demonstrate physical processes in microgravity, as well as daily life on ISS, which will be used to generate educational documentaries.

Technology demonstrations
An experiment called Synchronized Position Hold, Engage, Reorient Experimental Satellites (SPHERES) is planned to launch on the 12A.1 Shuttle mission. The entire investigation consists of three self-contained small satellites, used to demonstrate formation flying control, and autonomous guidance, navigation and control. As a candidate payload, a beacon-to-beacon tester (BBT) will verify the infrared and ultrasound system on board ISS to certify there is no interference, prior to the flight of the complete experiment.

Space Product Development payloads
One small payload is being prepared as a Progress candidate, using Group Activation Packs. The Yeast Gene Expression in Microgravity Group Activation Packs (GAP Yeast) investigation will evaluate the role of individual genes in the response of yeast to space flight.

Manual Group Activation Pack with Fluid Processing Apparatus sample tubes

Obtaining and Maintaining the Microgravity Research Environment

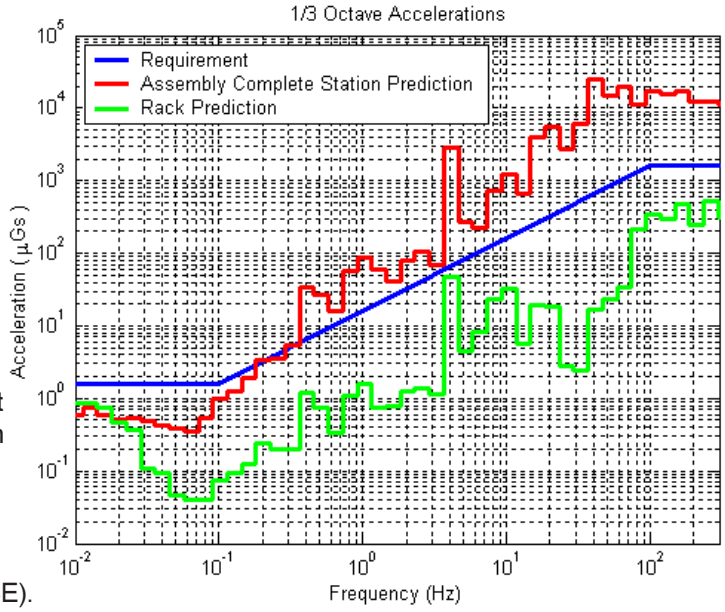
By Craig Schafer/SAIC

A research-quality microgravity environment has been at the heart of the ISS design. Proactive management and strict engineering discipline have come together to attain that goal. Challenging design requirements, operational constraints, program management, and state-of-the-art isolation systems working together provide a research-grade microgravity environment at least 180 days a year in spans of at least 30 days.

The environment can be described in two broad categories: quasisteady and vibratory. Quasisteady accelerations change very slowly or not at all over an orbit and are due to orbital effects such as drag and tidal forces. Vibratory accelerations are generated by the mechanical systems onboard, such as pumps and fans, and fluctuate in frequency and magnitude. The actual magnitude in the lab modules will generally vary between 1-2 mg depending on the distance from the station's center of gravity.

Microgravity requirements were infused into the very physical configuration of the ISS. Several earlier designs were discarded because they did not supply the needed microgravity research environment. For example, the labs needed to be as close to the center of mass as possible, which made the earlier "Power Tower" design undesirable. To get the quasisteady vector to maintain a stable direction, the ISS flies in an airplane-like attitude, with the deck always pointing to Earth. This is called Local Vertical Local Horizontal, or LVLH. LVLH is maintained solely with the Control Moment Gyros. In order to keep the ISS continuously powered, gimbals were added to the solar arrays to track the sun while in LVLH. Thruster firings are inhibited during microgravity periods so sensitive experiments are not upset.

Some racks hosting sensitive experiments will be equipped with the Active Rack Isolation System (ARIS). ARIS senses the acceleration environment and actively counteracts it with a complex electromechanical system. Seven research racks are scheduled to be equipped with ARIS. ARIS developers just completed more than a year of highly successful on-orbit testing in the ARIS ISS Characterization Experiment (ARIS ICE).



Isolated racks predicted to meet microgravity requirements on Core Complete ISS

Since the ISS could not be put together on the ground and tested before launch, the expected Core Complete microgravity environment can only be examined in cyberspace. The ISS Program maintains extremely large analytical models of the station. The models use the best available test and simulated disturbance source data and conservative assumptions on unknown characteristics, such as damping, to generate a prediction of the future microgravity period environment.

Monitoring the on-orbit microgravity environment is the responsibility of the Principle Investigator Microgravity Services (PIMS) at the Glenn Research Center. PIMS's sensors, the Space Acceleration Measurement System (SAMS-II) and the Microgravity Acceleration Measurement System (MAMS) have been continuously monitoring the microgravity environment since their delivery and activation in 2001. MAMS is a semi-stationary quasisteady and vibratory sensor. SAMS-II has multiple vibratory range sensors that may be placed almost anywhere in the station. The PIMS Web site provides near-realtime presentations of SAMS-II and MAMS data (http://pims.grc.nasa.gov).

Comparing on-orbit data to the models can provide insight into how well the models are predicting the environment and act as a gauge to how well the station is on its way to meeting the requirement. An August 2002 analysis showed that the quasisteady models' predictions are within 2 percent of MAMS measurements. The vibratory models have larger uncertainties because, in some cases, the ISS environment has been too low to be accurately correlated. However, the data were good enough to help reduce conservatisms by up to 50 percent. As is shown in the inset picture, when the modeled environment prediction is combined with the ARIS ICE isolation test results, it is likely the microgravity requirement will be met.

The Microgravity Integrated Performance Team acts as the microgravity environment's sentinels. The MIPT has members from across the ISS Program who work together to design and maintain requirements, sponsor on-orbit tests, and review vehicle and payload designs.

It appears the ISS is well on its way to achieving the long sought-after microgravity environment. Through proactive management, groundbreaking technology, and challenging requirements, the ISS will become the finest microgravity laboratory to which the world has had access.

Spock is on the Bridge!

By OZ/John-David Bartoe

Last fall, NASA Administrator Sean O'Keefe established the position of NASA ISS Science Officer onboard the Space Station. In making the announcement, O'Keefe noted that with the Space Station nearing its second year with a permanent crew living onboard, it's time to increase emphasis on the orbiting outpost's main mission - Research!

Dr. Peggy Whitson was the first NASA ISS Science Officer. Although she did not graduate from the Vulcan Academy of Science, she does have a Doctorate in Biochemistry from Rice University. Dr. Donald Petit was the next Science Officer, and now the mantle has been passed to Dr. Edward Lu.

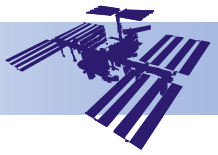
To achieve this increased research emphasis, the NASA ISS Science Officer will work with the U.S. research community to understand and meet the requirements and objectives of each ISS investigation. This will help achieve maximum scienfitic research returns. The Science Officer will continue to be the point-of-contact for the ISS crew with NASA-sponsored principal investigators as well as payload developers, integrators and trainers. NASA will explore with its 15 international partners the potential to expand the Science Officer roles as the station's research capabilities are increased. The description of duties for the NASA ISS Science Officer can be found on the OZ Web site at http://iss-www.jsc.nasa.gov/ss/issapt/payofc/payoff.html

NASA is also exploring with its 15 international partners the potential to expand the Science Officer role as the Station's research capabilities are increased.

Research Accommodations

U.S. Research Investigations Accommodated, Compared to the 12-Month Plan

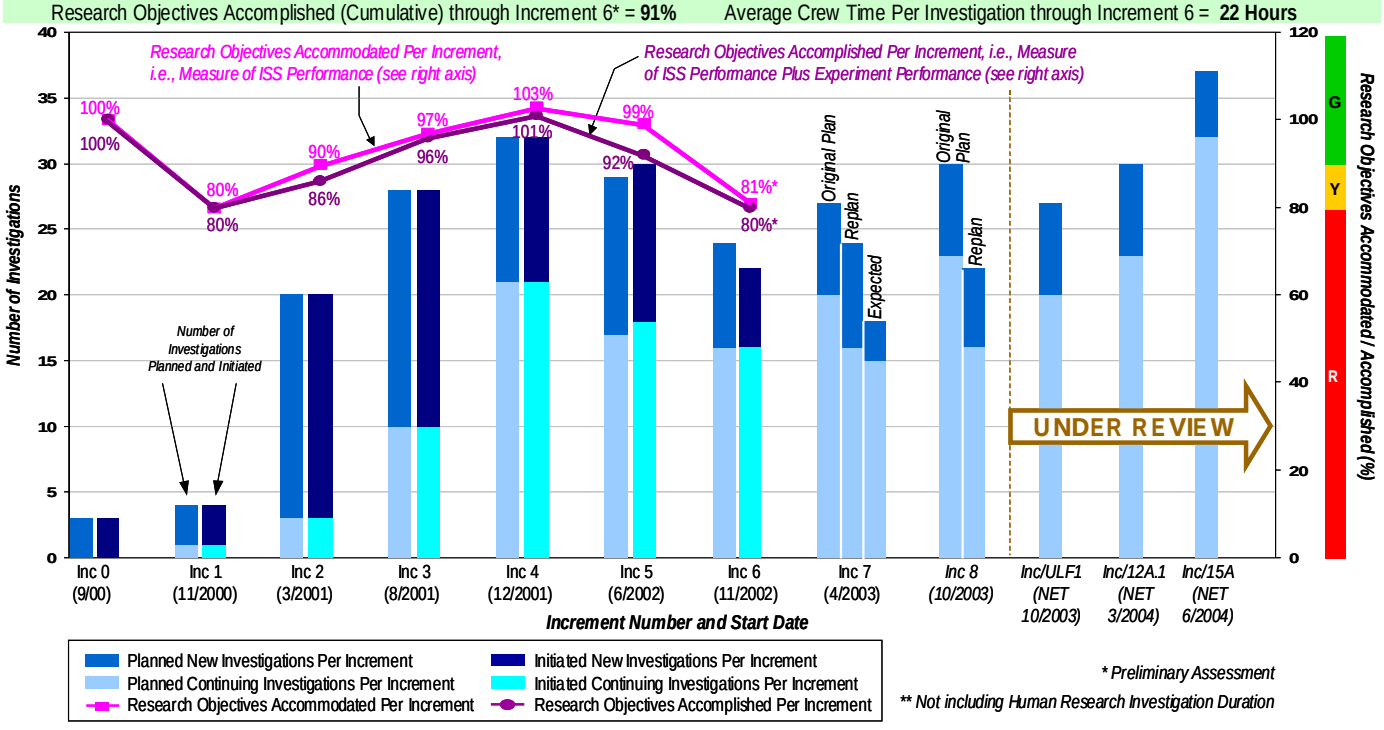
13 June 2003 (Data through 31 May 2003) *[POC: Lesa Roe]*



- Y ***During Increment 6, 92% of Planned Investigations initiated, 81% of research objectives accommodated.***
- G ***Cumulative through Increment 6: 99% Planned Investigations initiated***
- R ***Increment 7: 67% Originally Planned Investigations expected to be initiated***
- R ***Increment 7: 75% Replanned Investigations expected to be initiated.***
  Six additional investigations will be on standby in Russia for possible 12P launch (4 for Increment 7, 2 for Increment 8).
- Y ***Increment 8: Plan in jeopardy due to no research upmass allocation***

Status: Red

Total Number of Investigations to Date = **74**
Research Objectives Accommodated (Cumulative) through Increment 6* = **94%**
Research Objectives Accomplished (Cumulative) through Increment 6* = **91%**
Continuous U.S. Research Time to Date = **27 Months**
Average Investigation Duration through Increment 6** = **1838 Hours *(77 days)***
Average Crew Time Per Investigation through Increment 6 = **22 Hours**



** Preliminary Assessment*
*** Not including Human Research Investigation Duration*

Payload Operations and Integration

Increment 6
By Lamar Stacy

A complete plan for troubleshooting of the Microgravity Sciences Glovebox (MSG) was developed, reviewed, and implemented. This plan consisted of rotating the rack and removing all thirteen of the connectors from the electronics control box to establish a 'minimum' operational configuration. After successful completion of that test, each connector was added back to the box with a rack rotation and tested. Eventually, all connectors were remated without any further malfunctions and approval was granted to resume science operations in the MSG. Astronaut Don Pettit removed the Pore Formation and Mobility Investigation (PFMI) and installed Investigating the Structure of Paramagnetic Aggregates from Colloidal Emulsions (InSPACE). Numerous runs were accomplished on two of the InSPACE coil assemblies during the remainder of the Increment.

Procedures for the repair of the ARCTIC unit were developed by the Payload Developer and performed by Don Pettit with much assistance from the ground. The unit was successfully powered on and it operated in freezer mode briefly before it began to trend to failure. The remaining Thermal Electric Devices (TEDs) appear to have also failed and the unit was powered off.

Astronaut Petit's repair of ARCTIC inspired Fred Sayer/Photo and TV Ops Manager in the Payload Operations and Integration Center (POIC).

An on-orbit payload debrief was conducted with Nikolai Budarin to discuss the few U.S. payloads that he supported.

Commander Ken Bowersox successfully completed the Human Research Facility (HRF) FOOT run. The EVARM readings were terminated several weeks ago due to nominal failure of the batteries in the dosimeters. All other HRF payload operations scheduled to date have been successfully completed. The Earth Knowledge Acquired by Middle school students (EarthKAM) was set up and operated twice during the month of April.

Increment 7
By Carmen Price

Increment 7 is officially here! The Expedition crewmembers, Commander Yuri Malenchenko and Flight Engineer Ed Lu, began their mission with the launch of 6Soyuz on April 26. The Soyuz docked with the ISS on April 28. The Expedition 6 crew and the Expedition 7 crew completed their handover with the undock of 5Soyuz on May 4. Increment 7 is approximately 6 months in duration. Two Progress vehicles are scheduled to dock with the ISS during this timeframe. 11Progress is planned to launch on June 8, and 12Progress is planned to launch on August 30. The Increment will conclude with the launch of 7Soyuz on October 18.

Increment 8
By Eric Melkerson

Increment 8 (Option) is the proposed follow-on mission to Increment 7 and is currently in the Increment Definition and Requirements Document (IDRD) development phase. As manifests are defined for Soyuz and Progress flights, focus will be placed on developing the payload developers' operational re-quirements and fitting them into an overall timeline for the increment. Crew training will also come to the forefront, as priorities must be set on the training the Crew will receive prior to flight. Work continues on defining the payload operations for what was previously known as Increment 7 and Increment 8. The new designation for these increments will be Increment ULF1 and Increment 12A.1, respectively.

Ground Systems Department Corner
By Donna Sellers

The Payload Operations Integration Center (POIC) plans were to support with Enhanced HOSC System (EHS) Build 7/7.1 in July and EHS Build 8 in October. Plans are under discussion at this time that would involve a direct transition to Build 8 in October bypassing Build 7 usage for flight support. This would reduce the need for a major operations transition and lessen the impacts to the user. In early June, the problems encountered with the EHS Build 8 series will be reviewed and the decision to proceed with the load on the simulation string will be determined. Some of the EHS Build 7 and 8 enhancements include:

- The underlying infrastructure to provide synchronized passwords and logins across multiple POIC hosted services/platforms. Lightweight Directory Access Protocol (LDAP) services included are EHS Web in Build 7 and the Enhanced HOSC Personal Computer (EPC) in Build 8.
- Crew Health Care System (CheCS) data will have an increase in allowable file length for the Ku-Band file downlink.
- Payload Information Management System (PIMS) has several enhancements including the addition of Operational Change Request (OCR) templates and the improvements in the imports and exports of products to PIMS
- Near Real Time (NRT) data retrievals should be four times faster.

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Payload Operations

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- Realtime Telemetry processing loading for the Login Servers is two times faster.
- EPC has several local PC enhancements including full version of Display Operations, Scripting, and Command Operations in Build 7/7.1 and Computational Generation/ Operations in Build 8 (this allows users to write their own Comps using Commercial-Off-the-Shelf (COTS) products such as Visual Basic or Visual Studios). Also, Build 8 has Custom Data Packet (CDP) improvements to allow one sample/second data retrieval.
- Users can now save command data sets locally allowing for improvements in import/export of command data sets (example: KSC to MSFC).

Telescience Resource Kit (TReK) Release 2 Service Pack 2 is in work and is expected to be released in the June/July timeframe. This service pack includes both fixes and user requested enhancements. Of primary importance are changes to ensure TReK is compatible with EHS Build 8.0. Tutorials and examples showing how to use the TReK Applications Programming Interface (API) with Visual Studio.NET is also included.

The Internet Voice Distribution System (IVoDS) is now supporting 21 POIC remote payload facilities. IVoDS version 1.1.0 will be released in the July/August 2003 timeframe. This release includes some problem fixes and upgrades. Testing is in progress to upgrade the IVoDs firewall and conference servers. These modifications will increase performance and allow support for up to 200 users.

PDL (continued from Page 1)

note that some of the suggestions for improvement made by PDs were the same as, or very similar to, those made by the payload integration community. Three suggestions seemed to be very important to all groups involved: 1) the capability to apply a payload's data to multiple flights without copying the data; 2) the ability to produce PDL reports selected from randomly chosen data fields; and 3) the establishment of an easy and common navigation scheme across all data sets.

Results and status of the PDL Summit Meetings will be communicated to PDs and to all OZ offices. Those who attend, or have attended, the PDL Summit Meetings will receive minutes and attachments associated with the meetings. OZ management will be briefed via OZ staff meetings and monthly PMR activities. The entire research community will also be kept informed via future issues of the ISS Payload News.

Quote for the Day:

[In honor of the SSRMS handover and the fun we all have with 'frames'.]

"I shut my eyes in order to see."

Paul Gauguin (1848 - 1903)
French Post-Impressionist Painter

Humor from Comm with Crew

"It's the latest innovation in office safety. When your computer crashes, an air bag is activated so you won't bang your head in frustration."

Mick Culp, Editor
ISS Payloads News
mculp@ems.jsc.nasa.gov

Letters to the Editor

I just saw a copy of the first ISS Payload News and it's pretty cool! I think we're going to enjoy following these newsletters here at WCSAR. WCSAR is already on the mailing list for this newsletter, but I was wondering if you could send me my own copy of the November issue this one time since my picture is in the upper right-hand corner of page 9 … We fly the ADVASC payload, in case you're wondering who we are!

Matt DeMars
Wisconsin Center for Space Automation & Robotics (WCSAR)

Ed: Matt, we're well aware of your part in the Space Product Development program, and I hope your mom enjoyed the picture.

• • •

A copy of "ISS Payloads News" just crossed my desk and I would like to know how I can get a subscription to it. I am an ISS user and would like to be involved in these discussions and stay up to date on changes in the payload development process, but I don't see any instructions on subscribing in the newsletter. If you would please add me to the notification or distribution list I would greatly appreciate it.

Dr. Bill Carswell
University of Alabama in Huntsville

Ed: Thanks for pointing out the missing instructions. To subscribe, send your name and address to the Editor with a brief description of your involvement with ISS research.

• • •

Is there a Web site where ISS Payloads News can be accessed? I want to ensure that others see this newsletter. It's good stuff! (Thanks for the timely update on the lean six sigma activity.)

Michael P. Doherty
Glenn Research Center

Ed: Thanks Michael, each issue is maintained on the ISS Payloads Office Homepage, http://iss-www.jsc.nasa.gov/ss/issapt/payofc/payoff.html.

• • •

I was just informed … that NASA is publishing a newsletter for payload developers. STAR is developing the Advanced Animal Habitat - Centrifuge (AAH-C) for SSBRP and we are always on the lookout for ISS information. Please include my name in your distribution list.

Sherryl L. Lifer
Star Enterprises, Inc.

• • •

Dr. Paul Todd forwarded a copy of your newsletter to me. I am the project manager for the ADSEP processing facility that has flown on the shuttle twice and is currently being readied to go to station. I wanted to ask if I could receive a copy of the newsletters.

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I am the Project Manager at SHOT, Inc. for our efforts to develop the Advanced Animal Habitat - Centrifuge (AAH-C) for NASA Ames Research Center's Space Station Biological Research Project (SSBRP). It is my understanding that you are publishing a newsletter specifically geared towards payload and hardware developers who are, or will be, flying on the ISS. Please let me know how I can get on your distribution list.

Mark Ainsworth
SHOT®

Ed: You just did it.

• • •

I recently received a copy of the February edition of ISS Payload News from a colleague and I would very much like to be added to the distribution list. I find the publication very informative and well presented.

Jacqueline Maldonado
Orbital Technologies Corporation

• • •

Ed: Thanks to all who have taken the time to write. We appreciate your kind words and suggestions for improvements.

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From the Editor

In the February issue we featured the Window Observational Research Facility (WORF). It was correctly pointed out to me that we failed to mention Jack Estes' contribution to the campaign for the WORF and earth observation science. To the right is a close-up of the memorial plaque added to the WORF to honor Jack after his untimely death during the facility's development. To learn more about this renounded geographer see http://www.physicstoday.org/pt/vol-54/iss-12/p75a.html.