



Eastern Range upgrades to result in greater capability

The Eastern Range recently suspended launch support activities for scheduled maintenance and will again do so from Aug. 20 through Aug. 28.

Installation and integration of communications components associated with the Range Standardization and Automation (RSA) modernization program started earlier this month.

Although upgrades have been common occurrences on the Eastern Range since it was built nearly 50 years ago, the program is a highly visible part of RSA. These upgrades will shift the communication network, currently connecting the Range Operations Control Center (ROCC) to its downrange sites, from primarily landline systems to an advanced satellite-based system.

The RSA program is a comprehensive effort undertaken by the Air Force to modernize the launch support infrastructure of the Eastern Range (Cape Canaveral Air Station) and Western Range (Vandenberg Air Force Base, Calif.).

RSA touches every aspect of range launch support — from communications to operations. These improvements provide a significant increase in data handling capabilities and overall efficiency. When complete, launch-related data transmitted today on landlines, microwave relay

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Spaceport News

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John F. Kennedy Space Center

Raffaello Multi-Purpose Logistics Module at KSC

The Italian Space Agency's Raffaello Multi-Purpose Logistics Module (MPLM), the second of three such modules for the International Space Station, arrived at Kennedy Space Center Aug. 4. It was transported to the United States by a special Airbus 'Beluga' air cargo plane from the factory of Alenia Aerospazio in Turin, Italy.

The Raffaello MPLM, one of Italy's major contributions to the International Space Station program, is a reusable logistics carrier. The logistics modules are the primary delivery system used to resupply and return Station cargo that require a pressurized environment.

The Raffaello cylindrical module is approximately 21 feet long, 15 feet in diameter and weighs almost 4.5 tons. It can carry up to 20,000 pounds of contents.

Launched in the Space Shuttle's payload bay, Raffaello will contain supplies, science experiments, spare parts and components for the International Space Station.

Once on orbit, it will be removed from the payload bay and docked to the Space Station using the remote manipulator arm of either the Shuttle or the Station.

During each MPLM mission, supplies and scientific experiments are exchanged for items to be

returned to Earth, including completed experiments, equipment for repair, or trash and recyclables.

The Raffaello and Leonardo logistics modules are processed at KSC's Space Station Processing Facility (SSPF) with engineering support from the Italian Space Agency, Alenia Aerospazio and Boeing. Among the activities for the payload test team to prepare the

module for launch are integrated electrical tests with other Station elements in the SSPF, leak tests, electrical and software compatibility tests with the Space Shuttle using the Cargo Integrated Test Equipment (CITE), and an Interface Verification Test (IVT) once the module is installed in the

(See Raffaello, Page 6)



Inside a high bay in the Space Station Processing Facility (SSPF), workers on the floor oversee the transfer of the Multi-Purpose Logistics Module (MPLM) called Raffaello to a workstand where it will undergo testing. Sharing the space in the SSPF is the first Italian-built MPLM, Leonardo, seen at right, and the U.S. Lab, Destiny, in the background. One of Italy's major contributions to the ISS program, the MPLM is a reusable logistics carrier and the primary delivery system used to resupply and return Station cargo requiring a pressurized environment. Weighing nearly 4.5 tons, the Raffaello measures 21 feet long and 15 feet in diameter. Raffaello is scheduled to be launched on mission STS-100 July 2000.

KSC's 'safe haven' makes room for more

One year ago this month, KSC's Vehicle Assembly Building received a face lift with at least 700 gallons of paint. Behind its freshly painted bright exterior, however, lies a beehive of activity throughout the year — as orbiters are rolled into cavernous bays and mated with external tanks and solid rocket boosters in preparation for rollout to the pads and eventual launch.

But the landmark facility also

provides another critical function for the nation's space program: it functions as a shelter for a fully assembled Space Shuttle from severe storms.

During each year's hurricane season from June 1 through Nov. 30, KSC implements a 'safe haven' plan to protect NASA's valuable Space Shuttles.

When a Shuttle is at the launch pad during this period and Shuttle managers expect sustained winds of

69 mph or greater, a decision may be made to roll the Shuttle stack back into the VAB. The building can withstand winds up to 125 mph and protects Shuttle hardware from wind-driven debris.

During this period, solid rocket booster stacking operations for the mission third in line from launch typically do not proceed past stacking the left and right aft

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VAB ...

(Continued from Page 1)

booster segments on the mobile launcher platform (MLP). This allows workers to quickly remove the segments from the MLP and then clear the VAB high bay when a Shuttle rollback is imminent.

In an effort to enhance the VAB's 'safe haven' capacity, KSC officials awarded a \$2.56 million contract to Rush Construction Corporation on Aug. 4 to extend the crawlerway to the north-west bay (high bay 4) of the VAB.

"The primary goal of the safe haven construction project is to strengthen our readiness for hurricane season by expanding the VAB's storage capacity," said Don McMonagle, manager, Space Shuttle Program Launch Integration. "The flexibility we gain will allow us to accommodate unplanned flight hardware moves and minimize their impact on the Shuttle manifest."

Planning for the project began in July 1998, and construction efforts will begin this month — concluding in May 2000.

Rush Construction Corporation of Titusville, Fla., will restore a buried portion of the Apollo-era crawlerway that extends into the VAB's western high bay 2. The contractor will also pave an orbiter tow-way utility road between Orbiter Processing Facility (OPF) bay 3 and

VAB high bay 4, also on the building's west side. Mechanical utilities that provide water and compressed air to several facilities in Launch Complex 39 will be replaced along the outside of the crawlerway.

Only VAB high bays 1 and 3, located on the building's east side, are currently equipped to house a full Shuttle stack comprised of two solid rocket boosters, an external tank, and an orbiter atop the MLP. High bays 2 and 4 have been used primarily for external tank checkout and to store booster segments and ground support equipment. Following the modifications, external tank checkout capabilities will remain unchanged, but ground support equipment storage will be relocated to the low bay area.

United Space Alliance (USA), NASA's Shuttle operations contractor, will renovate the interior of both western high bays in a separate effort valued at about \$1.7 million.

Once complete, high bay 2 will be able to store a fully assembled Space Shuttle, and high bay 4 will accommodate horizontal orbiter storage.

Inside high bay 2, USA will remove lifting cranes and catwalks; perform structural steel modifications to accommodate Shuttle clearance; install new catwalks for Mobile Launcher Platform access and install an infrastructure to support the MLP and utilities.

KSC's operational communication system and

gaseous nitrogen and helium supply systems will be activated in both high bays 2 and 4. The floor in high bay 4 will also be modified to accommodate orbiter storage.

With Shuttle access limited in high bay 2, Shuttle managers plan to use it for storage only — not for processing. Also, their preference is to store a partial rather than full stack in bay 2.

"Fortunately, after 95 Shuttle flights, we have only rolled the Shuttle back to the VAB 13 times and only four of those were because of a severe weather threat," explained Dave King, KSC's Director of Shuttle Processing. "As a precaution though, we have to stop booster buildup operations for downstream flights to ensure quick access to one of two available high bays during the volatile hurricane season. A third high bay with full storage capacity, allows us to proceed with downstream booster operations during hurricane season and maximizes the utilization of our versatile VAB."

Construction crews last performed major modifications to the VAB in the late 1970s when NASA moved from the Apollo era into the Space Shuttle era.

Built between 1963 and 1966, the VAB is 525 feet tall, 716 feet long and 518 feet wide.

One of the largest buildings in the world, it measures 129,482,000 cubic feet.

Its footprint covers eight acres in KSC's Launch Complex 39.

Property Awareness custodians honored for their efforts

The eighth annual KSC Property Awareness Week held Aug. 9-13 was a very successful event, said chairperson Marilyn Burger of United Space Alliance. This year's theme was "Show Your Care — Be Property Aware." The highlight of this year's events was a custodian/directorate awards ceremony at the KSC Visitor Complex, which included a continental breakfast hosted by Delaware North Park Services. In addition to certificates, the 63 honoree custodians, selected from approximately 1,300 KSC custodians, were presented with inscribed stainless steel mugs. All other KSC custodians were provided with souvenir event flashlights.

The keynote speaker at the ceremony was Cindy Lodge, NASA logistics project manager, Space Station and Shuttle Payloads Directorate, who stressed the importance of managing KSC government equipment resources, which total 122,000 items valued at \$6.4 billion dollars.

The awardees were:

NASA:

Michelle Amos
Christopher Forney
Charles Jenkins
Lauren Lunde
David Macon
Peter Marciniak
Bobbie Raymond
Marie Reed

Margaret Rosenberry

Cathy Lewandowski-Scoggens

Michael Schado

United Space Alliance:

Sharon Andruss

Alan Bredberg

William Brown

David Covert

Diana Davis

Victor Gastelum

Neal Griffith

William Hack

Chuck Hawkins

Sharon Lee

William Matlack

Michael McGuirk

Robert Murray

Michael Nattress

Michael Schnoke

Peter Stonk

Charles Surber

Veronica Taylor

Robert Thomas

Diana Townsend

Edward Walter, Jr.

Lewis Wolf

Walter Young

Boeing:

Karen Kremkau

Jay Yankeloff

Steve Lewis

John Vining

Roxanne Thompson

Don Gooch

Kirk Landfried

Mike Wilson

Kathy Brothers

Shannon Daday

Space Gateway Support:

Mary Roe

Earl Jarrett

Jim Chaudoin

Ernest Conyers

David Russell

Donna Buttler

Wanda Bullock

Doug Husted

Pam Brightman

Joan Scotto

Victor Kurjack

Ronnie Spurgeon

Thomas Hahn

Lorraine Denison

Delaware North Park Services:

Pat Keesee, Exhibit Maintenance

Keith Roberts, Food and Beverage

USBI:

Steve Dean

Pam Lundgren

Dave Taylor

Space Act Award winners honored at KSC

A Technology Awards luncheon was held Aug. 11 at the Radisson Hotel in Cape Canaveral to recognize NASA and contractor innovators who received Space Act awards during the past year. A total of \$156,000 in Space Act awards was earned by 185 KSC workers

this past year. The luncheon to honor the innovators was held in conjunction with the center's third annual Technology Transfer Week, July 26-30, sponsored by the Technology Programs and Commercialization Office.

Space Act awards include:

- Automatic awards — patent application, software released to the public or having a technical article published in the NASA *Technical Briefs* magazine; and
- Board action awards — projects that have been evaluated by the NASA Inventions and Contributions Board at NASA Headquarters.

Projects that received recognition included a gas-liquid super-sonic cleaning system, a control

monitor unit, a hazardous waste management inventory system, a KSC simulation system, various lightning strike location technologies, a hazardous gas detection system, a dental mold leveling tool, two groundwater treatment technologies, a thermal insulation system and method, a cable and line inspection mechanism, a KSC fixation tube, various software systems, and others.

Washing up savings at KSC

The KSC/Pratt & Whitney USBI Parachute Wash Water Reuse Small Group Team recently was selected to receive a 1999 Federal Energy and Water Management Award.

The award recognizes the

team's accomplishment in devising a system to reuse parachute wash water as cooling tower make-up water for the Industrial Area Chiller Plant. The project conserves approximately 300,000 gallons of potable water annually, reduces maintenance costs, saves energy, improves the performance of the sewage treatment plant and paid for itself in less than a year!

The Federal Energy and Water Management Award will be presented to the team by the Department of Energy on behalf of the Interagency Energy Policy Committee at an award luncheon in Washington, D.C. on Oct. 28.



August employees of the month



August employees of the month are, left to right, back row, Dan Clark, Space Station and Shuttle Payloads; Martha Grace Bell, Office of the Chief Financial Officer; Roslyn McKinney, Equal Opportunity Program Office; and Dan Diolosa, Checkout and Launch Control System Office; and left to right, front row, Betsy Reckenberger, Safety and Mission Assurance; Lee Furis, Administration Office; Renee Debing, ELV and Payload Carriers Program; and Josie Burnett, Space Station Hardware Integration Office. Not shown are Patrick O'Rourke, Installation Operations; Joe Tellado, Logistics Operations; Curt Martin, Space Shuttle Program Launch Integration; John Tinsley, Engineering Development; Joseph Fasula, Procurement Office; and Marcia Groh-Hammond, Shuttle Processing.

Looking SHARP — students continue summer work at Kennedy Space Center

This summer, Kennedy Space Center continues its annual participation in the NASA-wide sponsorship of the Summer High School Apprenticeship Research Program (SHARP).

Each year NASA sponsors a variety of educational programs and opportunities for teachers and students of all ages.

One such program — SHARP — is a mentor-based, eight-week program with NASA scientists, engineers and other research specialist serving as professional role models.

Initiated in 1980, SHARP was specifically designed to attract and

increase underrepresented students' participation and success rates in mathematics and science courses.

Ultimately, the program hopes to encourage these students to pursue career paths that increase the pool of underrepresented science, mathematics, engineering and technology professionals.

About 200 SHARP apprentices are selected from a nationwide pool of 1,400 high school juniors and seniors.

The selected students are placed at one of nine NASA field installations throughout the United States.

To be eligible for SHARP,

students must have an overall 3.0 grade point average; demonstrate a strong interest in and aptitude for a career in mathematics, engineering, or the sciences; attend school within a 50-mile radius of the NASA Field Installation; be available on a full-time basis (40 hours per week) for the entire duration of the program; possess teacher recommendations; and write a 300-word essay.

This year, KSC had 26 apprentices.

They work on a wide variety of research projects, including web page design, finding more efficient means of repairing orbiter tiles,

wildlife ecology, aquatics, soil composition and transport engineering.

In addition to research, apprentices participate in enrichment activities including portfolio building, public speaking, and college preparatory seminars.

The SHARP experience culminates with a final research papers and presentations, which were given on July 30 in the Universe Theater at KSC's Visitors Complex. Apprentices' reports provide detailed records of their research projects and the presentations give short synopses of their projects and experiences.

Business outside KSC: It's not rocket science, or is it?

For good advice on how to protect a structure from lightning, why not ask an expert? At Kennedy Space Center, employees help protect some of the most valuable structures in the world from lightning in one of the country's greatest areas of storm activity.

That's what Wayne Dillon, general manager and technical director for WOSN-FM in Vero Beach, thought when he sought to protect his business' valuable structures. And he found KSC engineers eager to help through the Space Alliance Technology Outreach Program (SATOP).

SATOP speeds the transfer of space technology to small businesses. The goal is to help these businesses solve problems, thus helping them to succeed.

It is a cooperative program sponsored by Florida's Technological Research and Development Authority (TRDA), NASA and key space industry contractors and organizations.

Since the programs inception, more than 600 solutions have been provided for more than 900

requests, like Dillon's.

"Without the protection, we could have thousands of dollars of damage, not to mention lost revenue from being off the air," said Dillon. He should know. He saw it happen at another station where he once worked.

Dillon wanted to ensure that it didn't happen to the tower that broadcasts his station's signal.

His customer service manager, Laurie Spencer, submitted a Request for Technical Assistance to SATOP last fall.

Shortly thereafter, KSC Boeing engineers Jimmy Nelson and Marc Parsons went to Vero Beach to examine the tower and an adjacent building that housed WOSN-FM's transmitting equipment.

In December, the engineers presented Dillon and his electrical engineer with a comprehensive plan on how to ground the broadcast tower in the event of a lightning strike.

Dillon commented about how quickly the engineers solved the problems.

"I was so impressed on how fast

they solved the problem," he said.

"There is so much technology within the space program that is applicable to other industries. SATOP allowed me to capitalize on this knowledge and develop a plan to protect my station. I would recommend that all small businesses look into this great program."

Indeed, many are. On Aug. 13, an annual workshop was held at KSC's Mission Briefing Room in the Operations and Checkout Building to apprise local business leaders on opportunities and developments related to SATOP.

KSC Deputy Director of Launch and Payload Processing Loren Shriver welcomed the leaders to the space center and reacquainted them with KSC's progress in becoming a Spaceport Technology Center.

"Technology, as defined in NASA's technology plan, is the practical application of knowledge to create the capability to do something entirely new or in an entirely new way," Shriver said.

"The majority of lifecycle costs for any complex system — such as space transportation — is attributed to operational and support activities, so to reduce the cost of access to space, KSC's driving force is in technology development," he continued, "and that can have wide-reaching applications."

Those applications in the past



two years of the Space Alliance Technology Outreach Program has helped Florida businesses:

- create more than 500 jobs;
- save more than 460 jobs and four companies from closure; and
- develop more than 16 new products.

SATOP has infused more than

(See SATOP, Page 5)

Toastmasters' speaker visit to KSC



On Aug. 4, Bhetty Waldron (above) presented a speech to the KSC Toastmasters Club for evaluation and feedback. Waldron is among nine finalists in the Toastmasters International Competition for the "Best Speaker in the World." After the presentation, Waldron conducted a one-hour Communication and Leadership Workshop at KSC. Waldron is the author and star of a one-woman concert performance, "Charcoal Sketches," and currently head of the drama department in Palm Beach County.

Range ...

(Continued from Page 1)

towers and numerous satellite connections, will be primarily handled by a single, dedicated satellite link directly to the ROCC. The length of the maintenance periods is needed to modify, redistribute and recertify several hundred communication circuits at each location. These improvements will ultimately enhance real-time processing of telemetry data critical to range safety and launch customers.

Telemetry is used to determine the performance of the booster and payload remotely. "This new communication system serves as the backbone to future RSA

modernization efforts, increasing the reliability and flexibility of the Eastern Range," said Lt. Col. Wayne Thompson, commander of the 45th Range Squadron.

During the scheduled maintenance period, the Antigua and Ascension stations will go off-line to perform the switch-to-satellite communication. An earlier maintenance down period took the Jonathan Dickinson Missile Tracking Annex near Jupiter, Fla., off-line.

To limit the impact to Eastern Range customers, the 45th Space Wing recently partnered with NASA and launch contractor teams so that the Range schedule would not conflict with Shuttle and rocket launches.



A shipping container with payload flight hardware for the third Hubble Space Telescope Servicing Mission (SM-3A) was transferred onto a transporter from the C-5 air cargo plane that brought it to KSC on Aug. 12. The hardware was then taken to KSC's Payload Hazardous Servicing Facility for testing and integration of payload elements. Mission STS-103 is a "call-up" mission to replace portions of the Hubble's pointing system — the gyros — which have begun to fail. Although Hubble is operating normally and conducting its scientific observations, only three of its six gyroscopes are working properly. The gyroscopes allow the telescope to point at stars, galaxies and planets. The STS-103 crew will not only replace gyroscopes, it will also replace a Fine Guidance Sensor and an older computer with a new enhanced model, an older data tape recorder with a solid state digital recorder, a failed spare transmitter with a new one, and degraded insulation on the telescope with new thermal insulation. The crew will also install a Battery Voltage/Temperature Improvement Kit to protect the spacecraft batteries from overcharging and overheating when the telescope goes into a safe mode. Launch of STS-103 is currently targeted for Oct. 14 but under review, pending the launch date of a prior mission, STS-99, also under review (see page 6).

SATOP ...

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\$23 million into the Florida economy and has generated more than \$47 million in new sales revenues.

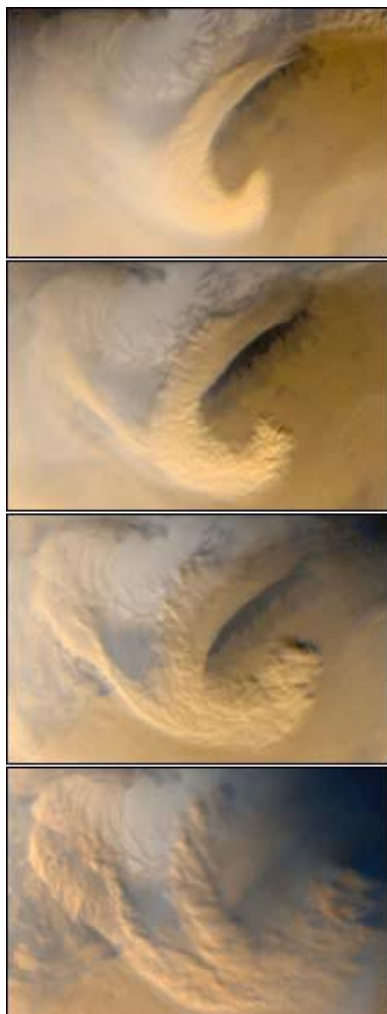
"The American people have been supporting NASA and the space program for such a long time," noted Bruce Larsen, NASA technical program manager and SATOP alliance partner.

"This program is a great way to thank them for that support and to give back to the community," he said.

SATOP helps businesses in a variety of industries — helping companies with rotor failures, mildew prevention, assembly techniques, medical applications and other issues in a wide range of industries.

For more information on the program, call the TRDA at (407) 269-6330 or visit its website at <http://www.trda.org>.

The red planet a dynamic world of shifting sands



The four images above show the evolution of a storm system that developed over the Martian north polar region on June 30. Each picture was taken approximately two hours later than the previous photo. Mars Global Surveyor images show the red planet's surface as a dynamic, still-evolving topography.

Newly released images from NASA's Mars Global Surveyor show that the red planet is a different place today than it was two years ago when the spacecraft arrived — a world constantly reshaped by shifting sand dunes, monster dust devils, wind storms, frosts and polar ice caps that grow and retreat with the seasons.

"Mars is a cold, dry desert, but our camera has shown it is far from being a stagnant place," said Dr. Michael Malin, principal investigator for the Mars Global Surveyor camera at Malin Space Science Systems, San Diego, Calif. "Over the past few months, we have captured a unique record of seasonal and meteorological events, which demonstrates that Mars is active and dynamic today."

The spacecraft's camera monitors the planet's weather on a daily basis from orbit, just like weather satellites on Earth. Today, Mars is a much more dynamic place than the planet the Viking spacecraft saw in the late 1970s. The weather has been particularly active during the past two months, as spring arrived in the southern hemisphere and autumn approached in the north.

"Storm clouds have been brewing over the north polar ice cap all through the month of July, and soon, ever-increasing portions of the north polar cap will be

plunged into wintertime darkness," Malin said.

In other regions of Mars, dust devils are the prevailing weather story. Dust devils result from spinning vortices of air that arise when the ground is heated and general wind flow is light. On Earth they are relatively small features, but on Mars, dust devils are thought by some to be a major transporter of the fine, pinkish dust that gives the sky its unearthly brownish color, as seen by the Mars Pathfinder and Viking landers. Dust devils may also help initiate the seasonal raising of dust over wide areas of Mars.

In mid-May, swirling columns of dust as high as five miles were observed in northern Amazonis Planitia. Dust devils in this area, northwest of the large Tharsis volcanoes, appear to be common; they were also seen by the Viking missions of the 1970s.

The average dust devil is slow-moving and may carry several tons of dust within its height of 1.2 miles.

The Mars Global Surveyor launched aboard a Delta II expendable launch vehicle from Launch Pad 17A at Cape Canaveral Air Station on Nov. 7, 1996.

A variety of new images from the Mars Global Surveyor is available on the Internet at <http://www.msss.com/>.

STS-99 delayed until October

Shuttle managers decided on Aug. 12 to delay the rollover of Shuttle Endeavour from OPF bay 2 to the Vehicle Assembly Building to conduct extensive wiring inspections and preventative wire maintenance in the orbiter's payload bay. An in-depth evaluation of payload bay wiring aboard orbiters Columbia and Atlantis revealed the potential for damaged wire to also exist in Endeavour's payload bay. As a result of the findings, Shuttle program managers decided to conduct inspections of the wiring in Endeavour's payload bay before its next mission, STS-99. The additional work will delay the STS-99 launch to at least early October.

As of press time, workers began preparations to remove the Shuttle Radar Topography Mission (SRTM) payload from Endeavour's payload bay to gain access to the lower cable trays that run the length of the orbiter's midbody. Shuttle engineers and technicians were scheduled to begin necessary inspection and mitigation efforts. The impact of this delay and the unplanned wiring work needed on the rest of the Shuttle fleet is under assessment.



Above, in the Orbiter Processing Facility (OPF) on July 28, STS-99 Mission Specialists Janet Kavandi and Gerhard Thiele (with the European Space Agency) looked over the Shuttle Radar Topography Mission (SRTM) payload as part of the Crew Equipment Interface Test. The test provides an opportunity for crew members to check equipment that will be aboard the orbiter during their mission. Below, a radar antenna, part of the SRTM, was ready to be stored in the payload bay of Endeavour on Aug. 5 before door closure. The SRTM is a specially modified radar system to gather data for the most accurate and complete topographic map of the Earth's surface ever assembled. STS-99 was originally scheduled to launch Sept. 16, however, during the launch of Space Shuttle Columbia on mission STS-93, a damaged wire caused a short circuit in two separate main engine controllers. Shuttle program managers decided to conduct inspections of the wiring in Endeavour's payload bay before its next mission, STS-99.



Raffaello ...

(Continued from Page 1)

Space Shuttle's payload bay at the launch pad. The most significant mechanical task to be performed on Raffaello in the SSPF is the installation and outfitting of the racks for carrying the various experiments and cargo.

Raffaello provides interfaces for up to 16 racks, five of which also furnish power, data and fluid support to a refrigerator freezer. The racks will be installed into the module using an efficient

piece of robotic equipment called the Rack Insertion Device (RID). The RID was developed by Kennedy Space Center engineers for fast and easy installation and removal of the racks for rapid turnaround of the logistics module between missions.

The first of the three MPLM's, Leonardo, arrived at KSC on Aug. 3, 1998.

Donatello, the third module, is planned for arrival at KSC in 2001. Raffaello will be launched aboard Space Shuttle Endeavour on mission STS-100, currently planned for July 2000.



At KSC's Shuttle Landing Facility, the one-piece, upward-hinged main cargo door of the Airbus Industrie A300-600ST "Beluga" Super Transporter was opened Aug. 5 to offload its cargo — the second Multi-Purpose Logistics Module (MPLM) for the International Space Station (ISS). One of Italy's major contributions to the ISS program, the MPLM, named Raffaello, is a reusable logistics carrier and the primary delivery system used to resupply and return Station cargo requiring a pressurized environment.



John F. Kennedy Space Center

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