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# Spaceport News

*America's gateway to the universe. Leading the world in preparing and launching missions to Earth and beyond.*

http://www-pao.ksc.nasa.gov/kscpao/snews/snewstoc.htm John F. Kennedy Space Center

# 2001 Mars Odyssey spacecraft arrives

The Mars Odyssey spacecraft arrived at Kennedy Space Center on Jan. 4, marking the first major step toward NASA's return of a spacecraft to an orbit around Mars.

The spacecraft was shipped aboard an Air Force C-17 cargo airplane from Denver, location of the Lockheed Martin plant where the spacecraft was built.

Mars Odyssey was moved on a transport trailer from KSC's Shuttle Landing Facility to the Spacecraft Assembly and Encapsulation Facility 2 located in the KSC Industrial Area. There it is receiving its final assembly and checkout.

Two of the spacecraft's three science instruments are being installed and its three-panel solar array integrated.

It will undergo a spacecraft functional test, be fueled and then mated to an upper stage booster, the final activities before going to the launch pad.

Launch, which is being managed by KSC, is planned for April 7, the first day of a 21-day planetary window.

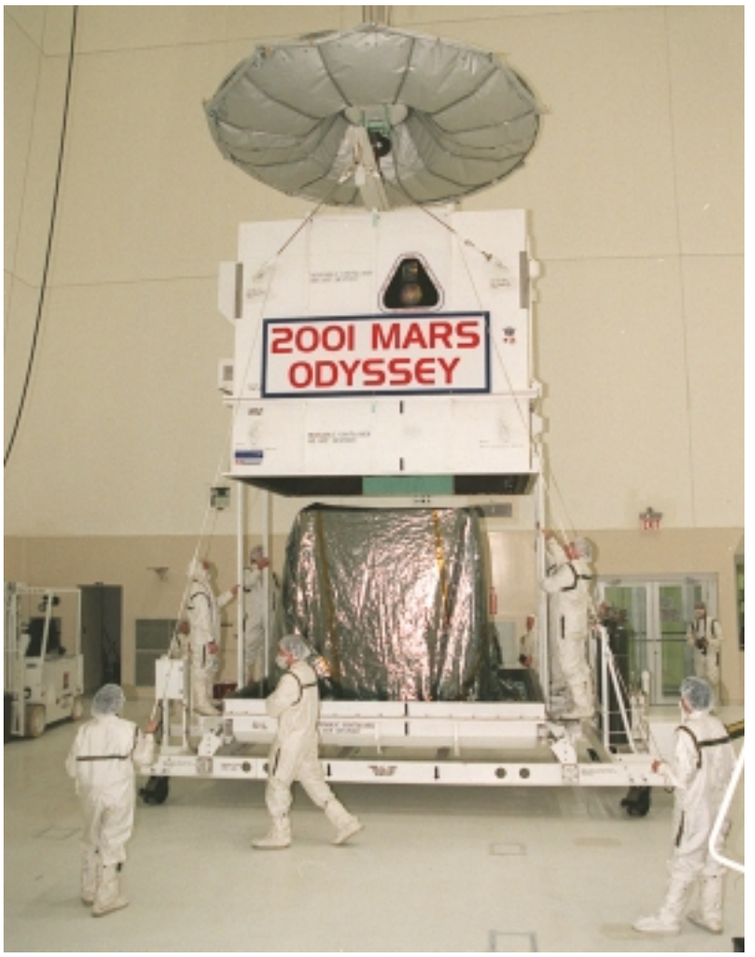
Mars Odyssey will be inserted into an interplanetary trajectory by a Boeing Delta II launch vehicle from Pad A at Complex 17 at the Cape Canaveral Air Force Station.

The spacecraft will arrive at Mars on Oct. 20 for insertion into an initial orbit. Its final operational altitude will be a 250-mile-high Sun-synchronous polar orbit.

Mars Odyssey will spend two years mapping the planet's surface and measuring its environment.

"Ultimately the spacecraft could contribute significantly toward understanding what may be necessary for a more sophisticated exploration of Mars," said George Pace, project manager.

Program management of the mission is by the Office of Space Science at NASA Headquarters with project management by the Jet Propulsion Laboratory.




An overhead crane lifts the crate covering the Mars Odyssey spacecraft in the Spacecraft Assembly and Encapsulation Facility 2.

## Inside





# New alternative fuel vehicle available

The latest alternative fuel vehicle (AFV) to be added to the Kennedy Space Center fleet has the cleanest internal combustion engine on the planet.

The vehicle – the natural-gas-powered Honda Civic GX – has been assigned to the NASA Transportation Office vehicle pool and is available to sign out as a government vehicle.

The KSC fleet is one of the first Federal fleets to use the environmentally friendly automobile.

"The Honda is the latest entry in the list of available alternative fuel vehicles. We will see many new innovative and energy-efficient vehicles introduced in this millennium," said Janet Keith, NASA/KSC Fleet manager.

KSC continues to set the example by maintaining the largest fleet of AFVs in our region and is considered a leader in the transition to AFVs and use of alternative fuels.

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About 300 of the 2,000 government vehicles on Center are capable of using alternative fuels.

Alternative fuels are produced domestically and burn cleaner than gasoline.

Those advantages are important because in the United States vehicles and aircraft burn over 400 million gallons of petroleum fuels every day.

Burning that much petroleum fuel releases tremendous quantities of harmful pollutants into the air. Pollutants include carbon monox-

**(See FUEL, Page 6)**

# KSC team wins major technology award

The Federal Laboratory Consortium (FLC), Southeast Region, recently presented an award for "Excellence in Technology Transfer" to three Kennedy Space Center employees for developing and commercializing the "Gas-Liquid Supersonic Cleaning and Cleaning Verification Spray System" technology.

KSC Center Director Roy Bridges presented NASA employees Eric Thaxton, Raoul Caimi and Melanie Chan with FLC certificates during a recent ceremony.

"We are very proud of our people who won this award. It is a first for KSC but it won't be the last," said Ken Payne, the Director of the Spaceport Engineering and Technology Directorate. "As we progress toward being a true spaceport technology development center, we will have many additional opportunities to share our technology with industry to make life better for humankind."

Thaxton, Caimi and the late Gary Lin developed the Gas-Liquid Supersonic Cleaning System to perform precision cleaning and cleanliness verification of complex Space Shuttle mechanical and electronic parts. The system uses a supersonic gas-liquid jet instead of CFC-113 solvents.

This technology was needed to replace Freon and chlorofluorocarbons (CFCs). New laws target their use. The technology was also needed to reduce other cleaning solvent use.

Dr. Ron Barile, a scientist with Dynacs Inc., the KSC Engineering Development Contractor, continues to perform the majority of needed testing, verification and modifications.

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**Ken Payne**
**Director**
**Spaceport Engineering and Technology Directorate**

Three private companies are licensed to commercialize the Gas-Liquid Supersonic Cleaning technology, thanks to the efforts of Chan, licensing manager with the KSC Technology Programs and Commercialization Office. She worked with the innovators to transfer the technology.

CryCle Cryogenic Development Inc. of the Netherlands became the first foreign firm to license a NASA invention patented in the United States.

Preferred Engineering of Danbury, Conn., licensed the system for use in nuclear power plant maintenance.

Va-Tran Systems of Chula Vista, Calif., a leader in $CO_2$ precision cleaning, was interested in the system's ability to remove hydrocarbon contamination.

The FLC cited the benefits and significance of this technology transfer. It's of benefit to the environment because the system uses environment friendly liquids.

It's also a better method of cleaning because little waste is generated and little water required.

It produces cost savings by decreasing the amount of contaminated, industrial, or hazardous waste that must be handled.

Dutch company CryCle made a significant, initial investment in the United States for technical personnel, materials and partial manufacturing.

Under its patent license agreement, the company is required to perform a substantial portion of the development or manufacturing in the United States.

CryCle partnered with a U.S. firm to build the prototype unit, a mobile unit that was built for European demonstrations.

The two U.S. licensees, Preferred Engineering and Va-Tran Systems, have proposed applications in the hygienic and bacteriological cleaning in dairy, livestock, slaughterhouses and greenhouses.

They plan to manufacture both a mobile unit and a stationary supersonic cleaning unit.

The NASA engineers were the prime designers of the technology, which took five years to develop.

Prior to this supersonic nozzle cleaning system, KSC Shuttle workers used large quantities of solvents, making disposal difficult.

The innovation works by mixing air and water from separate pressurized tanks and ejecting this mixture at supersonic speeds from a series of nozzles located at the end of a handheld wand.

The high velocity of the mixture dislodges contaminants.

Although traditional high-pressure spray cleaning systems are widely used for cleaning various types of mechanical, electrical and fluid components, they use large quantities of chemical solvents.

Disposal creates an environmental problem, especially with the use of Freon 113 and other CFCs.

The supersonic system uses considerably less pressure compared to other high-pressure cleaning systems because the energy is provided by the nozzle's supersonic design.

Its use is appropriate for applications requiring removal of oil, grease, adhesive, flux, fingerprints and other hydrocarbons.

The low volume of water required means there is less fluid left after cleaning that must be handled as contaminated, industrial or hazardous waste.

# KSC software benefits other launch sites

Control Monitor Unit (CMU) software technology licensed from NASA Kennedy Space Center in 1997 currently is being used to help automate commercial spaceport launch control systems at the Cape Canaveral Spaceport (CCS) and several other U.S. launch sites.

The technology licensed by Titusville-based Command and Control Technologies Corp. (CCT) is the foundation for three commercial products: the Command and Control Toolkit (CCTK), the T-Zero launch control software and the Spaceport RangeNet software.

NASA originally contracted the development of the CMU technology for use in controlling and monitoring complex systems of equipment under development for the International Space Station.

Interest in and use of CCT's software based on the CMU technology continues to grow.

In December, the Spaceport Florida Authority (SFA) used CCT's CMU-based software to successfully launch a suborbital LiteStar rocket.

The launch was designed to validate new hardware and procedures at CCS Launch Complex 20, a newly reactivated launch facility that is now available through SFA to support a variety of small orbital and suborbital launch vehicles.

In addition, SFA has entered into an agreement with CCT to provide a turnkey, state-of-the-art launch control system for the complex.

The new system will provide the spaceport with four launch controller stations, a state-of-the-art launch event sequencer, simulation software for testing and operator training, vehicle commanding, data archival and retrieval, and live on-screen video.

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# Inside

## the Payload Changeout Room

The Payload Changeout Room (PCR) at each pad at Kennedy Space Center is a 70-foot high clean room used to transfer vertical payloads into the cargo bay of the Shuttle.

The PCR is part of the pad's Rotating Service Structure (RSS) and features a massive, multi-platform hydraulic lift, the Payload Ground Handling Mechnism (PGHM).

Although the PGHM advances over a length of rails during transfers, those rails do not bear the PGHM's weight. The PGHM actually hangs from beams near the PCR ceiling.

Payloads – brought from the Vertical Processing Facility – are offloaded from a payload canister to the PCR by a team of 20 to 40 United Space Alliance technicians and engineers using the PGHM when the RSS is in the "park" position. The Rotating Service Structure then rotates to embrace the Shuttle and the payload is transferred by the team via the PGHM into the cargo bay.

Most recently the PCR was used to transfer the 28-foot long U.S. Laboratory Destiny into Atlantis.

About 20 technicians accomplished the transfer of the 32,000-pound payload over several days through a complex series of maneuvers, many of which were slow and tedious to perform correctly.

"The closer you get to linking the PGHM to the payload or the payload to the orbiter, the slower you have to go," said Don Lovelace, Pad A PCR/Environmental Control System operations manager for USA. "We have to be very careful not to damage either."

Before the transfer begins, the payload is loaded into a canister in the Vertical Processing Facility and taken to the pad on the payload canister transporter. The canister is then lifted to mate with the PCR.

After the canister doors are open, the PGHM is moved forward in the PCR 30 feet toward the payload. The team of technicians on the PGHM then deploy wing platforms and PGHM ladders so they can better access the payload from the PGHM. The PGHM is then moved forward about 10 feet to about 10 inches from the trunnions, large pins used to hold the payload in place.

In that position, the PGHM front end is finely adjusted in the three dimensions so that the PGHM support fittings, J-hooks, can be attached to the payload trunnions. Those adjustments take hours.

*"The closer you get to linking the PGHM to the payload or the payload to the orbiter, the slower you have to go. We have to be very careful not to damage either."*

**Don Lovelace**
**Pad A PCR/Environmental Control System Operations Manager**

After adjustments are completed, the J-hooks are attached to the trunnions and the weight of the payload transferred by slightly lifting the J-hooks. The payload is removed from the canister and the PGHM is backed up in a similar fashion to its approach. The canister is lowered and taken away.

After the orbiter is in place at the pad, the RSS is rotated to mate the PCR with the cargo bay. The PGHM, carrying the payload, is maneuvered in a similar manner as when it linked up with the payload except this time the goal is linking the payload trunnions with the latches in the orbiter cargo bay.

The transfer of Destiny was considered relatively easy, Lovelace said, because only one payload was moved. Depending upon the number of payloads to be transferred (up to five) per Shuttle mission, the transfer operation can require up to about 40 team members.

Payload transfer task team members are pulled from various shops at both pads, including Liquid Oxygen and Liquid Hydrogen 2, Hypergolics/PRSD, Swing Arms, Ground Support Equipment Electrical, and Environmental Control Systems. Thoroughly training new technicians in payload transfer operations takes about two years.

"The entire task team is extremely committed to professional excellence during all payload transfer operations," Lovelace said. "We strive to perform our tasks to the highest standards in keeping with USA and NASA expectations of the entire KSC team."

The payload canister is lifted to mate with the Payload Changeout Room in the Rotating Service Structure at Pad A.

An Orbiter Integrity Clerk monitors personnel and equipment entering and departing the PCR.

Above, United Space Alliance engineer Chrystal Jolly reviews procedures with technician Dave Waters. At left, engineer Pete Reutt directs technician Melanie Melancon on the J-Hook Control Console.

Above, United Space Alliance technicians Robert Stitt (standing) and Sal Mezzatesta observe clearances between the orbiter and Destiny. At left, Stitt and Mezzatesta perform J-Hook operations. At far left, task team members conduct pre-operations for payload transfer.

# Goldin contacts workers through Internet

NASA Administrator Dan Goldin communicated his views on the NASA Integrated Action Team report to space program employees agencywide Jan. 11 through a high-quality webcast that was a first of its kind for the agency.

NASA Chief Engineer Brian Keegan was also featured in the webcast, which included a 20-minute taped introduction to the report by Goldin and Keegan and a live question-and-answer session. Viewers from various centers were able to submit questions via e-mail.

The NIAT report is the result of efforts started in March by Keegan to develop an integrated plan addressing recommendations from reports on the Mars program, space shuttle wiring issues and a generic assessment of NASA's "Faster, Better, Cheaper" practices.

The report recommends a series of actions for more effective management of the agency's many complex engineering projects. The report's recommendations are broken into the following themes:

- Developing and Supporting Exceptional People and Teams
- Delivering Advanced Technology
- Understanding and Controlling Risk
- Ensuring Formulation Rigor and Implementation Discipline
- Improving Communication

Goldin asked that all employees in related programs read the NASA Integrated Action Team report and that supervisors take the time to meet with employees to discuss the reports' implications for improving work processes.

The webcast was open to employees agencywide via desktop computers or computer-equipped conference rooms. At KSC, 68 computers were used to access the webcast. About 100 people watched the webcast from KSC conference rooms.

The webcast event was not highly publicized because of the experimental nature of the communication.

NASA's Spaceport Engineering and Technology Directorate's Internet Systems Lab provided technical support for the web multicast at KSC.

The webcast was considered a technical challenge for the agency because it was fed to all the centers at the same time. In addition, a much faster frame rate and higher resolu-tion was used than in typical NASA webcasts so that visual and sound clarity would be closer to that provided by television.

"The use of webcast rather than television as the forum to discuss the NIAT report was a calculated step by Mr. Goldin to promote the use of technology within NASA. This was the first use of this technology by the administrator to communicate across the Agency, and by all measures it was a resounding success," said Richard Sharum, NASA KSC technical lead for the event.

Keegan said the communication was a pilot project and that future agencywide webcasts will likely follow.

Goldin asked that all employees in related programs read the NIAT report and that supervisors take the time to meet with employees to discuss the report's implications for improving work processes.

The NAIT report and more information about the webcast can be accessed directly at https://webcasts.hq.nasa.gov/niat/

# ELV Program Manager Bruckner retires

Bobby Bruckner, manager of the Expendable Launch Vehicles (ELV) and Payload Carriers Programs at Kennedy Space Center, retired from NASA on Jan. 3 after 35 years of federal service.

Bruckner was responsible for acquisition of ELV launch services to satisfy all of NASA's requirements for ELV launches.

He successfully consolidated the ELV Program from several NASA Centers to a single location at KSC.

The ELV organization he managed performs analyses of advanced missions, which allow mission managers to select launch vehicles appropriate to the specific mission needs. The program also performs NASA payload-to-launch vehicle integration, payload processing support, launch vehicle processing oversight, and launch countdown management.

Bruckner's responsibilities extended from KSC to NASA launches at Vandenberg Air Force Base, and planned launches from Alaska and Kwajalein Island.

As the manager of the Payload Carriers Program, Bruckner was responsible for maintaining a fleet of reliable and cost-effective payload carriers for payloads that fly on the Space Shuttle.

The Payload Carriers organization supports advanced payload planning by contributing new payload carrier designs and by reducing the cycle time from payload inception to launch. Previously Bruckner served as director of Payload Processing.

In that position, he managed the processing of Shuttle and ELV payloads at KSC, planning for Space Station processing at KSC, and ELV launch management.

Before that he was director, Payload Ground Systems.

Bruckner joined NASA in June 1966 at Kennedy Space Center where he worked as an electrical engineer developing telemetry and data display systems used in the test and checkout of Apollo/Saturn launch vehicles.

Bobby Bruckner

# Two SE&T managers retire from NASA

William Williams and Coleman Bryan recently announced their retirement from NASA and their positions in the Spaceport Engineering and Technology Directorate at Kennedy Space Center.

Both had careers spanning the Apollo, Skylab, Apollo-Soyuz and Space Shuttle human space flight programs.

Bryan, chief, Physical Test and Analysis Branch, gave 32 years of federal service with NASA at KSC.

His scientific contributions, especially in the area of oxygen compatibility and hazard characterization, helped KSC achieve a high safety standard. Bryan also was a leader in standards and methods for chemistry in the American Society for Testing and Materials.

Williams, Commercialization manager for the directorate, gave more than 34 years of federal service, including 33 years with NASA at KSC.

Williams' contributions to the KSC Technology Development and Technology Commercialization programs enabled KSC to achieve many significant milestones associated with those programs.

# FUEL ...

*(Continued from Page 1)*

ide, sulfur dioxide, ozone, particulate matter and nitrogen oxides.

The EPA and American Lung Association have determined that these pollutants damage our lungs and degrade the environment. But that's not the only reason to lessen our use of petroleum fuels.

The United States imports about 52 percent of the petroleum it uses, much more than during the '70s energy crisis.

This position makes the U.S. economy highly susceptible to the policies of foreign oil-producing countries. The economy has suffered several surges in gasoline prices in recent years.

To alleviate these problems, communities across the nation are working to make AFVs commonplace by participating in the Department of Energy's Clean Cities program.

Regional Clean Cities Coalitions bring together vehicle fleet operators, vehicle manufacturers, fuel providers, public citizens and representatives from all levels of government to allow a coordinated effort in the transition to AFVs.

Right now, cars, trucks and vans from Ford, GM, DaimlerChrysler, Honda and others are available in versions that can burn alternative fuels, such as natural gas, ethanol or propane instead of gasoline.

But there are obstacles to widespread use of AFVs. Consumers ask such questions as "Why buy an AFV if refueling stations are scarce?" and "Why put in stations if AFVs are scarce?"

One of about 300 of the 2,000 government vehicles on Center that are capable of using alternative fuels.The Kennedy Space Center fleet is one of the first federal fleets to use the natural-gas-powered Honda Civic GX, pictured above.The car has been assigned to the NASA Transportation Office pool and is available to sign out.

Here in Central Florida the Space Coast Clean Cities Coalition is working to establish refueling stations near resident AFVs and along major travel corridors in its nine-county region.

KSC supports the state's AFV initiatives through a reimbursable agreement that allows Florida Department of Transportation vehicles to refuel at the KSC compressed natural gas fueling station. KSC also supports the Space Coast Clean Cities Coalition.

Current efforts by the coalition include the opening of a compressed natural gas station in Titusville, grant proposals for additional stations in Melbourne, Deland and Debary, as well as ethanol refueling at KSC.

For additional information on AFV developments here at KSC, or participating in Clean Cities, contact Hien Nguyen, 7-8455 or Dave Koval, 7-8189.

# SOFTWARE ...

*(Continued from Page 2)*

The system will be based on CMU technology and the Command and Control Toolkit package augmented with the newly released T-Zero launch control software.

Another major milestone for the commercial use of the CMU technology came in December when CCT announced it had made final delivery of spaceport operations software and computer systems at the Kodiak Launch Complex in Alaska.

Just a few months earlier, in September, the NASA launch facility in Wallops Island, Va., ordered CMU-based software for testing to determine if the software is now suitable for the high launch rates supported at their site.

More benefits of the CMU-technology are to come, said Craig Jacobson, NASA project manager, Future Missions and International Partner Division.

"The CCT products are also in use developing concepts for the next generation tools for payload processing at KSC and customer sites," Jacobson said. "The broad applicability and configuration flexibility are key concepts for new approaches to future tools."

John F. Kennedy Space Center

Spaceport News

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