

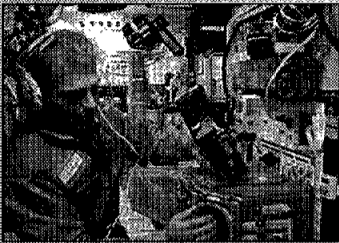
Space News ROUNDUP!

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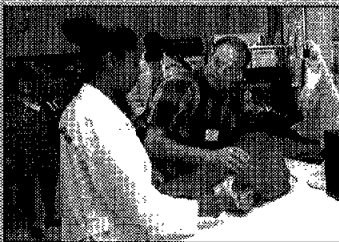
Thirty-five years ago at the Manned Spacecraft Center, Mercury-Atlas 8 succeeded.

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Thomas last U.S. astronaut on Mir

Cosmonaut Sharipov also joins STS-89 crew on docking mission

Astronaut Andy Thomas will be the final U.S. crew member to live and work aboard Russia's Mir Space Station.

Thomas will launch aboard *Endeavour* as a member of the STS-89 crew in January 1998 to begin a four month stay on Mir. He has been training in Russia since January of this year as the backup to Dave Wolf, who began his tour aboard Mir on Sept. 28.

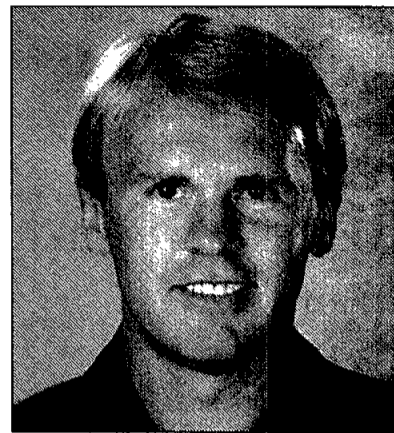
Joining Thomas as a member of the STS-89 crew will be Cosmonaut Salizhan Shakirovich Sharipov, a 32-year-old first time space flyer from Uzgen, Kirghizia.

STS-89 is targeted for a January 1998 launch to dock with Russia's Mir Space Station. The mission will be commanded by Terry Wilcutt. Also on board will be Pilot Joe Edwards and Mission Specialists Bonnie Dunbar, Michael Anderson

and James Reilly. Thomas will remain on Mir to begin a four-month stay and continue the American presence, replacing Dave Wolf, who will return to Earth on STS-89.

"Andy's assignment to Mir provides a great deal of flexibility to support crew activities on board," said David Leestma, director of Flight Crew Operations.

Please see **THOMAS**, Page 8



Andy Thomas

Space station adding Brazil to partner list

By James Hartsfield

NASA and the Brazilian Space Agency will work together on the design, development, operation and use of Brazilian developed flight equipment and payloads for the International Space Station, officials for both announced last week.

NASA Administrator Daniel S. Goldin and Brazilian Space Agency President Luiz Gylvan Meira signed the implementing arrangement Oct. 14. Under this arrangement, the Brazilian Space Agency (AEB) will provide for use on the space station a Technology Experiment Facility and an Expedite the Processing of Experiments to Space Station pallet.

The experiment facility will provide long-term exposure to the space environment for active and passive experiments. The EXPRESS pallet will serve as an interface mechanism to attach small payloads to U.S. truss segments of the station. Both pieces of hardware will provide greater capability for experiments that require exposure to the space environment on the station's exterior.

Brazil also will supply a Window Observational Research Facility, which will be used as a mount with data and power connections for optical experiments to perform observations of the Earth. Other contributions will include an Unpressurized Logistics Carrier and associated equipment for transportation of cargo on the space shuttle. The carrier is a cargo carrier to be used for station items, such as exterior spare parts and maintenance equipment, that do not require a pressurized environment. In exchange for AEB-provided equipment and support, NASA will provide Brazil with access to its station facilities on-orbit, as well as a flight opportunity for one Brazilian astronaut during the course of the program.

With the signing of this arrangement, Brazil joins as a bilateral partner of the U.S. in the International Space Station.

National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
2101 NASA Road 1
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Reply to Attn of: AA

JSC SAFETY & TOTAL HEALTH DAY

Dear Fellow Employees:

Safety affects us all. Some things can be taken for granted—safety is not one of them—therefore each of us must continuously focus on it.

On October 15, we celebrated Safety and Total Health Day. It is my sincere hope that all employees benefited from the activities that day. I believe the investment we made enables our JSC community to live safer and healthier.

In the past two years our injury rate decreased 45 percent. While this reduced rate is a great improvement, 59 people were still injured. We also recently experienced several ground mishaps that could have been prevented if someone had spoken up and asked "Is this safe? Let's stop and find out." Speak up, and take action on any situation you feel is not safe.

Of equal importance is our Flight Safety process, which culminates at the Flight Readiness Review two weeks before every Space Shuttle flight. All project managers present problems they have experienced, how they resolved them, and their affect on safety. You have a responsibility to voice your concerns and problems to your managers so that the board can make a sound decision on whether we are safe and ready to fly.

Each of us can make a real contribution to ground and flight safety. Each employee should not be afraid to raise a ground or flight safety issue. There are

Please see **ABBEY**, Page 8

Thank you,

George W. S. Abbey

George W. S. Abbey
Director

STS-86 crew returns home

Foale says space cooperation sets international example

By Kelly Humphries

Astronaut Mike Foale, feeling a bit "pasty" from lack of sunlight aboard the Space Station Mir, said upon returning home that the U.S. and Russia's work together in space should be an example to the world, especially its children.

"What we're doing, working together, is gluing countries of the world together," Foale told a crowd of well-wishers who welcomed him after a fourth-month absence on Oct. 7. "Russia has overcome enormous problems in this last four or five months in space, but not alone, with American help.

"This is an example, not just to our countries, but to others who are participating in our space program and others who might want to in the future, that there are great things for us to do as a planet in space," Foale concluded. "I hope the children here who are running around happy see this example, will notice this some more than the strife and awful wars that seem to be occurring around the world."

Joining him was the rest of the STS-86 crew, which returned home Oct. 7 to Ellington Field after 10 days on orbit—Commander Jim Wetherbee, Pilot Mike Bloomfield, Mission Specialists Scott Parazynski, Vladimir Titov, Wendy Lawrence and Jean-Loup Chrétien.



ATLANTIS

"It really was a year of a whole lot of fun, much more than I ever thought we'd have," Wetherbee said of the year of work leading up to the flight. "This is my fourth flight and you'd think I would remember what it is like, but you cannot believe the power of this thing going uphill. It just staggers your mind to feel all that thrust under you."

Wetherbee said things seemed both larger and smaller in space.

"We were a lot higher than I ever was before and cities looked tiny. You're so high that you can see the entire United States," he said. On the other hand, "Mir is much longer than I ever expected. Floating up to get to the base block to do the press conference just took forever.

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JSC Photo STS86-S-016

U.S. Astronaut Mike Foale returns home to hugs from his wife, Rhonda, and children at Ellington Field. Scott Parazynski is in the background.

Shuttle research provides earthshaking revelations

Research aboard the space shuttle is helping to provide a way to protect structures from major vibrations such as those produced by severe earthquakes and high winds.

Dr. Mark S. Whorton, an aerospace engineer at NASA's Marshall Space Flight Center, has been working for several years on resolving vibration problems in a micro-gravity environment that can affect sensitive science experiments conducted aboard the shuttle in orbit.

"Movements of the shuttle, such

as attitude corrections and the activities of the crew members aboard the vehicle, create vibrations that can affect delicate experiments being conducted on board," he said. "Solutions to reducing these minor vibrations in space also can be applied to reducing the affect of major vibrations produced by earthquakes and high winds on terrestrial structures such as buildings and bridges."

Whorton said the research is focusing on technological "tools" that

architects and construction engineers can use when designing more earthquake-tolerant structures.

The National Science Foundation, under its program on Earthquake Hazards Mitigation in the Civil and Mechanical Systems Division, is funding a major research program on structural control. Under this effort, the Georgia Institute of Technology and other universities are involved in various aspects of earthquake engineering. Research activities at Marshall are focused in

the area of active vibration control.

"Clearly, for applications in the space program, lightweight but equally effective vibration-mitigating alternatives were needed. We found that these technologies had down-to-Earth applications as well. One way of countering structural vibrations caused by a strong gust of wind or seismic ground motion is to place sensors and force-producing devices called actuators at specific locations on buildings. As sensors in the system measure the

motion of the structure, actuators apply forces to counteract the structure's vibrations," Whorton said.

"This technology—in part derived from the nation's space program—is being adapted to meet the needs of the construction industry around the globe," Whorton said. "The active control technology for vibration isolation is mature and is fully capable of doing the job. This is a technology ready now for commercial applications."

Columbia ready to roll to launch pad

By Kyle Herring

Columbia was set to be shuttled from its protective processing hangar to the Vehicle Assembly Bldg. today for stacking with the external tank and solid rocket boosters in preparation for the final shuttle mission of the year—STS-87.

Now atop the mobile launch platform, *Columbia* remains targeted for a mid-afternoon launch on Nov. 19.



Processing work has gone smoothly in the Orbiter Processing Facility since *Columbia* returned from its last mission in July. Close-out work in the aft compartment and closing of the payload bay doors put the orbiter in good shape for the move to the VAB. Only some protective insulating tile replacement work on an Orbital Maneuvering System pod next to the tail remains at the pad.

A five-day stay in the VAB is planned before *Columbia* rolls the three and a half miles to Launch Pad 39B, next Wednesday. The pad is being used for the first time since STS-81, when it was taken out of service for modifications/upgrades.

Columbia's crew—Commander Kevin Kregel, Pilot Steve Lindsey, Mission Specialist Winston Scott, Takao Doi and Kalpana Chawla, and Ukrainian Payload Specialist Leonid Kadenyuk—will travel to Kennedy Space Center for its countdown dress rehearsal Nov. 4 and 5.

Shuttle managers are scheduled to meet Nov. 3 to select the official launch target, now tentatively set for 1:46 p.m. CST Nov. 19.



JSC Electronic Photo

Astronaut Dave Wolf takes time out from getting his laboratory up and running to provide a televised status report from the Russian Mir Space Station. Wolf reported that the air on Mir is clear and clean, and that there is plenty of work to be done.

Life's good aboard Mir, Wolf says

Life is good aboard the Russian Space Station Mir and there's plenty of work to do, U.S. Astronaut Dave Wolf said in a televised status report last week.

"I don't have any regrets about making this trip," Wolf said. "This has surpassed my wildest expectations and we expect a lot when we go into space."

Wolf is beginning his second month as a Mir crew member, working with Mir 24 Commander Anatoly Solovyev and Flight Engineer Pavel Vinogradov. With all systems aboard the Mir Space Station functioning normally, Solovyev and Vinogradov performed an Oct. 20 internal space walk into the Spektr module to restore the ability of its solar arrays to track the Sun. Wolf stayed in the Soyuz capsule.

Wolf worked with the Canadian Protein Crystallization Experiment, which will analyze the crystalline structure of 32 proteins in an effort to improve drug development and design; the Biotechnology of 3-Dimensional Tissue Engineering, which looks at basic cell-to-cell interactions and their role in the formation of functional tissue; and the Fundamental Biology Active Dosimetry of Charged Particles, which will allow investigators to conduct real time radiation monitoring aboard the Mir.

"Our main goal is this laboratory, and we're getting a lot of good work done in it," Wolf reported. "We have already observed structures that are impossible to form on Earth—absolutely fascinating results."

Wolf said the air on Mir is extremely fresh and clean, and that he has taken it upon himself to keep the air filters clean of all the dust and particles that float through the air and clog them. He said he hopes to participate in an external space walk next month.

"I certainly feel well prepared to," he said. "We have a number of American scientific instruments on the outside of the station that need to be retrieved, along with taking some measurements on the behavior of the surfaces of the station, how they've reacted to this long duration in space to help us design better surfaces for the International Space Station that we're starting to build next year. As far as I see, things are all go."



Smart software betters shuttle trainer

Even after each pilot astronaut makes 500 practice landings with a training aircraft that simulates the space shuttle, landing the actual shuttle for the first time is a challenging task. To assist future shuttle pilots, NASA will install new, intelligent software in the training aircraft to make its approach and landing "feel" even more like a shuttle landing.

"Tests of the smart software in simulators on the ground with the Shuttle Training Aircraft hardware were extremely successful, proving that the trainer airplane using new computer coding will seem a lot more like a shuttle as it comes in and lands. Landing an orbiter for the first time will seem a lot more familiar to astronauts," said Dr. Hamid Berenji, software project manager at Ames Research Center.

The improvements are detailed in a technical paper recently presented in Barcelona, Spain. Authors were Steven Swanson of the Shuttle Training Branch at JSC, and Berenji

and Dr. Ping-Wei Chang, computer scientists at Ames.

"In keeping with one of NASA's major goals to increase flight safety, the new software could be used to improve all kinds of simulators, from airplanes to simulations done in special machines," Berenji said.

The new software to be installed in the Gulfstream II Shuttle Training Aircraft refines the "rules" that onboard computers use to simulate the orbiter's descent from 35,000 feet to landing.

The special software uses a form of "adaptive fuzzy logic" that programs a computer with words as well as numbers and "neuro fuzzy logic" to learn by experience, changing the patterns it uses to make decisions.

"We expect that new astronaut-pilot confidence will be much higher," he said. "That means shuttle safety will be improved, too," he added.

Chamber test overcomes brief centerwide power failure

Despite a centerwide power failure, the latest test of regenerative life support systems continues to go well in Bldg. 7 as four team members try out equipment and techniques being designed for future space exploration missions.

Phase III Commander Nigel Packham and crewmembers Vickie Kloeris, John Lewis and Laura Supra report that the recycling systems are running smoothly and providing high purity water and air.

"The systems and our control room team experienced a challenge during the recent centerwide power failure," Kloeris reported. "The control room team rose to the occasion and worked quickly and efficiently during the outage to guarantee that we were safe and that the systems were in a stand-down mode and ready to come back on line as soon as the power was restored."

"For the first few seconds after the power failed, the only light was from

the displays of our lap top computers which automatically switched to battery back-up. Seconds later, we had flashlights in hand and very shortly after that the emergency power came on-line. Bet you never thought about your lap top as an emergency light! It was safety day in action and a job well done."

The test team collected measurements within the chamber that will be used to determine how noise levels associated with the water and air

recycling equipment affect the productivity and comfort of the crew. They also compared methods of training people on tasks they have not performed before, which may be used during long duration space flights, such as a trip to Mars.

"The crew is in very good spirits as we quickly approach the one-third point in the test, which is the milestone marking the duration of the LMLSTP Phase II test," Lewis said. "We all seem to be sleeping very

well. We think the daily exercise prescription helps with that."

"We certainly appreciate all the visits, calls and E-mails from coworkers, friends and family," Supra said.

"Astounding is the word I would use when describing the way this team has come together," Packham said. "Everyone is giving 110 percent, and with that attitude, Mars seems to be getting a lot closer every day."

Cassini on its way toward Saturn

A seven-year journey to the ringed planet Saturn began at 3:43 a.m. CDT Oct. 15 with the liftoff of an Air Force Titan IVB/Centaur carrying the Cassini orbiter and its attached Huygens probe.

Cassini is now on an interplanetary trajectory that will deliver it to Saturn on July 1, 2004.

The planet Saturn, its famous icy rings, and its enigmatic moon, Titan, are the prime scientific targets of the international mission, the most ambitious and far-reaching planetary exploration ever mounted. The mission marks the first time a space probe will attempt to land on the moon of another planet, providing

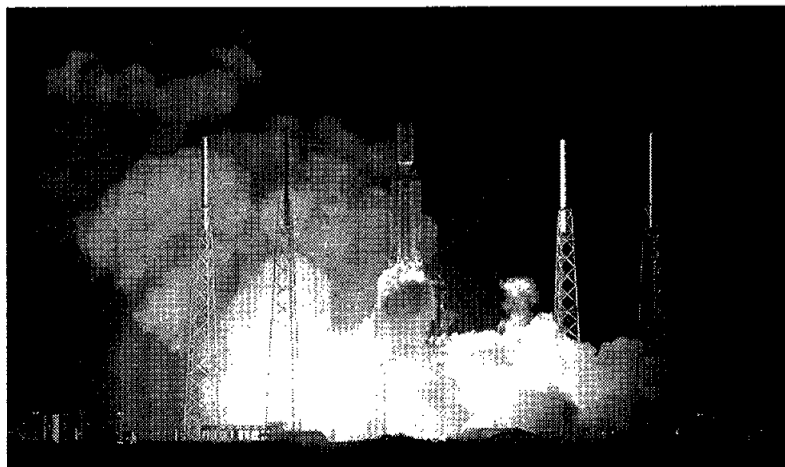
the first direct sampling of the Earth-like atmosphere of Titan and the first detailed pictures of its previously hidden surface. Titan is Saturn's largest moon, nearly the size of Mars and bigger than either Mercury or Pluto.

The launch had been postponed twice, first in early October to allow engineers at Kennedy Space Center to repair damaged thermal insulation on the European Space Agency's Huygens probe and again on Oct. 13 due to upper level winds that had the potential of blowing debris outside safe impact limit lines.

Damage to the Huygens probe, which is scheduled to descend by

parachute into Titan's sky on Nov. 6, 2005, was caused by a higher-than-acceptable flow rate from air conditioning to the probe.

Cassini, in development since October 1989, is a cooperative endeavor of NASA, the European Space Agency and the Italian Space Agency. The mission includes a sophisticated robotic spacecraft equipped with 12 scientific experiments to orbit Saturn for a four-year period and study the Saturnian system in detail. The ESA-built Huygens probe that will parachute into Titan's thick atmosphere carries another six scientific instrument packages.



NASA Electronic Photo KSC-97PC-1547

The Titan IVB/Centaur rocket carrying the Cassini probe launches from Kennedy Space Center's Launch Complex 40 on Oct. 15 on its way toward the solar system's giant ringed planet, Saturn.

Community News

JSC kicks off Combined Federal Campaign

Center's goal for 'Lift Your Voice ... Raise Hope' campaign \$480,000

JSC officially kicked off the 27th annual Combined Federal Campaign on Oct. 10, establishing a goal of \$480,000 for 1997.

The theme for the Texas Gulf Coast CFC, of which JSC's efforts are a part, is "Lift Your Voice... Raise Hope." The JSC Campaign will run through Nov. 19.

The CFC is a once-a-year voluntary fund-raising effort that gives JSC employees a chance to contribute to local, national, and international health and welfare charities. The CFC was established by Presidential executive order to provide a single, uniform fundraising

program within the Federal Government. The Office of Personnel Management establishes the regulations governing the CFC, including the charities which participate in the campaign.

There are more than 1,500 charitable organizations in the Houston CFC, which will be listed in a brochure to be distributed to each employee. The brochure will be online at: www4.jsc.nasa.gov/ah/1997/cfc/cfc97.htm.

Among these are the NASA College Scholarship Fund, which provides educational assistance to selected NASA dependents, and

Space Family Education, which provides quality care for children of JSC employees.

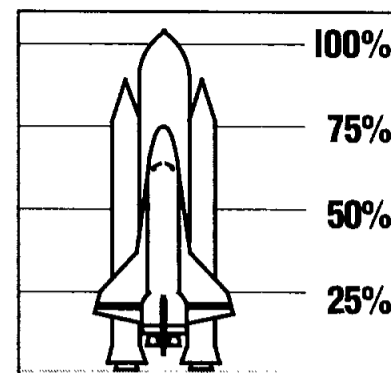
Last year, JSC employees gave more than \$479,000 of the \$2.4 million contributed by federal employees throughout the Houston area. This year's CFC goal is \$2.5 million.

JSC CFC Coordinator Teresa Sullivan said there are some additional incentives this year for employees who pledge one hour's pay or more. Those who pledge one hour's pay per month will receive a CFC lapel pin. Those who pledge two hours' pay will receive a lapel pin and travel mug. Those who

pledge \$600 or more per year will receive a lapel pin, travel mug, and a personalized certificate of appreciation signed by George Forman.

In addition, those employees contributing one hour's pay per month or more will be eligible for the drawing for five one-month reserved parking spaces. The drawing will be held at the conclusion of the campaign.

"In making your decision, it is good to remember that you will not only be helping your community to help itself, you may be helping a neighbor or loved one when they need it most," Sullivan said.



1997 GOAL: \$480,000



JSC Photo by Robert Markowitz

Willie Williams, left, and Dan Barta of the crew and Thermal Systems Division, discuss closed-environment plant growth development, one of the technologies showcased at last year's NASA JSC Inspection.

Inspection 97 shares JSC technology

By Jovan-Justine Love

For the second year, JSC is hosting an event bringing together leaders from various fields to explore the programs, activities and technologies of human space flight. For three days, Nov. 12-14, JSC will open its doors to for an "up-close" look at the center's capabilities and facilities.

More than 1,200 leaders from industry, business, community organizations and education took part in last year's event, and more are expected to attend this year's.

NASA/JSC Inspection 97 will showcase the Space Shuttle and

International Space Station Programs, Mir activities, Mars studies, and the space-age technologies and expertise that make them possible. Business and technical leaders from the petroleum, chemical, energy, transportation, agriculture, manufacturing, medical and engineering fields may visit more than 175 exhibits and demonstrations in 17 buildings, at Ellington Field and the new Sonny Carter Training Facility.

"For more than three decades, JSC has been the world leader in human space flight operations," said JSC Director George Abbey. "At the

heart of our capabilities are the specialized technologies, expertise and facilities needed to launch humans into space, construct an International Space Station, and develop missions beyond Earth's orbit. Visitors will see first hand the technologies and facilities that make human space exploration a reality."

"Much of the work we do—from research to developing spacecraft to fabricating equipment that astronauts use on orbit—has potential commercial applications," said Inspection 97 Event Chair Doug Blanchard.

USA volunteers help others in United Way Fall Days of Caring

Volunteers from United Space Alliance in Houston participated in this year's United Way Fall Day of Caring Sept. 9 and 13.

Employees in Houston participated in community projects at many sites including the Bay Area Habitat for Humanity, the Bridge Over Troubled Water, the Klein Neighborhood Center and Freeman Memorial Library. These volunteers provided much-needed services for those less fortunate or in dire need.

Volunteers at the Bridge Over Troubled Water, a shelter for women, completed a number of tasks. Using brushes and rollers they supplied, volunteers painted doors, hallways and door frames. The team also painted walls, shelves, and cabinets in three large play rooms.

Hammers, screw drivers, electric drills and saws, and sledge hammers could all be seen busily in motion at the Klein Neighborhood Center in La Porte where volunteers constructed a pre-fabricated storage building and built a fence.

In addition, one of the projects that annually comprises United Way's Fall Day of Caring—a year-round event sponsored by a team working at the Klein Neighborhood Center involving yard maintenance—was once again held. The grass was mowed, a fence was repaired, an unused sandbox was torn down, trees were trimmed, and a flower bed was rebuilt.

USA volunteers planned, organized, and facilitated a joint community outreach project cosponsored by several United Way agencies and by the Freeman Memorial Library. The volunteers contacted and scheduled the participation of

United Way agencies, compiled literature and training materials, designed posters, raffled off an audio course on teaching children values, facilitated gifts to the library, published a reference on web-based child and parent empowerment groups, and organized and facilitated a two-hour roundtable event. The goal of the event was to help make the community more aware of support systems and networks, training opportunities, and references that can help empower and protect children and strengthen families.



United Space Alliance

Those participating on projects for the Bay Area Habitat for Humanity worked on the construction of a new home for a low-

income family from the local area. A tremendous amount of work went into installing all required plumbing in the house and constructing a new roof. The plumbing crew installed most of the copper supply lines in the house and, despite a slow start and the hot weather, the roofing crew managed to place about one-third of the shingles on the roof.

USA employees and members of their families also joined forces to help out in Florida.

Employees from both Ground Operations and Integrated Logistics, painted the homes of four Brevard County elderly residents. One resident, Clarence Collins, said, "I sure do appreciate all your hard work. Now I can walk outside and have pride in my home again thanks to you."

All total, USA employees in Florida donated more than 162 hours of volunteer time to complete the projects.

USA donates to local university alumni group

Joseph Hammond, vice president of Human Resources and Administration for United Space Alliance, recently presented a donation of \$10,000 to the University of Houston-Clear Lake Alumni Association.

The contribution, accepted by Alumni Association President Debra McCracken, was made in fulfillment of the company's sponsorship of the association's "Out of This World Weekend on the Bayou" fund-raising event held in early October. USA was a sponsor of the event, the university's major fund-raising activity of the year. The event featured the Bayou

Classic Celebrity Golf Tournament at South Shore Harbour Country Club, the Bayou Professional Series, the Bayou Ball at Space Center Houston, and the Bayou Chef's Night and Auction held at the university. UHCL, an upper-level university, is focused on teaching, research, scholarship and professional service.

The university's four schools—Business and Public Administration, Education, Human Sciences and Humanities, and Natural and Applied Sciences—offer courses leading to bachelor's degrees in over 30 fields of study and master's degrees in over 40 fields of study.

JSC Safety Alert

Renewed Emphasis on the Safe Operation of Forklifts at JSC

What Happened

On June 30, a JSC employee was injured while lifting an Uninterruptible Power Supply battery cabinet during a forklift operation in Building 7. After the incident, the cam lever, which secures the forklift tine in place, was found to be in the "unlocked" position. On Sept. 18, a close call was submitted citing the improper use of a tie-down strap to lift equipment in the Building 422 lay-down yard. Illegal extensions had been made to the forklift, and no lift procedure was in place.

Safety Implications

About 85 workers are killed each year in incidents related to industrial truck operations, and nearly 35,000 suffer injuries each year that result in lost work days. About 20 percent of those incidents are caused, at least in part, by inadequate training. About two-thirds of all forklifts are involved in an accident during the typical 8-year life span of the equipment. A new OSHA rule requiring forklift training became final in September. Under this OSHA standard, employees who operate industrial trucks must be provided training and re-evaluated periodically by their employers.

What You Can Do

All JSC organizations should ensure that employees operating forklifts are trained, certified, and are complying with 29 Code of Federal Regulations 1910.178, "Powered industrial trucks." All JSC organizations should institute the training requirements of the new OSHA standard as soon as possible. All JSC employees operating forklifts must attend the JSC training course for forklift safety and be certified by their respective organization. JSC organizations should conduct safety team meetings prior to forklift operations. JSC organizations should periodically re-evaluate employees and lifting operations.

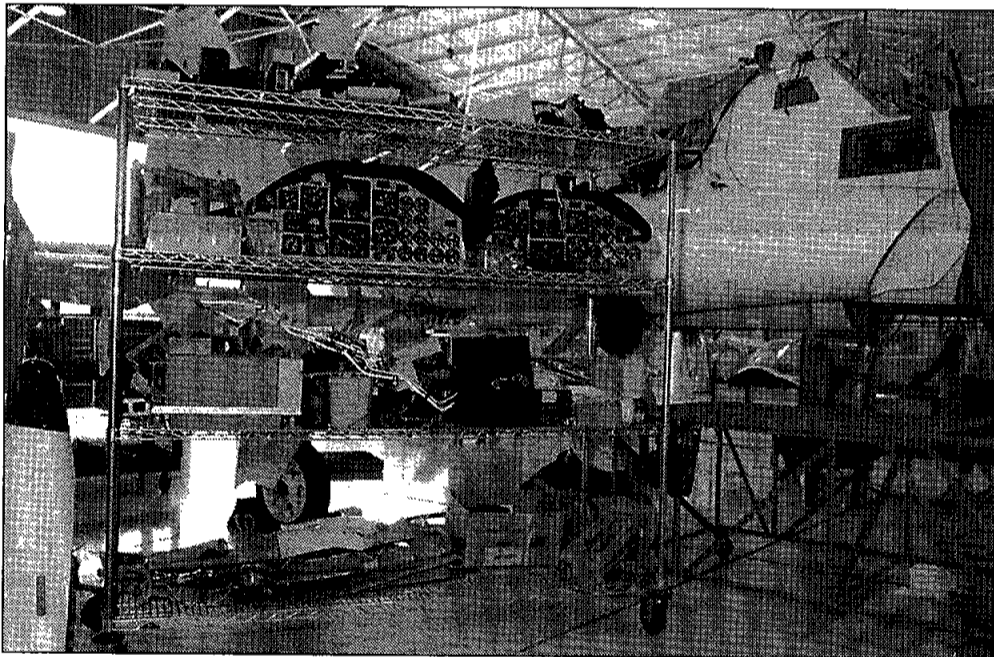
JSC Photos by Steve Candler

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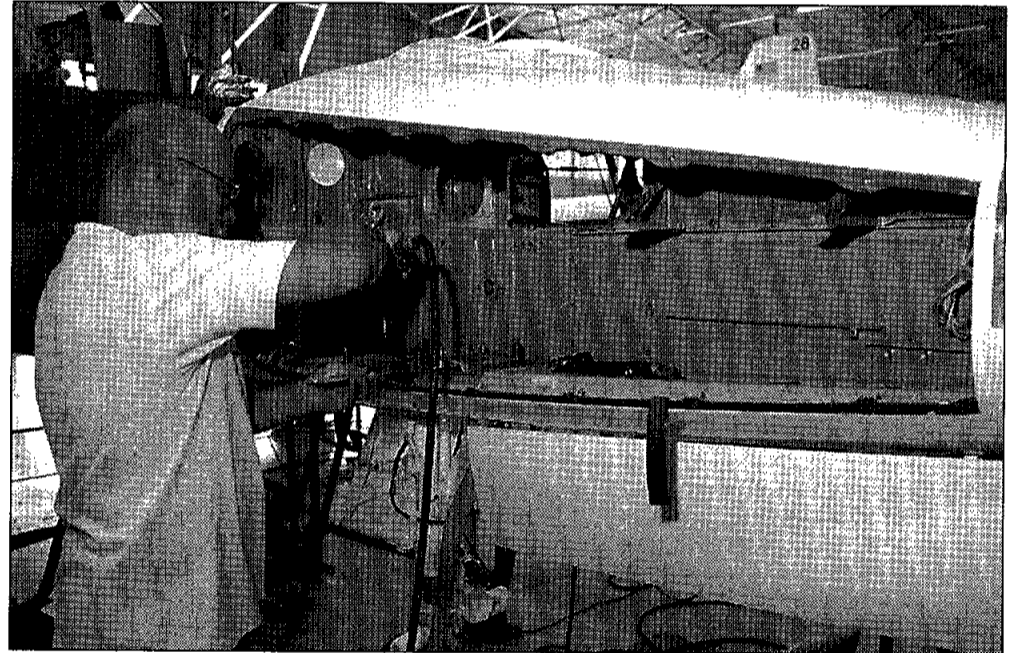
- 1) NASA T-38 astronaut training aircraft fly over the space shuttle launch pad at Kennedy Space Center in Florida.
- 2) A rack in one of the Ellington Field hangars operated by JSC's Aircraft Operations Division holds almost all the avionics being removed from a T-38 trainer. The left side of the rack contains the back seat display instrumentation, and the right side contains those instruments from the front section.
- 3) DynCorp employee Paul Trout removes avionics from the nose area of a T-38, to be replaced by new instruments as part of the avionics upgrade project.
- 4) T-38 Avionics Redesign Project Engineer Jill Brigham shows one of the astronaut training aircraft that contains all of the avionics upgrades.
- 5) DynCorp employee Steven Burris computer tests a new T-38 digital avionics package on right against the older analog instrumentation on the left. The new instrumentation is nicknamed "the glass cockpit," in reference to the cathode ray tubes used in the new instrumentation.
- 6) DynCorp employee James Lawson installs new digital avionics package in a T-38 rear seat cockpit. His face can be seen reflected in the vertical mirrors at right center of photo.



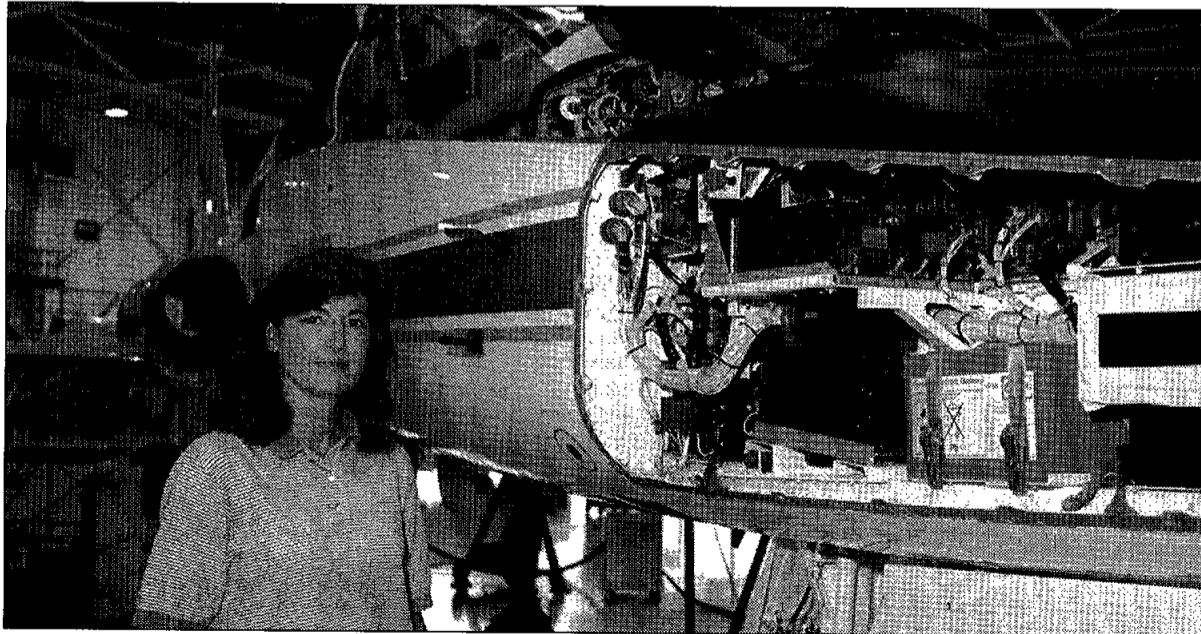
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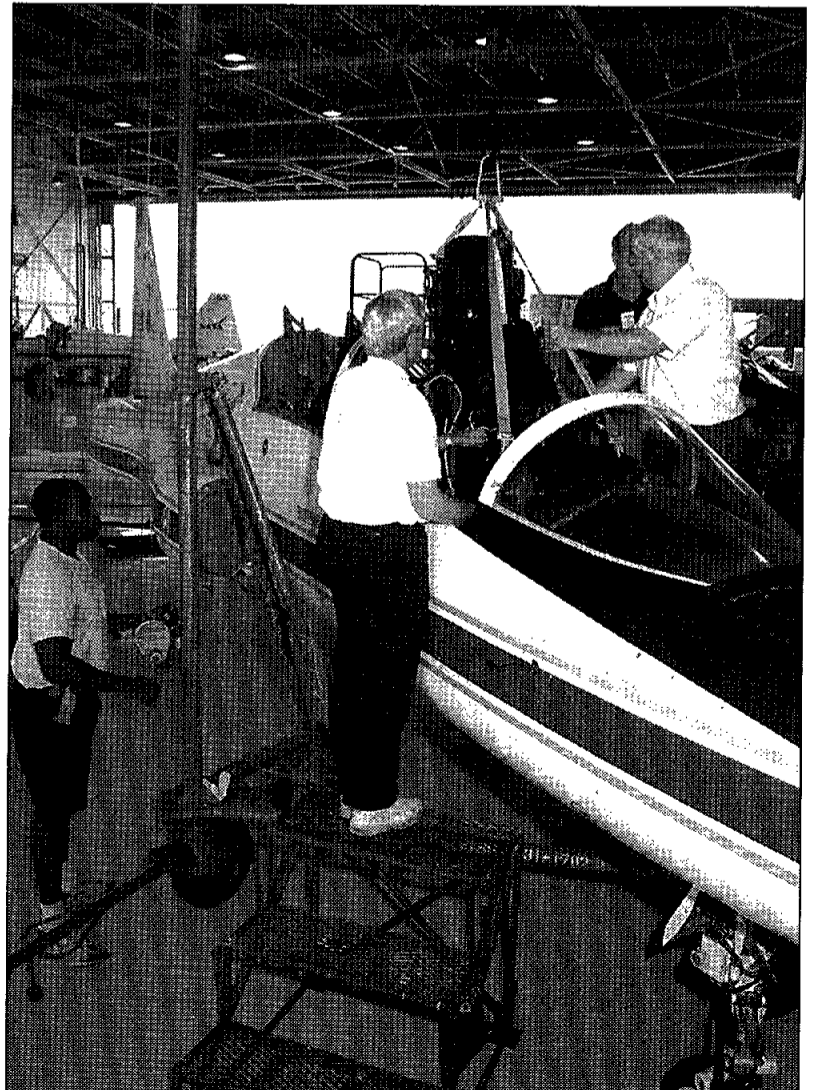
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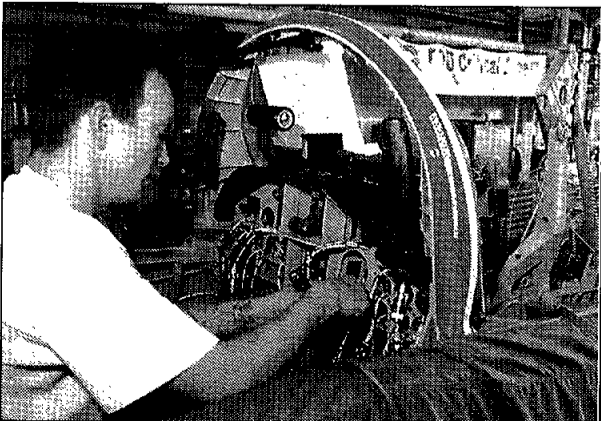
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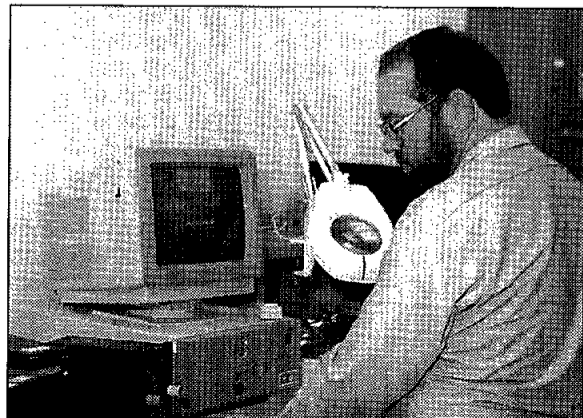
NASA Photo 97-13955



NASA Photo 97-10704



NASA Photo 97-10703



NASA Photo 97-10703

Training Aircraft Get 'Nose Job'

Avionics upgrade uses off-the-shelf hardware to improve safety, reliability of JSC's faithful T-38 aircraft fleet

By Elizabeth Soutter

Aircraft Operations engineers at JSC's Ellington field facility are combining new designs with off-the-shelf hardware to create all new avionics systems for NASA aircraft.

Charlie Justiz, a NASA research pilot working on the orbiter avionics redesign project, said the new avionics designs will make the center's aircraft safer and more reliable, providing pilots with data that is already translated into useful information, and blaze a trail for systems that will be used in space shuttles and future spacecraft.

"Don't make me (the pilot) crunch the data," Justiz said. "Present information to me so that I can make an informed decision."

Navigation has always been a critical element of travel. Early ships had to keep land in sight so as not to become disoriented and lost. The development of celestial navigation and the compass increased the ability of ships to cross the open sea. The onset of aircraft added altitude and attitude as critical components of navigation. As travel becomes increasingly rapid and more technologically complex, navigational systems must keep pace.

Avionics are the systems that convey relevant information to the pilot. Any information that will help the pilot travel from one location to another is provided by avionics. Pilots need to know exactly where they are, how high they are flying, the shortest route to their destination and how much fuel they are using. When bad weather prevents them from seeing the ground, they must also be able to determine their attitude—that is, whether they are upside down, in a spin, climbing or descending.

Early avionics included nothing more than a compass, fuel gauge and a clock. Pilots who flew into clouds sometimes became hopelessly disoriented and crashed. In 1937, an innovative pilot taking off from an airport in Long Island attached a string with a weight on the end to the inside of the cockpit. By watching the weight move, the pilot was able to judge his attitude and negotiate a cloud bank.

Soon, gyroscopes and a specially designed instrument face replaced the string and weight. The new instrument was called an artificial horizon or attitude indicator and it made flying in low visibility possible.

Altitude can be measured by air pressure. The higher up the plane is, the lower the air pressure. Barometers with specially designed instrument faces are used to determine the altitude of the aircraft.

As human beings accumulate more hours in the air and electronics advance, avionics systems continue to improve. By the mid-1980s, new aircraft boasted cockpit computers. Bulky gears, gyroscopes, barometers and other moving parts were replaced with color digital circuits and video readouts. This new instrument panel design was called a "glass cockpit"—a reference to the glass cathode ray tubes in the television monitors.

JSC's 30 T-38 aircraft were built between 1959 and 1968 and were equipped with analog avionics. The T-38s are used by NASA's astronauts to keep their flying skills current, and are flown all over the country. NASA began reevaluating its T-38s in 1987, and decided that the aircraft was basically sound and did not need to be replaced. An avionics upgrade would be the most cost-efficient way to increase the safety and reliability of NASA's astronaut training aircraft. This project called for a conversion to glass cockpits for an easy to understand, accessible avionics system.

The initial prototype for the upgrades was a NASA design contracted to a company in New York. Aircraft Operations officials quickly found that the cost of contracting the work out was greater than performing the work in house, using NASA and DynCorp engineers and technicians, and decided to continue the project at Ellington Field.

The result was a project that incorporated off-the-shelf technology with NASA designs to create an entirely in-house upgrade of the T-38. Deputy Director of Aircraft Operations David Finney estimates that 90 percent of the communications and navigation instrumentation have been replaced in the cockpit.

The upgraded aircraft can be easily distinguished from the original aircraft, even from a distance. The familiar "needle" that once protruded from the nose of the aircraft has been replaced by a solid black nose cone.

The needle is called a pitot tube, used to determine air pressure and air speed. The pitot tube is a metal cylinder with holes. A hole at the tip of the tube judges the ram air speed as the plane flies. A series of holes on the underside of the tube gauge air density; the higher the airplane, the less dense the air. The information from the pitot tube was translated by the mechanical avionics systems into data the pilot could use to determine the speed and altitude of the aircraft.

As part of the new design, the single pitot tube at the tip of the aircraft's nose was replaced by two smaller ones on either side of the fuselage. The removal of the front pitot tube made room for a weather radar system. The radar provides the pilot with advanced weather monitoring, which increases both flight safety and efficiency.

"Instead of flying all the way around a weather cell or trying to climb above it, a pilot can see where the rain really is," said

Project Engineer Jill Brigham. This allows pilots to determine in advance if it is safe to fly through the weather, or if an alternate flight path should be selected. An electrical engineer, Brigham headed the team that redesigned the avionics systems in the aircraft.

In addition to the new weather radar, the upgraded airplane boasts an entirely revamped avionics systems. The mechanical altimeter and attitude indicator have been replaced by digital television-style displays. The format of the indicators is largely unchanged from the original—the altimeter is still shaped like a dial, with a needle in the middle to indicate the aircraft's position. The new displays also provide the data in numerical form, at the corner of the display screen. Now, a pilot can see both the traditional dial display and the numerical quantity at the same time.

A computer also has been added to the T-38 cockpit. A flight manager computer allows a pilot to type in the pilot's flight plan. The flight plan—the route the pilot intends to take—is displayed on a CRT. The aircraft's position along the flight path is displayed along with a weather radar overlay. This work previously was done using maps and mathematical formulas.

Brigham, a private pilot herself, occasionally flies as a test engineer on T-38s. On a recent trip to Maryland, the benefits of her upgrades were made all too apparent.

"Halfway there we lost the flight management system that provides your guidance," she said. "So we were back to the maps." Brigham had to help the pilot to navigate the plane across country without the benefit of the avionics she had helped to design.

"It's a hard task, trying to keep the airplane from getting off altitude and paying attention so that everything else is stable," she said. With the glass cockpit "pilots fly more informed, so they're more efficient, safer. The new system

takes care of all of that work. We owe it to our pilots to take the workload off them. They deserve to be safe in the air."

Former shuttle commander and Ellington Field staff pilot Steve Nagel agrees.

"There's no question it's a safer plane," Nagel said. "First, you have an increased situational awareness. This means that you are much more aware of where you are and where you are going. Next, it increases your ability to avoid bad weather... it just gives a higher margin of safety."

Nagel flew four shuttle flights, logging more than 723 hours in space, and 8,000 hours as an aircraft pilot.

In addition to the safety benefits, Nagel cited other advantages to the newer technology.

"The astronauts of my generation were trained on airplanes with the old avionics. The new guys are used to much more high-tech cockpits." It is more consistent for the new astronauts to fly with the systems on which they were trained, Nagel said. In addition, the new flight computer provides better training for the mission specialist astronauts.

"The purpose of having mission specialists fly in the T-38s is to get them used to flying as

part of a crew. It's good for them to be able to fly an aircraft that has a computer interface system on board," Nagel said.

The old avionics system did not include a computer. This made learning to fly the upgraded aircraft a challenge.

"At first it was harder (to fly the upgraded T-38). There was a lot

more information available and I had to learn how to use the displays and the navigation computer. It got easier over time."

Also hard to get used to was the absence of the pitot tube at the front of the aircraft. "I kept thinking something was missing," Nagel laughed. "But the airplane still flies the same. Over time it was fine. I actually like flying (the upgraded T-38) better than the other."

Experience with the T-38 upgrades will help pave the way for shuttle upgrades. Two generations of avionics technology have been engineered since the space shuttle was built and engineers have begun to turn their attention to improving the way astronauts receive navigational information.

The first step in the orbiter avionics redesign is to change the cockpit from a mechanical system to an electrical system, as was done with the T-38s.

"Right now, orbiter avionics are like a Swiss watch. There's things spinning in there, little gears and wheels. And the folks who know how to overhaul those gizmos are retiring," Justiz said.

As an example, the current attitude director indicator on the shuttle is called the LEM ADI. It was named after the vehicle it was designed for—the Lunar Excursion Module of the Apollo project.

"It is the same exact system as that on the LEM," Justiz said.

The age of the system and the lack of trained engineers to maintain it made an upgrade inevitable, and JSC Director George Abbey and Deputy Director Jim Wetherbee provided input into how it should be done. "Mr. Abbey and Capt. Wetherbee suggested a top-down approach. If we know the upgrades had to happen, why not make them work for us?"

The current system is not only difficult to overhaul and maintain, it is difficult to use.

"I've seen trained astronauts look at the indi-

cator we've got right now and get it wrong. If this is a trained astronaut, one of the best in the world, in an orbiter he or she trained in, and they get it wrong, there's something wrong with the system. It's not the people and it's not the training, because we've got some of the best in the world."

The initial changes to the orbiter cockpit won't be startling. "That was done on purpose to keep the changes minimal on start up," Justiz said. As with the T-38s, the current dials will be replaced with television displays to create a glass cockpit.

"We're going to go from moving pieces of metal to LCD's (liquid crystal displays)," he said. The first upgrade—called a multi-function electronic display system—will begin on *Atlantis* during the orbiter's next maintenance period in November. Other orbiters will follow until the entire shuttle fleet is converted to the glass cockpit.

The critical aspect of the initial upgrade is to change to an electrical cockpit. "The electronic medium is infinitely flexible," Justiz said. Once the electronics have been installed, an entirely new avionics design is possible.

"The current cockpit has a lot of numbers displayed. Those are okay if you have the time to digest the numbers. Unfortunately, in most of the work we do in space and during ascent and entry, it would be better if we presented that information in a way that the human being can digest it without first having to look at the number and translate it into something."

The top-down approach means rethinking the format in which information is displayed for the pilot. "Okay, I know what the cockpit looks like now, but what is the information I really need? I don't really care what the hydraulic pressure is. I want to know: is it in the green? Has it been in the green? Is it fluctuating?"

The initial stages of the new orbiter cockpit design are following in the footsteps of similar upgrades in the aviation industry. "If you look at all the companies around the world who have worked on how to get information to a pilot, they have come up with pretty much the same standard (for avionics) and almost identical designs. And they came up with it from the top down." Justiz said this allows the use of new technologies and years of accumulated flight experience.

While the aeronautics industry has provided a useful form to follow, much of the data is not translatable to astronautics. The orbiter must judge its location not only in terms of altitude and speed, but also in terms of its relation to a constantly rotating Earth.

"It's like trying to use a choo-choo train to develop displays for an airplane," Justiz said. The result is that NASA engineers must design a flight management system that works for the orbiter. "No one has ever done this before. We have spec sheets on airplanes, jet fighters, cargo airplanes and airliners, but now we've got to upgrade an orbiter, a *space vehicle* for which there is only one system like it in the world."

After the initial upgrade to the electrical cockpit, Justiz and his team will begin to test new cockpit designs, looking for one that performs all the functions necessary in a format that is as natural as possible for the pilot.

The initial testing for that new cockpit will occur at Ellington Field using the Shuttle Training Aircraft. Pilots will practice with different types of cockpit layouts in order to determine which are most efficient and safe.

Ellington Field engineers will remain busy with the task of testing and designing the new glass cockpit design. Meanwhile, work on the T-38s will conclude later this year with all 30 aircraft updated.

Aircraft Operations expects the glass cockpit will extend the useful life of its T-38s almost another half century, flying into the record books as the steady workhorse that carried NASA astronauts safely into the 21st century. □



'Instead of flying all the way around a weather cell or trying to climb above it, a pilot can see where the rain really is.'

—Jill Brigham
T-38 Avionics Redesign
Project Engineer

35 Years Ago at MSC

MA-8 opens way for one-day flight next trip

NASA says Schirra-Sigma 7 mission 'perfect'; reentry right on button

[Reprinted from the Oct. 17, 1962 issue of Space News Roundup]

In a mission so successful that it virtually eliminated the need for further six-orbit missions and paved the way for a one-day flight, Astronaut Walter M. Schirra gave America its longest space flight to date Oct. 3 and landed less than five miles from the prime recovery vessel in the Pacific.

America's first six-orbit mission was termed "perfect" by NASA officials and members of contract and supporting teams. "This proves what we've been saying," commented D. Brainerd Holmes, chief of NASA's office of Manned Space Flight. "Step by step development is the answer...not a matter of breakthroughs but of steady engineering development."

In the two weeks since, Schirra has undergone extensive debriefing periods and a brief appearance in Hawaii; returned to the United States; and been feted with a parade in Houston followed by two news conferences at Rice University, and a dinner given by Rice University President Dr. Kenneth Pitzer. He returned to Cape Canaveral Oct. 9 to work with engineers and scientists in checking the data recorded on the flight.

Monday of this week he went to his hometown, Oradell, N.J., for welcoming ceremonies and was presented with the NASA Distinguished Science Award. He was scheduled to pay a visit to President Kennedy at the White House yesterday.

Said MSC Associate Director Walter C. Williams, Operations Director for the flight, "So far as I'm concerned it was perfect. I found it invigorating. Sooner or later I'm going to be tired, but now I'm not."

Williams said the next mission, early next year, will be a one-day mission, as previously stated if the Schirra mission were successful.

Williams said he did not know how many one-day missions would be flown but that three boosters and three spacecraft are in preparation, although all three may not necessarily be used....

Schirra was awakened on the

morning of the launch by Dr. Howard K. Minners, astronaut flight surgeon, at 1:40 a.m. He was joined for breakfast at 2:10 by MSC Director Robert R. Gilruth, Associate Director Williams, and Dr. Minners. The menu consisted of filet mignon, eggs, orange juice, dry toast, coffee and bluefish, the latter a feature provided by Schirra, who had caught the fish the previous afternoon....

Following a 15-minute hold for repairs to radar equipment at the Canary Island tracking station—the only hold encountered since all spacecraft and booster systems checked out perfectly as did the weather, in spite of an earlier tropical storm threat—Schirra was launched at 7:15 a.m. EST.

Nine hours and 13 minutes later Sigma 7 splashed into the Pacific, so close to the prime recovery ship that photographers aboard were able to take their first pictures of an actual descent.

As the countdown was completed at Cape Canaveral, the prime recovery ship Kearsarge waited on the other side of the earth. Groups of young pilots gathered around a radio in the officers' wardroom and stood in silence through liftoff and the first few minutes of flight, then burst into laughter as the announcement came over the ship's loudspeaker system:

"Now hear this. The astronaut has departed Cape Canaveral for the Kearsarge."

It was a roundabout route: six trips around. But it was fast. During the flight the Sigma 7 attained a speed of 17,500 miles per hour with an estimated perigee of 100 miles and apogee of 176 miles.

The return of Schirra and his spacecraft to earth with almost pinpoint accuracy was an extraordinary tribute to the engineering skills attained by Project Mercury personnel. The spacecraft was spotted from the deck of the carrier as it dived toward earth at a speed of about 270 miles per hour, leaving behind a vapor trail like a high-flying jet aircraft. At about 21,000 feet the drogue parachute could be seen fluttering behind Sigma 7 and the main

'chute billowed visibly at 10,000 feet to abruptly slow the plunge.

There was never any doubt where the spacecraft was. The Hawaiian tracking station on Kauai had contact with Sigma 7 by relay through high-flying aircraft from an altitude of 60,000 feet "right down in to the water," according to the tracking station manager.

Schirra, in voice contact with the Kearsarge, said from his floating spacecraft that he felt well and would remain inside until he was picked up.

Almost exactly 10 hours after liftoff, he was piped aboard the carrier in the traditional Navy manner, the hatch was blown, and America's third orbital pilot emerged.

Schirra inspected the Sigma 7 briefly, shook hands with waiting NASA and Navy representatives and acknowledged the cheers of the ship's crew before walking to the sick bay where telephone calls from President Kennedy, Vice President Johnson and the astronaut's wife awaited him.

After a three-day cruise, during which the de-briefing was completed, Schirra was flown from the carrier to Hickam Field, Hawaii, and after lunch, boarded a military Air Transport Service jet for a non-stop flight to Houston, where he was greeted by his family and a small crowd of people at 12:45 a.m. Sunday morning.

Sunday afternoon, Oct. 7, a motorcade left MSC's Houston Headquarters at the Farnsworth-Chambers Bldg. to follow a pre-planned route through downtown Houston to Rice University. A crowd estimated at 300,000 by some police officials braved the hot weather and high humidity to get a glimpse of Schirra and others in the motorcade. In addition to Schirra and his family were Astronauts M. Scott Carpenter, John Glenn, Gordon Cooper, Donald Slayton, and Virgil Grissom, NASA Administrator James Webb, Congressmen Albert Thomas, Olin Teague and Bob Casey, Dr. Robert R. Gilruth, and other MSC officials.



Top: Flight Operations Chief Chris Kraft and Astronaut Wally Schirra go over the Mercury/Atlas-8 flight plan in Mercury Control Center. Left: Schirra is assisted from his pressure suit following the successful flight. "As far as problems go," he added, there is (one) which we have solved; this was the suit temperature. I have been much hotter in the tent at Cape Canaveral than I ever thought of being in Sigma 7." He said at one point he had such control over the coolant setting he got cold, "the first as far as I know we ever got cold in space."

The MA-8 press conference got under way at Rice at 4 p.m. with Administrator Webb making the opening remarks....

At that time four awards, in recognition of great services in space technology during the past year, will be made to teams of MSC—the Directorate of Engineering and Development, headed by Max Faget; the Mercury Project Office, headed by Kenneth Kleinknecht; the Preflight Operations Division, headed by G. Merritt Preston; and the Flight Operations Division, headed by Chris Kraft....

Schirra affirmed that the sensations of launch are perfectly described by both Glenn and Carpenter: "The railroad train that

you are sitting on really does move out." He described his activities during the early phases of the flight and said that overall, he thought, it was "a text-book flight."

He emphasized the sense of cooperation between himself as pilot and the tracking range, including Mercury Control Center. "It was a nice feeling to realize that questions I had could be answered; questions they had, I could answer...." He spoke of a feeling of "complete control," especially during retrofire.

Of the fuel problem, Schirra said, "My intention was to use so little fuel that no one could argue that we had enough fuel aboard Sigma 7 for 18 orbits if we wanted it. I think I proved that point."

Gilruth Center News

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday.

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Hatha Yoga: A stress relieving, stretching and breathing exercise routine to unite body, mind and spirit. Classes meet from 5:30-6:30 p.m. Thursdays. Cost is \$40 for eight weeks.

Nutrition intervention program: A six-week program to learn more about the role diet and nutrition play in health, including lectures, private consultations with a dietitian and blood analysis. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets at 7 p.m. every second and fourth Monday in Rm. 216.

Weight safety: Required course for employees wishing to use the weight room will be offered from 8-9:30 p.m. Call for next available class. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. Additional family members are \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Aikido: Introductory martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. Cost is \$35 per month. New classes begin the first of each month.

Step/Bench aerobics: Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Maidlow, instructor.

Ballroom dancing: Beginner classes meet from 7-8:15 p.m. Thursdays. Intermediate and advanced classes meet from 8:15-9:30 p.m. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Gilruth Home Page: Check out all activities at the Gilruth online at: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday and in the Bldg. 3 Exchange Store from 7 a.m.-4 p.m. Monday - Friday. For more information call x35350 or x30990.

Galveston Storm vs. Corpus Christi Sharks, Southwest Basketball League, 7 p.m. Nov. 7, Moody Gardens Convention Center, regular seating \$20, VIP seating \$40, on sale through Nov. 1.

EAA Wurstfest Bus Trip: Nov. 8, \$20, on sale through Oct. 31.

EAA Texas Renaissance Festival Bus Trip: Oct. 25 and Nov. 15, adults \$17.50; children (5-11) \$11; under 5 (but need bus seat) \$5; on sale through Nov. 14.

Texas Renaissance Festival: adults, \$12; children 5-12, \$5.50.

EAA Grand Casino Coshatta Bus Trip: Oct. 26, \$5, on sale through Oct. 17.

EAA Halloween Dinner/Dance: Oct. 25, \$15, on sale through Oct. 22.

Astroworld: \$19 Blue Light Special, valid only in Houston, through Jan. 4.

Moody Gardens: Tickets are \$9.50 for 2 of 4 events.

Seaworld: Adult \$27.25; children (3-11) \$18.25.

Space Center Houston: Adult \$8.95; children (4-11) \$6.40 JSC civil service employees free.

Movie discounts: General Cinema, \$5.25; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

Shirts: JSC logo T-shirt, \$10, polo style, \$23; International Space Station logo golf shirts, \$26 and \$28.

Stamps: Book of 20, \$6.40.

1998 Franklin Planner replacement refill orders being taken now.

Metro passes: Tokens and value cards available.

Book available: *Suddenly Tomorrow Came: A History of Johnson Space Center.*

Upcoming events: EAA Spring Break Ireland Trip: March 21-29, \$1,399 per person, double occupancy (\$200 deposit pre person, final payment due Jan. 21).

People on the Move

Human Resources reports the following personnel changes as of October 11:

New Management Assignments

Marilyn Sampay has been named as the deputy chief, Financial Management Division.

Additions to the Workforce

Linda Perez joins the Office of the Chief Information Officer as a computer engineer.

Bob Tepfer joins the Legal Office as an attorney.

Leo Perez joins the Applied Aerospace and Computational Fluid Dynamics Branch in the Engineering Directorate as an aerospace engineer.

Dave Jochim joins the Robotic Systems Test Branch in the Engineering Directorate as a mechanical engineer.

Ann Wood joins the Configuration Management Office in the International Space Station Program Office as a configuration management specialist.

John Shebalin joins the Payload Planning and Resources Branch in the International Space Station Program Office as a microgravity sciences discipline manager.

Chuck Ross joins the Medical Operations Branch in the Space and Life Sciences Directorate as a medical officer.

Promotions

Kelly Rubio was selected as a contracting officer in the Business Management Directorate.

Resassignments Between Directorates

Ed Walters moves from the Mission Operations Directorate to the Space Shuttle Program Office.

Alison Rickerl moves from the Mission Operations Directorate to the Safety, Reliability, and Quality Assurance Office.

Alan Brewer moves from the Mission Operations Directorate to the International Space Station Program Office.

Helen Dutton moves from the Mission Operations Directorate to the International Space Station Program Office.

Tom Kwiatkowski moves from the Mission Operations Directorate to the International Space Station Program Office.

Resassignments to Other Centers

John Carpenter of the Business Management Directorate moves to Ames Research Center.

Retirements

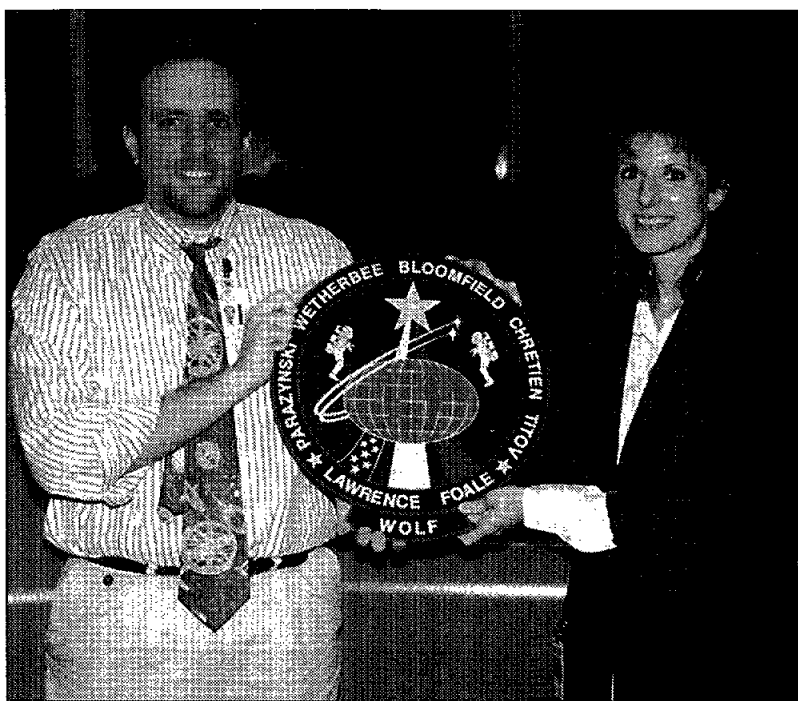
Susan Starkweather of the Business Management Directorate.

Gary Coultas of the Space Shuttle Program Office.

Resignations

Greg Aber of the Engineering Directorate.

Dayon Kane of the Engineering Directorate.



JSC Photo 97-14588 by

Roger Smith, STS-86 lead flight activities officer, left, and Yvette Shannon, STS-86 lead payload officer, prepare to hang the mission plaque after a successful shuttle-Mir docking mission.

Two teams share honor

Payloads, Flight Activities teams hang STS-86 plaque

The STS-86 mission plaque was hung by Lead Payload Officer Yvette Shannon and Lead Flight Activities Officer Roger Smith in recognition of the outstanding work done by both the payload and flight planning teams on a demanding and constantly changing flight.

"Due to failures aboard the Mir, there were late changes to the launch date, cargo complement, science equipment and even the crew manifest in the months and weeks prior to flight," said Lead Flight Director Paul Dye. "The work by the payloads organization, led by Yvette, was of the highest quality and proved to be totally accurate once the shuttle was in flight, despite cargo and science changes

that continued after liftoff.

"Likewise," Dye added, "the flight activity team led by Roger, was forced to contend with changes to the mission duration, assigned crew members, and constantly changing Mir attitude requirements in putting together the flight plan and attitude timeline. They were built in the final weeks before flight, accurately and completely filling the mission requirements, and despite their late generation, required few changes during the flight itself."

The mission plaque was hung by Shannon, with Smith holding the ladder, immediately after the handover of the vehicle from MCC-Houston to KSC post-landing.

JSC worker lands role in musical

By Lori Keith

NASA physicist Jerry Elliott, also known as J.C. High Eagle, will help Theatre Under the Stars kick off its 30th anniversary and final season at the Music Hall with Makin' Whoopee!, a jazzy remake of Florenz Ziegfeld's 1928 Broadway hit.

Elliott, of JSC's Technology Transfer and Commercialization Office, is a member of the show's large supporting cast. His character, the flute-playing High Eagle was specially created for this production, and all the flute music he plays are his original compositions. He also is the Native American cultural consultant for the play. His heritage is Osage/ Cherokee.



Elliott

Elliott is an award-winning poet, composer and musician. He has written more than 125 compositions and five of these have been performed at Carnegie Hall. He has appeared 20 times with the National Symphony at the Kennedy Center.

His list of credits also includes musical compositions and performances for the television series, Walker, Texas Ranger, and a documentary, The Last of the Medicine Men. He has written a screenplay, Sky People, and a new musical, Great Spirit.

The production will run from Oct. 30-Nov. 16. Show times are 8 p.m. Tuesday-Friday, 2 p.m. and 8 p.m. Saturdays, 2 p.m. and 7:30 p.m. Sundays. Tickets are priced from \$15 to \$48 and are on sale at the TUTS's box office, in the lobby of Corporate Plaza I, 2600 Southwest Freeway, off Kirby. Other ticket outlets can be located by calling 1-800-FIND-TIX.



Cal Seaman, Scott Hutchins and Dennis Davidson show off the "manhole cover-sized" medals they received for finishing the first annual Air Force Marathon.

Marathon celebrates Air Force anniversary

Three JSC workers recently participated in the first annual Air Force Marathon at Wright-Patterson Air Force Base, in Dayton, Ohio, in celebration of the U.S. Air Force's 50th anniversary.

Dennis Davidson of the Mission Operations Directorate, Scott Hutchins of the Space Shuttle Program Office, and Calvin Seaman of the EVA Projects Office, trained several months for the challenge and finished the race. Davidson, Hutchins and Seaman have been friends and colleagues for almost a decade, through their work both at

JSC, and as active members in the Air Force Reserve.

According to the trio, the race was well orchestrated and the pre-race spaghetti dinner was delicious.

"We got a really cool T-shirt and a finishers medal the size of a manhole cover," Seaman said.

Seaman said the hardest part was training during the hottest months of the year in Houston for a September marathon in Ohio. Although they had expected cooler weather for the race, they struggled through the "three Hs: heat, humidity, and hills."

More than 2,500 runners and wheelchair athletes participated in the Sept. 20 race.

The marathon followed a 26.2 mile course from the Air Force Museum, past the Wright Brothers Memorial, around the base flight line—once the site of Wilbur Wright Field established in 1917—through the Huffman Prairie Flying Field where Orville and Wilbur Wright honed their flying skills beginning in 1904, through parts of Wright State University, and finished up back at the Air Force Museum.

Dates & Data

Oct. 29

Astronomy seminar: The JSC Astronomy Seminar will conduct an open discussion meeting at noon Oct. 29 in Bldg. 31, Rm. 129. For more information, call Al Jackson at x35037.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Oct. 29 at Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at 281-333-6004 or Melissa Sommers at 281-332-0698.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Oct. 29 at the House of Prayer Lutheran Church. For more information, call Jeannette Darcy at x45752.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Oct. 29 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 281-282-4302 or Brian Collins at x35190.

Oct. 30

Radio club meets: The JSC Amateur Radio Club will meet at 6:30 p.m. Oct. 30 at Piccadilly Cafeteria, 2465 Bay Area Blvd. For more information, call Larry Dietrich at x39198.

Nov. 4

Quality society meets: The Bay Area Section of the American Society for Quality will meet at 6 p.m. Nov. 4 at Ramada King's Inn, NASA Road 1. John Gore will speak on "Total Quality Management in the US Coast Guard. For more information, call Ray Swindle at 281-335-6948

Nov. 5

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Nov. 5 in Bldg. 31, Rm. 129. Wes Kelley will speak on "An X-Prize Entry." For more information, call Al Jackson at x35037.

Communicators meet: The Clear

Lake Communicators will meet at 11:30 a.m. Nov. 5 at Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at 281-333-6004 or Melissa Sommers at 281-332-0698.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Nov. 5 at the House of Prayer Lutheran Church. For more information, call Jeannette Darcy at x45752.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Nov. 5 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 281-282-4302 or Brian Collins at x35190.

Nov. 6

Joint meeting: The International Council on Systems Engineering and the Society of Logistics Engineers will meet jointly at 6:15 p.m. Nov. 6 at South Shore Harbour Country Club. Dr. David Criswell will

discuss the "Institute of Space Systems Operations: Post-Doctoral Aerospace Fellowship Partnership with the NASA-JSC." Dinner costs \$10; call 244-0085 for reservations. For more information call Ken Zingrebe at x40085 or Robert McCormick at x35900.

Nov. 7

College of Engineering briefing: The University of Houston Cullen College of Engineering will host a briefing on graduate engineering opportunities at 10 a.m. Nov. 7 in Bldg. 45, Rm. 128. For details, call Kazuko Hall-Farley at x33075.

Nov. 8

Star Party: The JSC Astronomical Society and Challenger 7 Memorial Park on NASA Road 1 West invite the public to view the stars of fall from dusk until 10 p.m. Nov. 8. Telescope viewing and more will be free to the public. For more information contact Bill Williams at x32272.

Nov. 11

Aero club meets: The Bay Area Aero Club will meet at 7 p.m. Nov. 11 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

NPMA meets: The National Property Management Association will meet at 5 p.m. Nov. 11 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For details call Sina Hawsey at x36582.

Nov. 12

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Nov. 12 in Bldg. 31, Rm. 129. An open discussion is planned. details, call Al Jackson at x35037.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Nov. 12 at Lockheed Martin, 555 Forge River Road. For details, contact Richard Lehman at 281-333-6004 or Melissa Sommers at 281-332-0698.

NASA Briefs

NASA selects two small explorers

NASA has selected two new science missions to investigate flares on the Sun and the evolution of galaxies. The High Energy Solar Spectroscopic Imager will observe the Sun to study particle acceleration and energy release in solar flares. HESSI is scheduled for launch in 2000. The Galaxy Evolution Explorer will use an ultraviolet telescope during its two-year mission to explore the origin and evolution of galaxies and the origins of stars and heavy elements. The mission will launch in 2001. Selected as a mission of opportunity, the \$15 million Two Wide-Angle Neutral-Atom Spectrometers will be launched in 2001 or 2003 aboard a currently undesignated government mission. TWINS will provide stereo imaging of the Earth's magnetosphere.

Hubble uncovers galactic fireworks

NASA's Hubble Space Telescope has uncovered a spectacular fireworks show of stellar birth at the heart of a pair of colliding galaxies. As the nearest and youngest example known of this type of titanic cosmic encounter, this collision provides astronomers a unique opportunity for studying stellar formation produced by a catastrophic event in the cosmos. Such galactic collisions were probably more numerous billions of years ago, and Hubble's close-up view may offer a preview of what might happen to our own Milky Way galaxy in the distant future. Details are available on the Internet at: <http://opposite.stsci.edu/pubinfo/Latest.html>

Indefinite contracts available to centers

NASA's Goddard Space Flight Center has awarded multiple indefinite delivery/indefinite quantity contracts for satellite core-systems to support NASA's space science, earth science and technology needs. The awarded contracts will be open for use by all NASA centers and other government agencies. As NASA identifies missions, the contract holders will be given an opportunity to compete for providing the spacecraft. The following companies were awarded contracts: Ball Aerospace Systems Division, Boulder, Colo.; Lockheed Martin Missiles and Space, Sunnyvale, Calif.; Orbital Sciences Corp., Germantown, Md.; Space Systems/Loral, Palo Alto, Calif.; Spectrum Astro, Gilbert, Ariz.; Surrey Satellite Technology Ltd., U.K.; Swales Aerospace, Beltsville, Md.; and TRW Inc., Redondo Beach, Calif.

New logo symbolizes safety organization's pride, vigilance

The Safety, Reliability and Quality Assurance Office this month unveiled a new logo designed to recognize what the organization does and strives to accomplish.

The logo was designed by Dave Thelen of the Flight Systems Safety and Mission Assurance Division, selected from 19 entries by a panel of judges and voted on by the 600 SR&QA employees at JSC.

The outer perimeter depicts what the Safety, Reliability and Quality Assurance Office does. The region of the Earth shown is North America, with a star designating JSC's location. Views of the space shuttle, payload, space station and space walk-

ing crew member symbolize the principal JSC safety, reliability and quality assurance elements.

The eagle symbolizes pride in country, space program and work. The banner, "Ever Vigilant," is about the group's commitment to provide assurance to its customers — to employees concerning their work environment and to management concerning justifiable program risks.

Two more stars represent NASA's failures in the history of human space flight, the Apollo fire and the *Challenger* explosion, and serve as a reminder of the consequences if the organization is not vigilant in its responsibilities.



JSC Photo 97-14588 by Steve Candler
Dave Thelen, center, of the Flight Systems Safety and Mission Assurance Division, presents his design for the Safety, Reliability and Quality Assurance Office logo to SR&QA Director John Casper, right, and his assistant, Rich Dinkel.



Photo Courtesy Boeing
Sharon McDougale, a Boeing Flight Equipment Processing Contract employee, demonstrates the processing activities on the astronaut launch and entry suit for U.S. Rep. Nick Lampson, D-Texas.

Lampson reviews Boeing flight processing facility

U.S. Rep. Nick Lampson, who visited the Flight Equipment Processing Contract laboratory near JSC recently, said the personnel who process the flight equipment for NASA astronauts are doing outstanding work.

Lampson spent the day meeting employees, seeing first-hand the work that goes on in support of critical space hardware, and lending a hand with astronaut equipment processing.

"The Boeing personnel who process the flight equipment for our astronauts do an outstanding job," Lampson said. "It was a pleasure to spend the day with them and experience first-hand the skills they bring to bear in this critical area."

Lampson, whose Ninth Congressional District includes JSC, is on the House Science Committee and said he wants to learn as much as he can about the total impact of the space program on his district.

Lampson participated in processing activities on the extravehicular mobility unit, the 250-pound space suit used by astronauts during space walks. He also spent time with the launch entry suits—the orange "survival" suits worn by astronauts during launch and landing on each shuttle flight. In addition,

Lampson packed an astronaut clothing bag and personal hygiene kit for a crew member flying on the next shuttle flight, STS-87, scheduled for November.

"Spending a day on the job with people in my district gives me a chance to hear what issues are important to them, and to learn how they make their living," Lampson said. "There are thousands of men and women who don't work at the Johnson Space Center, but whose jobs are dependent upon our continued strong support for NASA."

Boeing was awarded the Flight Equipment Processing Contract in 1986 to test, maintain, repair, pack and ship astronaut equipment including space suits, crew communication items, cameras, tools, food, clothing and hygiene items. Today about 1,900 Boeing employees work on various programs in Houston including the International Space Station. Boeing was selected in August 1993 as prime contractor for the International Space Station.

"Congressman Lampson's visit to our operation was a very positive experience," said George Davis, Boeing FEPC program manager. "He left us with the impression he was interested in his constituents."

NASA Road 1 to close soon at Highway 3

NASA Road 1 will close briefly to all traffic in the near future to facilitate work on the railroad crossing at State Highway 3.

The closing had been scheduled for Oct. 27-28, but a new date has not yet been established.

Representatives of the Texas Department of Transportation and Union Pacific Railroad announced the closing for railroad crossing maintenance and upgrading last week after a meeting that also included representatives from JSC and the city of Webster.

Westbound NASA Road 1 traffic will be rerouted west on Sarah Deel to Hercules, then south on Hercules to State Highway 3, then east on Highway 3 to NASA Road 1. Eastbound traffic on NASA Road 1 will be rerouted along the same route.

JSC and contractor employees who use NASA Road 1 through Webster are encouraged to seek alternate routes if leaving the vicinity of JSC after 5:30 p.m. the day of the closure. The transportation department expects extremely heavy traffic along the detour route during the 12-hour closing period.

Abbey letter continues

(Continued from Page 1)

several ways for you to address safety issues and concerns (in preferred order):

0. STOP IT! Especially if there is imminent danger to life or health
1. Fix it yourself and submit a Close Call Report
2. Alert your supervisor and submit a Close Call Report
3. Submit a Close Call Report
4. Call the Safety Hotline 483-7500
5. Call the Center Director's Safety Hotline 483-1234
6. Submit an NSRS (NASA Safety Reporting System) Report

I have mentioned close call reports three times in this list because they are an easy way to help us prevent future mishaps. You may not have been seriously injured during your close call, but the next person who has the same problem could be seriously injured.

If we are to reduce injuries at the center and improve flight safety, managers, supervisors and employees must be sensitive to safety issues and address questions and issues that are raised regarding safety.

Thomas in Russia

(Continued from Page 1)

Thomas, recently in the U.S. for science training, returned to the Gagarin Cosmonaut Training Center in Star City, Russia, outside Moscow in early October. Joining Thomas on the return trip to Russia was astronaut Jim Voss, who will serve as Thomas' backup. Thomas' scheduled departure from Mir next May will conclude more than two years of continuous American presence on Mir, which began in March 1996 with the arrival of Shannon Lucid.

Sharipov will be assisting in the transfer of logistical supplies between the two vehicles. Selected as a cosmonaut in 1990, he completed training in 1992, qualifying as a crew commander. Sharipov was an Air Force pilot with experience flying the MIG-21 aircraft.



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Editor Kelly Humphries

STS-86 crew urges continued cooperation

(Continued from Page 1)

We just kept floating and floating and floating with this big long trailing wire behind us."

Bloomfield, back from his first mission, said he couldn't think of a more "fun" first flight and thanked all of the people on the ground who helped.

"We get all the attention, but all the credit goes to all the folks out there who helped us over the last nine months or a year, especially my family and friends and the training team," Bloomfield said.

The Russian on the crew, Titov, said he was glad to be back and reminded the crowd that Anatoly Solovyev, Pavel Vinogradov and American Dave Wolf are still in orbit with challenging work ahead.

"I'm very glad the Mir-shuttle program is continuing," he said. "We left

the crew on the station in good condition, physical and psychological condition."

Parazynski said: "STS-86 was the adventure of a lifetime for all of us. It was a highly complex mission that required flexibility on the part of the crew, the Phase 1 Program Office and also the flight control team."

Chrétien was exuberant about the performance of the space shuttle and echoed Foale's sentiments about international cooperation.

"*Atlantis* worked perfect," he said. "It worked like a butterfly, like the best race horse. I feel very honored to have been invited to participate in this great mission in which both the United States and Russia have demonstrated to the rest of the world that when two great countries want to do something in a very, very difficult

situation, they do it. I hope that my country and all the other countries who participate in the space program feel that honor and some kind of stimulation to keep their seat in that program."

Lawrence thanked the managers and workers who had made it possible for her to make the flight despite a last-minute switch with Wolf for the long-duration stay on Mir. She added that there was a plus side:

"The flyaround will be something I will never forget," Lawrence said. "Mir is an amazingly beautiful station from space. It is an inspiration for all of us who've been there to go on and work really hard for the International Space Station. The future is bright for us if we can continue down that path, especially continue down the path of joint cooperation with Russia."