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Chronology of KSC and KSC Related Events for 1991

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CHRONOLOGY OF KSC

AND KSC RELATED EVENTS

FOR 1991

BY KEN NAIL, JR.

KSC LIBRARY ARCHIVIST

FOREWORD

This 1991 Chronology is published to fulfill the requirements of KMI 2700.1 (as revised) to describe and document KSC's role in NASA progress.

Materials for this Chronology were selected from a number of published sources. The document records KSC events of interest to historians and other researchers. Arrangement is by date of occurrence, though the source cited may be dated one or more days after the event.

Materials were researched and prepared for publication by Historian-Archivist Ken Nail, Jr., of EG&G FLORIDA, Inc. The 1991 Chronology includes two appendices: (A) Shuttle Era Firsts (p. 261) and (B) Shuttle Landings at KSC (p. 263). A General Index (p. 264) and a Company Index (p. 274) have been included for added convenience to researchers, and each entry has been headlined.

Comment on the Chronology should be directed to the John F. Kennedy Space Center, LIBRARY-E, Kennedy Space Center, Florida, 32899.

Walter L. Covington
Center Services

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JANUARY

January 2: **CHILD-CARE FACILITY OPENS**

This morning the doors to Kennedy Space Center's child-care facility were opened for the first time. About 120 children of KSC employees have been registered and there is a waiting list for the infant room, according to **Michael Weissman**, Manager of the facility for Tutor Time Space Coast Inc. "The first day was really a delight. It all went very smoothly," Weissman said. NASA government employees have priority over contractors for available space in the child care facility. An industrial area security gate off Kennedy Parkway South was moved to keep the day-care center off secured property so that parents without KSC identification badges could get to their children. KSC security officers have been trained in emergency medical techniques for children. [Banke, FLORIDA TODAY, p. 1B, Jan. 3, 1991.]

KSC BAT PATROL

USBI Co. workers who rebuild Shuttle boosters are looking to bats for relief from Space Coast mosquitoes which pester them in their unscreened 10-story building. At a cost of $100, workers from USBI and the Brevard Museum of History and Natural Science will place three bat houses next to the USBI facilities. The three houses are expected to attract about ten wild bats who should consume about 600 mosquitoes per hour, according to Museum Curator **Merle Kuns**. [Jones, FLORIDA TODAY, p. 1A, Jan. 3, 1991.]

January 3: **ORBITER PROCESSING**

Today the payload bay doors of Discovery are to be opened and the Ku-Band antenna is to be deployed and checked. The forward reaction control system is scheduled to be installed this evening. The rudder speed brake has been inspected and redundancy checks are underway. Atlantis is scheduled to be powered up today and the payload bay doors opened. The number 3 auxiliary power unit is scheduled for installation today; the remote manipulator system will be installed over the weekend. Inspections of the nose cap are continuing. Technicians are setting up platforms in Columbia's aft compartment to begin post-flight inspections. Access to the crew cabin is being established and some tile operations are scheduled. Booster stacking operations are continuing for Atlantis' STS 37 mission. A new 17-inch liquid hydrogen disconnect is being installed on the external tank this week. [KSC SHUTTLE STATUS REPORT, Jan. 3, 1991.]

January 4: **CEA, INC. CONTRACT**

CEA, Inc. (Canton,MA) has been awarded a $534,000 contract for fiber-optic cable work at Kennedy Space Center. The small business firm will furnish and install one 144-fiber cable from a main communications switching center, the Vehicle Assembly Building Repeater (VABR) in the Launch Complex 39 area, to the Orbiter Modification and Refurbishment Facility (OMRF). Two cables of the same capacity will also be provided to run from the VABR to the Launch Control Center (LCC). A second part of the contract calls for the installation of two 36-fiber cables from

the VABR to the Lockheed Logistics Facility and a copper audio cable link to a weather instrumentation location. [Kristofferson, KSC NEWS RELEASE NO. 3-91, Jan. 4, 1991.]

SANTA CRUZ CONSTRUCTION CONTRACT

Santa Cruz Construction (Merritt Island, FL) was awarded a $144,294 contract by Kennedy Space Center for the installation of underground communications conduits and access manholes in the center's Industrial Area. The small business firm will install the conduits to provide a communications pathway under NASA Causeway East and to expand hardware capabilities for the KSC Operational Intercommunication System (OIS). The OIS provides communications links between the Space Shuttle Orbiter and payload processing facilities, the Launch Control Center and Launch Pads 39A and 39B. [Kristofferson, KSC NEWS RELEASE NO. 4-91, Jan. 4, 1991.]

SAUER, INC. CONTRACT

Sauer, Inc. (Jacksonville, FL) was awarded a Kennedy Space Center contract today worth $1.13 million for the removal of existing air handling units in the Vehicle Assembly Building and replacement with new models featuring computerized automatic temperature control. [Kristofferson, KSC NEWS RELEASE NO. 1-91, Jan. 4, 1991.]

TRITON MARINE CONSTRUCTION CONTRACT

Kennedy Space Center today awarded a $3.2 million contract to Triton Marine Construction (Houston, TX) for the rehabilitation and repair of four bridges at KSC. (See story below.) [Kristofferson, KSC NEWS RELEASE NO. 2-91, Jan. 4, 1991.]

DISCOVERY PROCESSING: STS 39

The forward reaction control system (FRCS) was installed overnight; an interface test of the system will be conducted tomorrow. The payload bay doors have been opened today and the Ku-Band antenna has been deployed for checks. Engineers are evaluating a problem with the pilot's attitude director indicator, a navigation aid that gives the crew information about the Orbiter's attitude in terms of pitch, yaw and roll. Exhaust ducts of the three auxiliary power units were tested and the data are being evaluated. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]

ATLANTIS: GPC INSTALLATION

Atlantis is powered up today for routine tests. The new general purpose computers are being installed in the Orbiter. Connections of the number 3 APU are continuing. The remote manipulator system is at the OPF and remains scheduled for installation this weekend. Instrumentation is being installed for the flutter buffet modification. Booster stacking operations are continuing. The left

aft center segment is being mated to the left booster today. The left forward center segment is scheduled for mating early next week. Technicians are aligning the new 17-inch liquid hydrogen disconnect in the proper position on the external tank. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]

STS 35 (COLUMBIA) PROCESSING

Technicians removed the sleep stations from Columbia's crew cabin yesterday. Tiles are being waterproofed and post-flight inspections in the aft compartment have commenced. [KSC SHUTTLE STATUS REPORT, Jan. 4, 1991.]

January 7: DELTA 2: FIRST 1991 LAUNCH

A NATO communications satellite was the first payload lifted to orbit in 1991 aboard a Delta 2 rocket at 7:53 p.m. tonight. The Cape Canaveral Air Force Station launch had been delayed 68 minutes due to overcast skies caused by the presence of two thunderstorms moving over Central Florida. **Don Tutwiler**, Director of the McDonnell Douglas Delta Launch Vehicle Division, said, "Launching was like threading a needle." Built by Marconi Space Systems and British Aerospace, the $110 million dollar NATO satellite will allow political leaders to communicate with each other and with the organization's Brussels, Belgium, headquarters. [Brown, FLORIDA TODAY, p. 1A, Jan. 7, 1991, and Brown, FLORIDA TODAY, p. 2A, Jan. 8, 1991.]

January 8: SHUTTLE FLOW DIRECTORS NAMED

Kennedy Space Center recently named flow directors for the Space Shuttle Orbiters Discovery and Endeavour. **John J. "Tip" Talone** has been named as the Flow Director for NASA's newest Orbiter, Endeavour, which is undergoing construction in Palmdale, CA. **John C. "Chris" Fairey** has been chosen as Flow Director for Discovery. [Malone, KSC NEWS RELEASE NO. 5-91, Jan. 8, 1991.]

January 10: ATLANTIS WINDOW REPLACEMENTS

Both Atlantis and Columbia suffered some damage to their windows during their most recent missions; two windows must be replaced on Atlantis at a cost of approximately $200,000. A window on Columbia is also suspect. "Whatever it is [that is damaging the windows], it's pulverizing itself when it hits the window. With the heat and the intensity it creates, it often just disappears," according to NASA Structures Engineer **Gennaro Caliendo**. Kennedy Space Center technicians have already begun replacing the windows on Atlantis at either end of the cockpit. Atlantis returned to Earth with more damage to its windows and heat protection tiles than experienced on previous missions. **Calvin Schomberg**, Projects Office Engineer at Johnson Space Center, said that most of the damage was confined to the front end of Atlantis so that he thought it had occurred during launch or landing. [Banke, FLORIDA TODAY, p. 2A, Jan. 11, 1991.]

January 11: **STS 39 PROCESSING: DISCOVERY**

Power on testing of Discovery continues today. Ammonia boiler servicing is scheduled to resume today also. The high bay of the OPF will be cleared for this operation. Results of the routine leak checks on the main propulsion system are reported good. Auxiliary power unit leak and functional checks indicate possible lube oil seepage around APU number 2. Repressurization tests and additional analysis will be performed. Potable water servicing and main engine heat shield and carrier panel installation continues today. Elevon cove leak checks are complete. OMS pod verifications are scheduled to continue this weekend. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 11, 1991.]

[] **OPF BAY 2: ATLANTIS PROCESSING**

Fuel cell power reactant and storage distribution system tests and liquid hydrogen leak and functional tests continue today. APU leak and functional tests and final connection operations are also continuing. The outside pane of Atlantis' window number 1 has been removed. The seals are currently being cured for installation of the replacement pane. Window number 6 will be changed out next week. In the Vehicle Assembly Building, the left forward solid rocket booster segment was lifted and mated to the existing segments on the mobile launcher platform in high bay 3. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 11, 1991.]

January 12: **KIT SPEEDS PROCESSING WORK**

NASA contractors are borrowing an idea from the airline industry which involves gathering the parts a technician needs for a specific task in advance, gathering them on a tray and delivering the complete "kit" to the worker's post. The idea has enabled KSC technicians to exercise increased efficiency in processing Shuttles for launch. "You can't ever process the Shuttle like an airplane. It's just too complex," said Pan Am World Services Manager **Don Baumann**, "but you can borrow ideas from the airlines and apply them here." The system will be adapted for about 250 routine Shuttle processes. [Banke, FLORIDA TODAY, p. 10E, Jan. 13, 1991.]

January 15: **PAYLOAD STATUS REPORTS**

The Tethered Satellite (TSS, STS 46) has been undergoing receiving inspection and initial tests in an off-line laboratory of the payload Operations and Checkout Building. Hardware associated with the TSS deployer is currently being integrated onto the pallet as well as integrating some associated experiments onto the mission peculiar support structure (MPESS). The first fit check of the satellite with the deployer is scheduled to occur January 17 and will extend until January 22. A second fit check will also be scheduled for later this month or during February. Today the alignment of the Gamma Ray Observatory's two sun sensors is being conducted. Fueling of GRO (STS 37, Atlantis) for its on-orbit activity was completed January 10 as scheduled. A total of 4200 pounds of monomethylhydrazine was loaded aboard (three to four times more fuel than is

required by most spacecraft). This large quantity of fuel will permit extended mission operations. Yesterday and today, work has been underway to remove the GRO's test batteries and install the six nickel cadmium flight batteries which are housed in two modular power supply units (MPS). The MPS units will be installed on the spacecraft tomorrow. The Instrument Switching Unit (ISU) which was removed on December 23, 1990, shipped to TRW, repaired and retested was reinstalled on the spacecraft yesterday. Integration and system tests are scheduled to start January 18. The ISU contains circuitry which controls electrical signals to various equipment throughout the Observatory which will be moved from the Payload Hazardous Servicing Facility (PHSF) to the Vertical Processing Facility (VPF) on February 6 for final tests and processing for integration with Atlantis. Final assembly, functional testing, and rf system testing of the Inertial Upper Stage for TDRS-E - STS 43, Discovery - has been completed by the Air Force/Boeing test team on Cape Canaveral Air Force Station. IUS buildup operations are scheduled for completion in mid-February. Due to possible limited availability of military aircraft due to the Persian Gulf situation, TDRS-E may be shipped early to KSC from the TRW plant in California. [PAYLOAD STATUS REPORT, Jan. 15, 1991.]

STS 39 PROCESSING

Cross feed lines of the orbital maneuvering system pods have been connected and leak check operations on those lines continue today. Final checks of the power reactant storage and distribution system (PRSD) and water spray boiler will also be conducted today. Following final tests on the auxiliary power units, all three APUs have been cleared for flight with final pressurization decay checks to continue as scheduled. Potable water sampling tests take place today. Several days of hydraulic operations are scheduled this week. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

ATLANTIS: APUS INSTALLED

Installation of APU number 3 was completed last night and the OPF Bay 2 was reopened for normal processing operations. PRSD fuel cell operations continue and the water spray boiler has been installed. Main propulsion leak testing continues. Work to replace window number 6 is on schedule. Hydraulic fill and bleed operations will be conducted this week following hydraulic operations on Discovery. In the Vehicle Assembly Building, the left forward solid rocket booster segment was pinned to the existing segments on the mobile launcher platform in high bay 3. The right aft segment will be taken to the VAB today with stacking operations scheduled for later today. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

COLUMBIA PROCESSING

Aft flight deck reconfiguration of Columbia continues today. Both left and right landing gear strut checks are in process; tile work also continues today. [KSC SHUTTLE PROCESSING STATUS REPORT, Jan. 15, 1991.]

January 16: DISCOVERY PROCESSING-OPF BAY 1

Scheduled operations continue in the Orbiter Processing Facility this week. Leak and functional tests on the auxiliary power units have been completed. Checks of Discovery's twin orbital maneuvering system pods cross feed lines continue today. The OMS actuator was checked out yesterday without any problems identified. Extensive integrated Orbiter hydraulic operations are underway and are expected to last throughout the week. Hydraulic operations today include functional testing of the landing gear, brakes and nose wheel steering. Rollout of the vehicle to the Vehicle Assembly Building is scheduled for no earlier than January 29. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 16, 1991.]

[] STS 39: APU 3 ASPIRATED

The exhaust on auxiliary power unit number 3 of Atlantis will be aspirated today as retesting on the unit continues. Hydraulic fill and bleed operations will be conducted tonight following today's hydraulic operations on Discovery. Main engine installation is currently scheduled to begin this weekend. The two OMS pods are currently located in the Hypergolic Maintenance Facility. There, work to install thrusters on the right hand pod is underway as final quick disconnect checks on the left hand pod continues. In the Vehicle Assembly Building high bay 3, build up of the right solid booster segments continues on the mobile launcher platform. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 16, 1991.]

January 17: VISITOR ACCESS RESTRICTED

The start of war in the Persian Gulf has already impacted Kennedy Space Center. Visitor access to Cape Canaveral Air Force Station has been stopped indefinitely by military officials because of increased security there. Self-guided tours of the Cape's Air Force Space Museum on Sundays have also been suspended. Spaceport USA tours of Kennedy Space Center will continue, however. KSC officials said that 27 space center workers had been activated as reservists and a support group for dependents was beginning to be organized. "A lot of NASA people were called to active duty so we have a special reason to hope for an early, successful conclusion of the operation," said NASA Administrator **Richard Truly**. "My admiration for the men and women in the Gulf knows no bounds and they have the full support of NASA." KSC Director **Forrest S. McCartney** said, "The people who were called are important members of the team and we're looking forward to them coming home. It's regrettable we live at a time when these kinds of crises happen." ["NASA Restricts Visitor Access," FLORIDA TODAY, p. 4A, Jan. 18, 1991.]

[] STS 39 PROCESSING: DISCOVERY

Scheduled operations continued today in the Orbiter Processing Facility at Kennedy Space Center. Water spray boiler servicing has been completed and

hydraulic operations continued in progress. Yesterday, brake anti-skid tests and landing gear functional tests were completed. Discovery's two orbital maneuvering system pods continue to undergo checks today. Sleep station installation operations are currently being worked. During helium purge operations last night, engineers determined there may have been hydraulic fluid introduced into the high pressure oxidizer turbopump on main engine number three. Crews will analyze the potential problem and make further evaluations tomorrow. Rollover of Discovery to the Vehicle Assembly Building remains scheduled for no earlier than January 29. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]

STS 37 PROCESSING: ATLANTIS

Hydraulic fill and bleed operations on Atlantis were conducted successfully last night along with checks of the nose wheel steering mechanism. Hydraulic operations will continue throughout the remainder of the week. Main engine installation is currently scheduled to begin this weekend. In the Vehicle Assembly Building High Bay 3, buildup of the right solid rocket booster segments continued on the mobile launcher platform. The right aft center segment will be delivered to the VAB today. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]

STS 40 PROCESSING: COLUMBIA

The ground service equipment was installed in the payload bay of Columbia last night as crews today continued with plans to remove the provisions stowage assembly (PSA) from the bay. Preparations also continued to access the dump line nozzle in the waste management system for failure analysis. Columbia is scheduled to be moved to the Orbiter Processing Facility later this month following the rollover of Discovery from the VAB. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 17, 1991.]

PAYLOAD STATUS REPORT

Pre-flight checkouts and testing of the STS-39 (Discovery) payloads continue to proceed on schedule in both the Orbiter Processing Facility (OPF) and the Vertical Processing Facility (VPF). The CRO and MPEC payloads are mounted in the forward section of Discovery's payload bay and are undergoing checkouts in the OPF. AFP-675, IBSS/SPAS-2 and STP-1 are hanging vertically in the VPF. The IBSS/SPAS-2 End-to-End Test and Interface Verification Test and STP-1 End-to-End Test were all satisfactorily completed this week. These three payloads are scheduled to be transported from the VPF to the launch pad on February 1. No significant problems are being worked on the Space Life Sciences-1 payload for STS-40, currently scheduled for launch in May 1991. A three-day long health check of the SLS-1 experiments and module should be completed by the end of the week. SLS-1 is scheduled to be transported from the Operations and Checkout Building and implemented from the Columbia at the OPF on or about March 7. Checkouts and testing of the International Microgravity Laboratory-1

(IML-1) elements continues inside the Operations & Checkout Building High Bay. The IML-1 payload for STS 42 was transferred to the Spacelab Integration area in Test Stand 2. The IML-1 floor and experiment rack integration is underway. The integration of #7 SL-J (Spacelab-J) rack (STS 47, August 1992) is proceeding inside the Operations & Checkout Building High Bay. Representatives from both NASDA and Mitsubishi Heavy Industries are on-hand and assisting with the operations. [KSC PAYLOAD STATUS REPORT, Jan. 17, 1991.]

[] HYDRAULIC FLUID CONTAMINATION: DISCOVERY

One of Discovery's turbopumps may be contaminated by the infiltration of a small amount of hydraulic fluid, according to Kennedy Space Center spokesman **Bruce Buckingham**. "Any amount of fluid is enough to contaminate the turbopump. They think that probably happened," he said. If contaminated, the turbopump must be replaced; alternatively, the entire engine may be swapped for one from another Shuttle. Any replacement work would be undertaken at Launch Complex 39A after rollout, Buckingham said. Presently, Discovery is scheduled to be rolled over to the Vehicle Assembly Building from the Orbiter Processing Facility on January 29; the STS 39 mission is scheduled for February 26. Discovery's payload which includes experiments for the Strategic Defense Initiative Organization and Air Force Space Systems Division, will be rolled to the launch pad February 1. [Banke, FLORIDA TODAY, p. 10A, Jan. 18, 1991, SEE ALSO: Glisch, THE ORLANDO SENTINEL, p. A-6, Jan. 18, 1991, Brown, FLORIDA TODAY, p. 10A, Jan. 24, 1991, and Date, THE ORLANDO SENTINEL, p. A-5, Jan. 24, 1991.]

January 18: DISCOVERY PROCESSING

Crossfeed leak checks between the twin orbital maneuvering system pods of Discovery and the forward reaction control system will be made today. Final hydraulic checkouts are scheduled for early completion today with flight controls and main engines undergoing final cycling operations. After these operations, the main engine locks will be placed on the three engines to allow workers an opportunity to further check the high pressure oxidizer turbopump on engine number 3 for possible hydraulic fluid contamination. Results of this inspection are expected tonight. [See stories below.] Rollout of the Orbiter to the Vehicle Assembly Building is currently planned for the end of the month. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 18, 1991.]

[] ATLANTIS PROCESSING STATUS

Hydraulic operations for Atlantis' STS 37 mission continue today. The payload bay doors will be cycled closed then reopened today for K-U Band testing. Preparations for the main engine installation are also underway. SSME installation is scheduled to begin January 20. In the hypergolic maintenance facility, fifth flight checks continued on the left hand orbital maneuvering system pod. The forward reaction control system (FRCS) is undergoing functional test this week. Installation of the FRCS into the Orbiter is targeted for late next week.. In the

Vehicle Assembly Building's High Bay 3, building of the right solid rocket booster continued on the mobile launcher platform. The right aft center segment will be lifted and mated to the stack tonight. [KSC SPACE SHUTTLE PROCESSING STATUS REPORT, Jan. 18, 1991.]

January 19: **NO CONTAMINATION FOUND**

Inspections concluded late on yesterday showed that no hydraulic fluid contamination of Discovery's main engine turbopump, according to Kennedy Space Center officials. The engine will not have to be replaced. "Everything seems to be OK and work is proceeding on schedule," said KSC spokesman **Bruce Buckingham**. Last week technicians purged Discovery's No. 3 engine with gaseous helium while testing for evidence of hydraulic fluid contamination. [Banke, FLORIDA TODAY, p. 11A, Jan. 20, 1991.]

January 20: **SUPPORT GROUP AT KSC**

Employees at Kennedy Space Center with family or friends in the Persian Gulf have been given the opportunity to form a support group. A meeting held on January 22 in the training auditorium will inform workers of the types of assistance local communities are offering to help people to cope with the war in the Middle East. EG&G Florida Inc.'s Dr. **Bud Ferguson** will guide the workers in forming the groups which would meet in offices or homes off space center property to allow for non-employees to attend their meetings. KSC managers have identified at least 27 workers who have been called to active duty as part of the military reserves and all of these had already been sent overseas before hostilities commenced on January 16. Information about the support groups is available at KSC by calling 867-7398. [Banke, FLORIDA TODAY, p. 4A, Jan. 21, 1991.]

January 22: **SPC EVALUATION WORST IN 4 YEARS**

NASA officials today disclosed that its Shuttle Processing Contractor - Lockheed Space Operations Co. - received 89 points of a possible 100 on its recent evaluation, the worst such evaluation in four years. As a result, Lockheed's rating fell from "excellent" to "very good." A number of shuttle processing accidents contributed to the lower rating. Lockheed President **Doug Sargent** said, "Naturally, we are very disappointed to receive a lowered grade for our performance during this period, but I would totally reject any implication that the overall quality of our work has eroded." Lockheed spokesman **John Williams** said, "The tone of the report is that our overall performance was absolutely superb, but it was marred by the occurrence of a few specific incidents. We're doing everything in our power to assure such incidents don't recur," he said. The incidents included: Extensive damage to one of Atlantis' three fuel cells when a Lockheed technician erroneously capped a fuel cell vent, allowing too much pressure to build up. Repair cost $3.1 million. One of Discovery's payload bay doors was accidently bent when Lockheed workers moved ground support equipment attached to the door; the door was not seriously damaged. One of Discovery's thrusters was accidentally dropped in a Shuttle Processing Hangar at a cost of $100,000. A

cooling line in Discovery's payload bay was dented when a technician left a ladder leaning against the three-quarter-inch diameter line. The line was replaced. Kennedy Space Center investigations determined that the primary cause of these incidents was inadequate training and improperly written work procedures, along with a failure to follow proper procedures. [Brown, FLORIDA TODAY, p. 17C, Jan. 23, 1991.]

January 25: **DISCOVERY TRANSFER DELAY**

Problems with Discovery's steering thrusters may delay the Orbiter's transfer from the Orbiter Processing Facility to the Vehicle Assembly Building, according to Kennedy Space Center spokeswoman **Lisa Malone**. "We're still looking at the thrusters. We won't know if we'll have to replace them until after we've looked at the results of tests planned for this weekend," she said. She added that spare thrusters are available at KSC. [Banke, FLORIDA TODAY, p. 8A, Jan. 23, 1991, Banke, FLORIDA TODAY, p. 6A, Jan. 25, 1991, Banke, FLORIDA TODAY, p. 6A, Jan. 26, 1991.]

INTERNATIONAL TRAVEL CURTAILED BY WAR

"All international travel should be discouraged until the Middle East situation can be better assessed," according to a recent KSC Bulletin distributed last week. Kennedy Space Center spokesman **Bruce Buckingham** said that NASA officials have curtailed travel overseas in light of hostilities in the Middle East. Workers from the space center will staff NASA's three European and African emergency landing sites during the STS 39 mission. Only workers required for the actual operation, however, will travel to those sites. Put on indefinite hold are plans to train new workers at the overseas landing fields, according to Buckingham. [Banke, FLORIDA TODAY, Jan. 26, 1991.]

January 26: **GENERAL PURPOSE COMPUTERS**

"We're really looking forward to these new computers," said **Ron Dittemore**, lead Flight Director for the upcoming STS 39 Discovery mission. The new computers are upgraded general purpose computers that work three times faster and hold twice the memory of their predecessors; the computers have been installed in both Atlantis and Discovery. Columbia will receive its new computers after its scheduled Spacelab mission in May, according to **Frank Littleton**, Manager of the Orbiter Avionics Systems Office at Johnson Space Center (Houston, TX). Littleton said the software for the new GPC's is essentially the same as that used previously on Orbiter computers. [Banke, FLORIDA TODAY, Jan. 27, 1991.]

ENDEAVOUR TO ARRIVE IN MAY

The newest Space Shuttle - Endeavour - is essentially finished and will arrive at Kennedy Space Center in May. "It looks good," according to **John "Tip" Talone** who has been assigned as NASA's Processing Manager for the Orbiter. Talone said, "When you see an Orbiter with all the new tile on it, clean as a whistle, it's

pretty impressive." Talone's counterpart with the Shuttle Processing Contractor Lockheed Space Operations Co. is **Eric Clanton.** When Endeavour arrives, its three main engines and two orbital maneuvering system pods will be installed at KSC. Lockheed might need to hire additional contractor technicians to meet the work demand imposed by the larger fleet, according to Clanton. "That's an additional demand on Lockheed as a company, so I'm sure there will be some resource build up, but not all of those people will go directly to Endeavour. You'll see a mix of experienced and inexperienced people working on Endeavour." **John Fairey**, formerly a Shuttle Project Engineer, will be Discovery's new Flow Director. He says there won't be much increase in NASA jobs. "There were conscious decisions made a couple of years ago to increase those numbers, start hiring and training, get people certified and experienced, so that when the Endeavour team had to be formed there would be resources to pull from," he said. [Banke, FLORIDA TODAY, pp. 9E-10E, Jan. 27, 1991.]

BRIDGE REPAIRS AT KSC

Triton Marine Construction (Houston, TX) has been awarded a $3.2 million contract for the repair of four bridges at Kennedy Space Center. The four bridges are: the NASA Causeway West drawbridge crossing the Indian River and the NASA Causeway East drawbridge over the Banana River. A bridge on Kennedy Parkway North spanning Haulover Canal and the JJ railroad bridge providing a rail link from the Florida mainland across the Indian River are also included in the new contract. ["KSC Bridges Under Repair," FLORIDA TODAY, p. 10E, Jan. 27, 1991.]

January 28:

CHALLENGER COMMEMORATED

"We will never forget them," said NASA Administrator **Richard Truly**, speaking of the Challenger crew who lost their lives five years ago today in the nation's worst space accident. Flags were lowered to half-staff and for 73 seconds - the length of Challenger's flight on January 28, 1986 - the entire Kennedy Space Center paused in its work to honor the memory of the seven members of the Challenger crew. The crew consisted of Commander **Dick Scobee**, Pilot **Michael Smith**, Mission Specialists **Judy Resnik, Ronald McNair, Ellison Onizuka**, Payload Specialist **Gregory Jarvis** and Teacher in Space **Christa McAuliffe**. Truly went on to say, "In the 28 months since we returned to flight, the Shuttle has flown safely 13 times. The Shuttle's performance on every one of these flights has been outstanding, and flight safety has been the keystone of our success. Kennedy Space Center Director **Forrest S. McCartney** spoke center-wide via closed-circuit television to 18,000 employees during the fifth annual commemoration ceremony. McCartney said, "The entire work force has committed itself to doing everything we possibly can to minimize the risk associated with this type of operation. We've performed modifications on all three of the Orbiters to make them safer to fly." [Dowling, STAR-ADVOCATE, p. 3A, Jan. 23, 1991, Date, THE ORLANDO SENTINEL, p. A-12, Jan. 27, 1991, "Hunting for the Hunters of Challenger Debris," THE ORLANDO SENTINEL, p. A-12, Jan. 27, 1991, Banke, FLORIDA TODAY, Jan. 28, 1991, "Challenger Families Don't Want to Dwell On Negative Memory," THE

ORLANDO SENTINEL, p. 6A, Jan. 28, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, Jan. 29, 1991. See Also: Glisch, THE ORLANDO SENTINEL, pp. A-1 and A-9, Jan. 28, 1991, Moore, THE ORLANDO SENTINEL, p. A-9, Jan. 28, 1991, and Gallagher, THE ORLANDO SENTINEL, p. B-3, Jan. 29, 1991, Dowling, STAR-ADVOCATE, p. 3A, Jan. 30, 1991.]

[] **DISCOVERY: LEAKY STEERING THRUSTER**

A one to four-day delay is expected in the launch of Discovery due to a leaky steering thruster discovered by technicians processing the Orbiter for its planned February 26 mission. The leak was found in one of 44 steering thrusters which are used by Discovery to maneuver while in orbit. These maneuvers are especially critical in Discovery's upcoming mission. Spare thrusters are available at Kennedy Space Center and the replacement operation is one which has been successfully completed by KSC technicians in the past. Two other thrusters might have to be replaced; one is suspected of leaking and the other is thought to have a bad weld. [Halvorson, FLORIDA TODAY, p. 1A, Jan. 29, 1991.]

January 29: **DISCOVERY GROUNDED TILL MARCH**

The STS 39 mission aboard Discovery will be launched no earlier than March 7 because of problems with three of the Orbiter's jet thrusters, according to NASA spokesmen. Two of three steering thrusters are being replaced because of leaks and a third is being swapped out because of a bad weld. The thrusters are critical when an Orbiter makes its descent through the Earth's atmosphere. Discovery's transfer from the Orbiter Processing Facility to the Vehicle Assembly Building has been delayed until February 7. [Halvorson, FLORIDA TODAY, p. 8A, Jan. 30, 1991.]

January 30: **PLAYALINDA BEACH ROAD CONSTRUCTION**

Construction on the $3.9 million Playalinda Beach Access Road Project began last December and will be completed by 1993. The project includes the road itself, a four-mile stretch of NASA railroad and a new ranger station. Construction of the new access road will cause the closing for six weeks of the Max Hoeck Wildlife Drive. According to Canaveral National Seashore Superintendent **Wendell Simpson**, the Hoeck Drive will become the new route for access to the southern end of the seashore. National Parks Service Supervisor **Amy Schneckenburger** said, "This phase of construction involves filling and grading of road material as the contractor prepares the road to handle one-way traffic. Once the road has been widened, we will be diverting west-bound traffic from the beach onto the old wildlife drive so that construction of the new section of railroad can begin." The wildlife drive is expected to be reopened to traffic by mid-March. ["Road Construction Begins," STAR-ADVOCATE, p. 3A, Jan. 30, 1991.]

[] **THRUSTER WORK BEGINS**

Today Space Shuttle technicians will begin the simultaneous replacement of the

three suspect steering thrusters in Discovery, according to Kennedy Space Center spokeswoman **Lisa Malone**. "It will be the first time we've changed out three at the same time," she said. Installation is expected to be completed late tomorrow. The replacement thrusters were tested this week at KSC's Hypergolic Maintenance Facility. [Halvorson, FLORIDA TODAY, p. 8A, Jan. 31, 1991.]

[] SPACEPORT USA CLOSED TEMPORARILY

An abandoned backpack found at Spaceport USA occasioned the closing of Kennedy Space Center's visitor's center while security officers investigated the backpack. Ordnance experts gathered outside the attraction's main entrance at about 9:30 a.m. for the investigation. Spaceport USA was evacuated after specially trained dogs indicated the bag might be dangerous. KSC's spokesman **Mitch Varnes** said that a Czechoslovakian tourist, who did not respond to public-address announcements because he didn't understand English, returned to the area to reclaim his backpack shortly after its discovery. He emptied the pack for security officers, who determined there was no danger. The visitors center was reopened about 10:10 a.m., according to Varnes. "This would have been suspicious under any circumstances, but the heightened security out here [because of the war in the Persian Gulf] just amplified the situation. Everyone's more alert," Varnes said. ["Spaceport Officers Check Out Backpack," FLORIDA TODAY, Jan. 31, 1991.]

January 31: SPACEPORT USA TOURS CONTINUE

An increased awareness of security considerations has been experienced at Kennedy Space Center due to recent military action in the Middle East. However, visitor operations at Spaceport USA have not been affected. Two hour bus tours of Kennedy Space Center continue at regular intervals throughout the day. Currently on display is Ambassador, a full-scale replica of a Space Shuttle Orbiter. The replica can be boarded to allow visitors an opportunity to see the working environment NASA astronauts experience aboard the Atlantis, Columbia and Discovery; it will be on display continuously through mid-April 1991. During January, Spaceport USA was visited by 184,004 persons which was 16% less than the January 1990 total of 221,106. [SPACEPORT USA PRESS RELEASE NTO581, Feb. 5, 1991.]

FEBRUARY

February 1: DISCOVERY'S THRUSTERS REPLACED

Discovery's three faulty steering thrusters were replaced today with new thrusters and testing of the units began at Kennedy Space Center. Two of the thrusters were replaced due to leaks and the third because of a bad weld. "We were pleased with the way the thruster change-out went," reported KSC spokeswoman **Lisa Malone**. "We're going to do some tests on the new thrusters this weekend. We should be through with all of this on Sunday." The thruster replacement caused the delay of the planned February 24 launch of Discovery on an eight-day Department of Defense mission. NASA also reported that filters in the waste management system were replaced on Discovery. The filters had deteriorated due to their age. Filters were also replaced on Atlantis and Columbia, said Malone. [Halvorson, FLORIDA TODAY, p. 2A, Feb. 2, 1991.]

February 2: GAMMA RAY OBSERVATORY

When the Gamma Ray Observatory arrives at the Vertical Processing Facility next week, it will carry 4,200 pounds of hydrazine - a record. "In my recollection, it's the largest hydrazine load that we've ever carried on a spacecraft," according to **Tom Breakfield**, Director of Shuttle Payload Operations. All of the spacecraft's systems will by tested by NASA technicians before the GRO is moved out to Launch Complex 39B where it will be installed in Atlantis's cargo bay. Later, a series of tests to verify electrical connections between the cargo and Atlantis will be conducted; liftoff is targeted for April 4, 1991. [Halvorson, FLORIDA TODAY, Feb. 3, 1991.]

February 3: DISCOVERY'S DOD MISSION

When Discovery launches in March it will be the first unclassified Department of Defense mission. The mission is devoted to collecting information needed to develop a space-based defense system. The Orbiter will act as an orbital observation post for celestial and manmade phenomena, but also as the subject of experiments. A free-flying science platform, part of the Strategic Defense Initiative, will monitor rocket firings, supply water dumps and other Orbiter activities. The STS-39 crew will arrive at Kennedy Space Center to participate in a two-day practice countdown presently scheduled for February 13-15, according to KSC spokesman **George Diller**. The crew is commanded by veteran astronaut **Mike Coats** and includes five space rookies. [White, FLORIDA TODAY, Feb. 4, 1991.]

February 4: NEW THRUSTER TO BE REPLACED

One of three new steering thrusters recently installed in Discovery may have to be replaced due to a faulty heater. The problem was uncovered in tests undertaken after the thrusters were installed. "We're evaluating why it failed and whether it can be repaired," said Kennedy Space Center spokeswoman **Lisa Malone**.

Managers will decide whether to replace the thruster tomorrow; replacement will force at least a 24-hour delay in moving Discovery into the Vehicle Assembly Building. The seven-man crew is expected to arrive at KSC for a two-day practice countdown February 13-15. [Halvorson, FLORIDA TODAY, p. 1B, Feb. 5, 1991.]

KSC CONSTRUCTION BUDGETED

The fiscal 1992 budget submitted by **President Bush** to Congress today includes millions of dollars for construction projects at Kennedy Space Center. "There's quite a bit going on down (at KSC) now, and I think you'll see us continue to improve the capabilities we have there," according to **J. R. Thompson**, NASA's Deputy Administrator.

KSC projects include:

*Construction of a Space Station processing facility. The budget calls for an expenditure of $35 million in 1992; NASA plans to award a $56.2 million construction contract to Metric Constructors Inc. (Tampa, FL) over three years.

*Modifications of a bay in the Vehicle Assembly Building. The proposed budget calls for $7.5 million to so modify the bay that it can store Shuttle Orbiters when no room is available in the Orbiter Processing Facility.

*Refurbishing the KSC crawlerway; the budget allots $3 million to continue refurbishment of the surface of the crawlerway. The entire refurbishment is expected to cost $10 million.

*Restoration of Shuttle Landing Facility shoulders. The Bush budget calls for the expenditure of $4 million to restore the shoulders of the 15,000-foot runway.

Speaking at a press conference, NASA Administrator **Richard Truly** said the overall NASA budget "provides for two significant new initiatives : a New Launch System jointly developed with DOD to provide a range of cargo capacities including heavy lift, and LIFESAT, a multi-launch recoverable biosatellite to help determine radiation protection requirements for long-duration space flight. The budget also proposes to initiate a new program, Assured Shuttle Availability, that will improve our ability to identify and incorporate high-priority improvements into the Shuttle. But the overwhelming majority of this budget - 99 percent - supports programs that have already been approved," Truly said. He went on to say that the budget increases are "required to begin implementing the recommendations set forth last December by the Advisory Committee on the Future of the U. S. Space Program, chaired by **Norman Augustine**...A number [of the Augustine Report goals] have already been implemented by NASA and others will follow. But it is important to remember that many of the most critical elements of the Augustine Report are resource-dependent and will require the support of Congress. [Hasson, FLORIDA TODAY, p. 8A, Jan. 31, 1991, Brown, FLORIDA TODAY, Feb. 1, 1991, Halvorson, FLORIDA TODAY, p. 4A, Feb. 5, 1991, Date, THE ORLANDO SENTINEL, p. A-6, Feb. 5, 1991.]

February 6: DELTA LAUNCH DELAY

A payload problem may delay the launch of a Delta 2 launch vehicle for four to five days, according to **Colin Cheeseman**, INMARSAT Program Manager. The INMARSAT satellite is owned by the International Maritime Satellite Organization, a sixty-nation consortium. An electronics box failed during testing according to company officials. [Halvorson, FLORIDA TODAY, p. 7A, Feb. 7, 1991.]

February 7: THRUSTER GLITCH THREATENS LAUNCH

The first launch of 1991 - Discovery's STS-39 mission - was threatened again with delay when a replacement steering thruster's heating unit failed a test today. The unit had been replaced to correct what was thought to be faulty wiring. Tests continued today to enable officials to decide whether the heater unit can be repaired or need to be replaced, according to Kennedy Space Center spokeswoman **Lisa Malone**. The extra work will delay Discovery's move from the Orbiter Processing Facility to the Vehicle Assembly Building. There is, additionally, a ripple effect from the delay in rolling Discovery over to the VAB; Columbia will remain longer in the high bay of the VAB and that lengthier stay threatens to delay its Spacelab mission. The major elements of Discovery's Department of Defense cargo were transferred from a satellite processing facility to Launch Complex 39A. The Gamma Ray Observatory was moved into the satellite processing facility to begin preparations for an April mission aboard Atlantis; the Atlantis crew is expected to fly to KSC at the end of the week to participate in cargo tests. [Halvorson, FLORIDA TODAY, p. 1A, Feb. 7, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 8, 1991, Date, THE ORLANDO SENTINEL, p. A-8, Feb. 8, 1991.]

[] DISCOVERY PROCESSING UPDATE

KSC's Space Shuttle processing teams have nearly completed outfitting the Discovery for its upcoming flight (STS-39) scheduled for launch in early March. A visible step toward launch will occur when Discovery rolls over to the Vehicle Assembly Building atop the Orbiter transporter February 9. Since Discovery was rolled into the Orbiter Processing Facility on October 18, following the STS-33 Department of Defense mission, about 22 modifications have been implemented, including the installation of the five new general purpose computers. The new computers feature 2.5 times the memory capacity and up to three times the processing speed of the older units. Required tests and inspections were performed on the Orbiter's major systems while in the Orbiter Processing Facility. Discovery's three main engines, two orbital maneuvering system pods and the forward reaction control system were removed for testing or replacement. While in the VAB, Discovery will be connected to the external tank and solid rocket boosters, which are already bolted to the mobile launcher platform. The Shuttle Interface Test is scheduled to be conducted in the VAB. This test will verify the mechanical and electrical connections between the assembled vehicle elements. Next week, the STS-39 vehicle stack will be rolled to Launch Complex 39A where flight preparations will continue through launch. The launch day dress rehearsal

with the STS-39 launch team and flight crew, called the Terminal Countdown Demonstration Test, is tentatively planned for February 19-20. Launch of Discovery on the STS-39 mission is planned for early March, with a seven-member NASA crew. The primary objective of the eight-day mission is to conduct a variety of experiments for the Department of Defense and the Strategic Defense Initiative. The mission will end with a landing at the Dryden Flight Research Facility (Edwards, CA). [Malone, KSC NEWS RELEASE NO. 16-91, Feb. 8, 1991.]

DELTA SATELLITE REPAIRED

A faulty electronics box which recently failed tests of an INMARSAT satellite at the Astrotech Space Operations payload processing plant (Titusville, FL) will be replaced. That clears the way for a March launch of a Delta rocket. The faulty unit was returned to its French manufacturer for repair; the repaired equipment is expected to be back at Astrotech next week, according to INMARSAT spokeswoman **Elizabeth Hess**. She said that the Delta 2 launch is expected no earlier than March 3. The INMARSAT satellite is virtually identical to a satellite launched aboard a Delta in October, 1990. It is the second of four second-generation satellites which will provide telephone, fax and data services to ships at sea, aircraft in flight and land transport vehicles. The satellite is built by British Aerospace; INMARSAT is a sixty country consortium which provides global mobile communications for maritime, aeronautical and land-based users. [Halvorson, FLORIDA TODAY, p. 5A, Feb. 8, 1991.]

February 9: ROLLOVER SCHEDULED FOR DISCOVERY

The Space Shuttle Discovery is scheduled to roll three-tenths of a mile from the Orbiter Processing Facility to the Vehicle Assembly Building today where it will be mated with its external tank and solid rocket boosters. The stay in the VAB will be at least five days before rollout to Launch Complex 39A. Wiring in one of the Orbiter's steering thrusters must still be fixed, according to Kennedy Space Center spokeswoman **Lisa Malone**. Workers will make the repair when Discovery has been hoisted into a vertical position; the actual repair will either be done in the VAB or on the launch pad. [Banke, FLORIDA TODAY, p. 5A, Feb. 9, 1991.]

COLUMBIA: ASTRO-1 REMOVAL

Workers this week plan to retrieve the Astro-1 Observatory from Columbia's cargo bay when the Orbiter arrives in the Orbiter Processing Facility. After the observatory's removal, technicians will begin processing the Shuttle for its next mission, a May Spacelab mission scheduled to last nine days. When it returns from the Spacelab mission, the Orbiter will be sent to a Rockwell International plant in Palmdale, CA, for extensive modifications. ["Orbiter Update," FLORIDA TODAY, p. 10E, Feb. 10, 1991.]

DISCOVERY, COLUMBIA SWITCH PLACES

The Space Shuttles Discovery and Columbia swapped places with each other late

today at Kennedy Space Center. Discovery moved first from the Orbiter Processing Facility to the Vehicle Assembly Building, arriving at 5:10 p.m. At about 9 p.m. Columbia rolled out of the VAB and replaced Discovery in the OPF. The rotation is caused by the lack of hangar space at KSC; a third hangar might be available by the end of the year. Columbia still retains its cargo from its December 1990 mission, but it is due to be removed this week. Discovery will be mated with its external tank and solid rocket boosters February 10. The launch of Discovery remains scheduled for March 9. [Banke, FLORIDA TODAY, p. 2A, Feb. 10, 1991.]

February 10: **DISCOVERY LAUNCH PREPARATIONS**

Discovery must now undergo tests of its electrical and mechanical connections to be cleared for rollout to Launch Complex 39A which could come as early as January 14. If rollout occurs on this timetable, Discovery's Department of Defense cargo would be installed at the pad February 15. Discovery's seven-member crew is expected to arrive at Kennedy Space Center for a launch countdown demonstration test February 19-20; the crew will also receive training in emergency egress procedures. The Flight Readiness Review is scheduled for February 21-22 after which a firm launch date will be announced. The target date is March 9 at 3:49 a.m.; the countdown for launch begins three days earlier. There is little room in the schedule for dealing with hardware problems, though historically, Shuttle flights regularly slip one day for each week the Orbiter is on the launch pad. [Banke, FLORIDA TODAY, p. 1A, Feb. 11, 1991.]

February 12: **DISCOVERY: CONNECTIONS TESTED**

Critical connections between Discovery and its solid rocket boosters and external tank are being tested today through February 14, according to Kennedy Space Center spokeswoman **Lisa Malone**. Rollout is scheduled for 12:01 a.m. February 15. The wiring problem in one of Discovery's thrusters (see above) will be worked on by technicians during the Orbiter's stay in the Vehicle Assembly Building. [Banke, FLORIDA TODAY, p. 7A, Feb. 13, 1991.]

[] **ADVISORY COUNCIL LETTER TO QUAYLE**

In a letter to Vice President Dan Quayle, the NASA Advisory Council has praised NASA Administrator Truly and his management team "for taking quick, decisive and promising action" to implement the Report of the Advisory Committee on the Future of the U. S. Space Program. [Vincent, NASA NEWS RELEASE NO. 91-10, Feb. 12, 1991.]

February 13: **WASTE VIOLATIONS COST EG&G**

The State of Florida's Department of Environmental Regulation has fined EG&G Florida Inc. $138,692 for nine violations ranging from accumulating hazardous wastes such as oil and paint in unapproved areas to failing to label hazardous waste containers. **John White**, an Environmental Specialist at DER in Orlando,

said, "Some of the violations sound fairly petty and some of them sound worse than they actually are, but it all reflects the management of the hazardous waste. If you find a lot of little things wrong, then somebody is not doing their job." "Kennedy Space Center," White said, "has areas that have received State permits for storing hazardous waste. There is no excuse for them storing hazardous waste for more than 90 days in areas that are not permitted. If they are going to hold drums of hazardous waste in non-permitted areas and we don't penalize them for it, what is the incentive for somebody else to get a permit?" White added, "This the first time we've gone after EG&G. In the past, we've always sent the notices to NASA, but the federal government has sovereign immunity and we can't penalize them. In this case, we felt that EG&G has a contractual responsibility for managing all the hazardous waste on the space center. They are getting paid to do it, so we are penalizing them." EG&G spokeswoman **Laurie Statmore** said that the penalties were under review and that the company had not decided upon a course of action. KSC spokesman **Dick Young** did not offer a comment. [Halvorson, FLORIDA TODAY, p. 1A, Feb. 14, 1991.]

COLUMBIA GIVES UP ASTRO-1, FINALLY

The Astro-1 Observatory has been inside Columbia's cargo bay for nearly a year, but this week the observatory will be removed from the bay and transferred to a spacecraft processing facility for disassembly. The instruments belonging to the observatory will be stored in the event NASA decides to approve another Astro flight, according to Kennedy Space Center spokesman **Mitch Varnes**. While Astro-1 is being unloaded from Columbia, technicians continue to prepare Discovery for its March launch. Tests to verify electrical and mechanical connections between the Orbiter and its stack finished early today. Rollout to Launch Complex 39A is set for 12:01 a.m. February 15. [Banke, FLORIDA TODAY, p. 8A, Feb. 14, 1991.]

February 15:

DISCOVERY ROLLS OUT

Discovery began its rollout to Launch Complex 39A this morning at 12:43. The Orbiter made the six hour journey sporting a 15-foot-long yellow ribbon on the mobile platform in tribute to troops serving in the Persian Gulf. The move was delayed because of problems with ground-support equipment. Discovery set a post-Challenger record by staying only five days in the Vehicle Assembly Building prior to rollout. The extreme cold weather forecast for this weekend almost caused the move to be delayed further. An electronics box that controls the amount of power sent to a heater on one of the Orbiter's steering thrusters was not working properly. **Lisa Malone**, Kennedy Space Center spokeswoman, said that the thruster engines must be warmed if the temperature falls below 55 degrees. The delay was averted when portable heaters were installed at the pad to blow warm air onto the thrusters. The faulty electronics box will be repaired at the pad. Launch is tentatively set for March 9. [Banke, FLORIDA TODAY, p. 1A, Feb. 15, 1991, Banke, FLORIDA TODAY, p. 5A, Feb. 16, 1991.]

DISCOVERY READY FOR CARGO

Technicians today will load a Department of Defense payload into Discovery's cargo bay. When that installation is completed, preparations get under way for a practice countdown scheduled for February 19 and 20. Discovery's crew is expected to arrive at Kennedy Space Center February 18 to take part in the countdown demonstration test. Discovery's Ground Processing Manager **Chris Fairey** said, "If nothing breaks, we've got a real good chance" of making the March 9 launch date. [Banke, FLORIDA TODAY, p. 5A, Feb. 16, 1991.]

February 16: **WOODWARD WINS SNOOPY**

NASA astronaut **Kevin Chilton** recently bestowed a Silver Snoopy award to **Brian Woodward**, a lead technician with Thiokol Corp. at Kennedy Space Center. Woodward's main duty is to direct the stacking of solid rocket booster segments in the Vehicle Assembly Building. The citation accompanying his award said his work "resulted in the increased overall efficiency of our technicians and provided a higher quality end product." "Booster Stacker Wins Silver Snoopy," FLORIDA TODAY, p. 9E, Feb. 17, 1991.]

February 18: **DISCOVERY CREW DUE TODAY**

The seven astronauts who are crew members for Discovery's upcoming STS 39 mission are expected to arrive at Kennedy Space Center today. While at KSC, the seven will practice making emergency escapes from the launch pad; receive training in operating some of KSC's rescue equipment; fly practice landings in T-38 training jets and NASA's modified Gulfstream 2 jet with landings on the Shuttle Landing Facility. Commander **Michael Coats**, Pilot **Blaine Hammond** and Mission Specialists **Guion Bluford**, **Gregory Harbaugh**, **Richard Hieb**, **Donald McMonagle** and **Charles Veach** will all spend about two hours aboard Discovery during the Terminal Countdown Demonstration Test. Also today, pad workers will check Discovery's main engines for leaks using gaseous helium. [Banke, FLORIDA TODAY, p. 4A, Feb. 18, 1991.]

February 20: **VICE PRESIDENT AT KSC**

Vice President Dan Quayle visited the Launch Control Center and inspected Discovery on Launch Complex 39A at Kennedy Space Center today. Quayle spoke to a gathering of about 2,500 KSC workers and outlined plans for a new launch vehicle that will fly initially without a crew, but will later complement the Shuttle in carrying people into orbit. "Our nation's launch capabilities are aging," he said. "It's time we have a new launch system. It's time we had technology that reflects the capabilities of the 21st century." The Vice President also spoke of equipment upgrades and a consolidation of Shuttle management at Kennedy Space Center. Quayle made a brief reference to the war in the Persian Gulf, remarking that Saddam Hussein "will get out of Kuwait one way or another." As the Vice President was preparing to board his plane at the Shuttle Landing Facility, the sound of an explosion caused his Secret Service bodyguards to move

Quayle back into his car. The noise, apparently, was due to an air hose which had accidentally popped loose from Quayle's plane during preflight servicing. [Brown, FLORIDA TODAY, p. 1A, Feb. 21, 1991.]

DISCOVERY ROLLBACK DECISION

"We really don't know what we're going to do," said Kennedy Space Center Director Forrest S. McCartney concerning the possibility that the Discovery may have to be rolled back into the Vehicle Assembly Building. That rollback decision may come tomorrow. Inspectors have found cracked hinges on two doors which cover an area where pipelines funnel fuel between Discovery's external tank and its three main engines. The cracks may keep the doors from closing completely after the external tank is jettisoned nine minutes after launch. If the doors cannot be closed properly a breach might result in the Orbiter's heat shielding which could damage or destroy the Shuttle during atmospheric re-entry. Three options are currently being considered: flying no earlier than March 9 with the cracked hinges if it is determined there is no threat to flight safety; reinforcing the hinges at the launch pad but not testing the repair at a cost of two or three days delay in launching the Shuttle and repairing and testing the hinges after a rollback from the launch pad. In order for the repair and full test of the hinges to be accomplished, Discovery would have to be demated and rolled over to the Orbiter Processing Facility. A decision to follow this latter course would delay the launch at least a month. [Banke, FLORIDA TODAY, Feb. 19, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 21, 1991, Banke, FLORIDA TODAY, p. 1A, Feb. 26, 1991.]

February 21: **COLUMBIA'S HINGES CRACKED, TOO**

Columbia has the same sort of cracked door hinges as does Discovery, NASA said today. Engineers are attempting to devise a plan to test Columbia's hinges to determine whether it would be safe to fly Discovery March 9. The test calls for one of Columbia's good hinges to be slightly altered to resemble the way Discovery's cracked hinges would work in space. [Banke, FLORIDA TODAY, p. 1A, Feb. 22, 1991, Date, THE ORLANDO SENTINEL, p. A 2, Feb. 22, 1991, Brown, FLORIDA TODAY, Feb. 23, 1991, Date, THE ORLANDO SENTINEL, Feb. 23, 1991.]

February 23: **PAYLOAD WORKERS RECEIVE SNOOPYS**

Payload workers **Keith Amsden** and **Jim Hughes** were presented Silver Snoopy Awards today by astronaut **Mario Runco**. Amsden and Hughes, both employees of McDonnell Douglas Space Systems Co., train employees who help prepare Defense Department payloads for Space Shuttle missions. ["Payload Workers Receive Astronauts' Highest Award," FLORIDA TODAY, Feb. 24, 1991.]

HOLLOWAY WINS DEBUS AWARD

McDonnell Douglas's Delta 2 Manager, **Lyle Holloway**, was today awarded the National Space Club's most prestigious award: the Dr. Kurt H. Debus Award. Holloway was the second recipient of the Debus Award, the first having been

George Page last year. Holloway has worked with the Delta launch vehicle program since 1962, when the rocket was an Air Force missile called Thor. He moved to Florida twelve years ago and was made Manager in Charge of the Delta 2 Team by McDonnell Douglas in 1985. ["Delta Manager Wins Kurt H. Debus Award," FLORIDA TODAY, Feb. 24, 1991.]

February 24: **ENGINEERS STUDY DOOR HINGES**

Engineers tested the Space Shuttle Columbia's doors today to determine how tight the doors would close even if the flawed part of the hinge failed. This test cannot be done on Discovery while it is on the pad. **Lisa Malone**, spokeswoman for Kennedy Space Center said that, "It may not be clear-cut, black-and-white that if doors don't close, we don't go. If everything proves it's OK to fly as is, we'll have the [flight readiness review] Wednesday. If not, there might be more tests so we can collect more data." [Brown, FLORIDA TODAY, Feb. 25, 1991.]

February 26: **DISCOVERY DECISION DUE SOON**

"It's looking like we're going to be able to fly [Discovery] as is," said Kennedy Space Center spokeswoman **Lisa Malone**. Malone remarked that with a simulated hinge failure, Columbia's doors worked properly. The February 28 Flight Readiness Review will focus on Discovery's cracked door hinges which were discovered during an inspection last week. Tests on Columbia, which has evidenced similar cracks, show that the flaw does not keep the doors from closing tightly against the Orbiter's underside. Meanwhile, work continues on preparing Atlantis for its April mission to deploy the Gamma Ray Observatory. There is evidence that an onboard steering thruster may be leaking; it will be retested. Atlantis' rollout to Launch Complex 39B is expected to take place March 9. [Banke, FLORIDA TODAY, p. 1A, Feb. 26, 1991, Brown, FLORIDA TODAY, Feb. 27, 1991, Date, THE ORLANDO SENTINEL, Feb. 26, 1991.]

February 27: **DISCOVERY LAUNCH: NO FIRM DATE**

The Flight Readiness Review, originally scheduled for February 28 and March 1 usually is the forum during which a firm launch date had been expected to be set for Discovery's STS 39 mission. That review has been postponed until March 4. **Richard H. Truly**, NASA Administrator, delayed setting the launch date and ordered the meeting postponed after a telephone conference February 26 failed to resolve safety concerns about Discovery's door hinges. "A number of people wanted to eyeball the data rather than do it by phone," said NASA spokesman **Mark Hess**. The astronauts' office, among other NASA offices, has asked for a review of engineers' analysis which said that the flight could be made safely. That conclusion was reached on the basis of tests done on Columbia's doors which have been found to have cracks similar to those on Discovery's door hinges. Johnson Space Center Director **Aaron Cohen** said, "There's a very high probability we'll fly as is." If NASA managers decide to roll Discovery back to the Vehicle Assembly Building the STS 39 mission would be delayed about a month, according to Kennedy Space Center spokeswoman **Lisa Malone**. [Brown,

FLORIDA TODAY, p. 1A, Feb. 28, 1991, Date, THE ORLANDO SENTINEL, p. A-11, Feb. 28, 1991.]

February 28: **ROLLBACK FOR DISCOVERY**

"Prudence calls for us to roll back and fix it," said Associate Administrator for Spaceflight **William Lenoir** about NASA's decision to roll Discovery back to the Vehicle Assembly Building for repairs to its door hinges. "We were walking on a fine line. We concluded, 'Let's take a step on the safe side,'" he said. Lenoir went on to say that had there been a pressing need, NASA would have flown. He said, "If there was a national defense or some emergency reason why we needed to go fly, I don't think any of us would have any hesitation to go fly this bird. We're being conservative." Shuttle Program Director **Robert L. Crippen** said Discovery's launch should come in either late April or early May. [Center Director **Forest S. McCartney** told a meeting of the NASA History Advisory Committee which met at Kennedy Space Center March 12 and 13, that he expected the launch to come in late April.] The repairs will delay the STS 39 mission for at least a month. Kennedy Space Center Chief Engineer **Chester Vaughan** said, "Since we don't know exactly what happened to the hinge mechanism, it makes us feel a little bit nervous about the situation." Lenoir said engineers believed that one of the two-inch cracks in Discovery's door hinges occurred during a ground mishap when a signal was sent to one of the doors to close while it was latched open. Since no one is sure what caused the other crack, the agency chose the conservative route of caution. There are no spares for the hinges which are original Shuttle parts. [Brown, FLORIDA TODAY, March 1, 1991, Date, THE ORLANDO SENTINEL, March 1, 1991, McCartney Remarks to the March 12, 1991, meeting of the NASA History Advisory Committee at Kennedy Space Center; Leary, THE NEW YORK TIMES, p. A 14, March 1, 1991.]

DELTA LAUNCH DELAYED

The launch of a Delta 2 rocket will have to be delayed until at least March 6 so a faulty electronics unit on the rocket's second stage may be replaced. "We've tested the new unit and everything looks good for Wednesday," said **Anne McCauley**, a spokeswoman for Delta manufacturer McDonnell Douglas Space Systems Inc. The Delta launch was to have been the first of 1991 due to the delay in launching Discovery. [Halvorson, FLORIDA TODAY, March 1, 1991.]

MARCH

March 1: DISCOVERY BORROWS HINGES FROM ENDEAVOUR

NASA said today that Discovery will be readied for an April 25 launch using door hinges borrowed from the newest Shuttle, Endeavour. NASA spokesman **James Hartsfield** called the repair decision, "not a long term-fix," but one which "will allow Discovery to fly its STS 39 mission." He went on to say that using Endeavour's equipment would allow engineers to remove the entire hinge mechanism from Discovery and learn more about what caused the cracks in the first place. Atlantis' hinges, whose cracks are thought not be as severe, will be repaired after its early April mission. Columbia's hinges will be modified before its May flight. Workers at Kennedy Space Center are currently making room in the Vehicle Assembly Building for Atlantis which will be rolled over on March 13 and for Discovery which will be rolled back March 14. [Brown, FLORIDA TODAY, p. 1A, March 2, 1991.]

[] TESTS DELAY DELTA LAUNCH

Launch of an international communications satellite aboard a Delta rocket has been delayed again to allow more time for tests of a faulty electronics box. The launch from Cape Canaveral Air Force Station is now scheduled for between 6 and 6:54 p.m. March 7, according to McDonnell Douglas Space Systems spokeswoman **Anne McCauley**. ["Delta Rocket Tests Delay Liftoff Again," FLORIDA TODAY, p. 1A, March 2, 1991, Halvorson, FLORIDA TODAY, p. 10E, March 3, 1991.]

[] LAUNCH/LANDING OPS CONSOLIDATION

NASA will investigate for four to six months the idea of consolidating Space Shuttle operations at Kennedy Space Center, making the launch and landing site the same. NASA Deputy Administrator **J. R. Thompson** said the agency is looking "very seriously" at the consolidation proposal which could cut the cost of operations by about 25 percent. Consolidation would mean getting Space Shuttle management together instead of having it spread among NASA headquarters, Marshall Space Flight Center in Huntsville, AL, and Johnson Space Center in Houston, TX. The proposal was recommended by the Advisory Committee on the Future of the Space Program on 10 December 1990. Thompson said that even though KSC can't offer the runway options and unlimited lengths that are available in the West, the wide, three-mile-long Shuttle Landing Facility at Kennedy Space Center proved to be more than adequate for the unscheduled 20 November landing of Space Shuttle Atlantis. [Space Calendar/February 25 - March 3, 1991, p. 4.]

[] WASTE DUMP PROPOSED NEAR KSC

The Florida Inland Navigation District plans to dump its dredging waste on a site at U. S. 1 and SR 405, the entrance to Kennedy Space Center because the area

is free of wetlands, islands and open water. The "black ooze" is sand, silt and much dredged from the bottom of the Indian River to make that river navigable. The dumping plan has been opposed by Titusville business leaders and by new Congressman **Jim Bacchus** (D-Orlando). Bacchus objected to the siting plan saying, "It's a prime piece of property in Brevard County. That is a site for which we have high hopes for the space industry." The land itself is part of a 95-acre tract owned by Hughes Aircraft Co. [Rowe, FLORIDA TODAY, p. 1B, March 2, 1991, Porto, FLORIDA TODAY, p. 1B, March 3, 1991.]

UNION APPROVES EG&G CONTRACT

The United Plant Guard Workers of America, Local 128, has ratified a three-year contract agreement with EG&G Florida Inc., base operations contractor at Kennedy Space Center, according to company spokeswoman **Laurie Statmore** today. Under the agreement, which expires November 1994, the union's 225 workers will receive an average pay increase of 4.1 percent, she said; she did not disclose the union's wage scale. Contract negotiations continue between EG&G and the Transport Workers Union, Local 525, which represents the company's 100 firefighters and other emergency service employees at Kennedy Space Center; their contract expires this month. ["Union Approves EG&G Contract," FLORIDA TODAY, p. 12C, March 2, 1991.]

March 3: **DISCOVERY, ATLANTIS SWITCH**

Discovery's rollback to the Vehicle Assembly Building depends on how work is progressing on Atlantis which is scheduled to be rolled over to the VAB from the Orbiter Processing Facility. Before the transfer, Discovery must have its explosive devices disconnected and its onboard storage tanks drained. If work on Atlantis falls behind [see below], NASA managers will order Discovery's rollback to take place March 7. [Brown, FLORIDA TODAY, March 4, 1991.]

ORBITERS TO GET NEW FUEL LINES

NASA has just signed a $27.6 million contract with Rockwell International Corp.'s Space Division to replace the 17-inch fuel lines in each Orbiter with new 14-inch lines. The new lines will have better seals and new flapper valves designed to prohibit a potentially catastrophic premature closure. ["Shuttles to Sport New Fuel Lines," FLORIDA TODAY, p. 10E, March 3, 1991.]

March 4: **ATLANTIS VAB MOVE DELAYED**

The transfer of Atlantis to the Vehicle Assembly Building from the Orbiter Processing Facility has been delayed for a day because of an electrical power problem. That delay, however, will allow Discovery to be rolled back from the launch pad to the VAB for door hinge repairs. "We wanted to make the schedule flexible in case this happened, and it did," said Kennedy Space Center spokeswoman **Lisa Malone**. The electrical problem was identified over the weekend when Atlantis' electrical systems were being tested. Malone said, "It may

just be a software problem. If something comes up where it would be more prudent to stay in the Orbiter Processing Facility, then of course we'd do that." Rollback for Discovery is scheduled for 2 a.m. March 7. Replacement hinges for Discovery have been taken from the Space Shuttle Endeavour now in the final stages of construction in California. The hinges are expected to arrive at KSC either March 6 or March 7. [Brown, FLORIDA TODAY, p. 6A, March 5, 1991.]

[] **WEATHER STALLS DELTA LAUNCH**

Bad weather at the launch pad at Cape Canaveral Air Force Station this past weekend again delayed the launch of an international communications satellite aboard a Delta rocket. That launch is now expected to come no earlier than March 8, according to McDonnell Douglas Space Systems Co. spokeswoman **Anne McCauley**. She said the launch window on the 8th will now be from 5:59 p.m. until 6:54 p.m. ["Inclement Weather Stalls Delta Flight," FLORIDA TODAY, p. 6A, March 5, 1991.]

March 5: **ATLANTIS CRACK FOUND, TOO**

A tiny crack in one of Atlantis' fuel line doors was detected after workers removed paint and saturated the area with dye. A repair decision will not be made until later in the week; the repairs would take two weeks. The crack is a quarter-inch long and less than a 1000th of an inch deep. Kennedy Space Center spokeswoman **Lisa Malone** said that earlier tests on Atlantis had failed to find the cracks because the fuel line doors were not completely open. [Brown, FLORIDA TODAY, p. 17A, March 6, 1991, Date, THE ORLANDO SENTINEL, p. A-3, March 6, 1991.]

March 6: **HINGES WON'T DELAY ATLANTIS**

NASA officials said that Atlantis will fly in April despite the discovery of two minute door hinge cracks. Kennedy Space Center spokesman **Bruce Buckingham** said, "Most folks feel these cracks have been there awhile and we've flown with them awhile." Another spokeswoman, **Lisa Malone**, said that "tests and analysis show that the cracks pose no threat to vehicle performance." The cracks found on Atlantis are about a quarter-inch long and less than a thousandth of an inch deep. NASA officials also said that, as a long-term solution, the agency will design a single, "beefier," forged part to replace the faulty door hinge part. [Brown, FLORIDA TODAY, p. 1A, March 7, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, March 7, 1991.]

March 7: **DISCOVERY RETURNS FOR REPAIRS**

Discovery made its return trip from the launch pad to its processing hangar early this morning. Repair of the cracked door hinges will take at least a month, delaying the STS 39 mission until late April or early May. Similar, though smaller, cracks have been found on both Atlantis and Columbia. Kennedy Space Center spokeswoman **Lisa Malone** said that engineering tests confirm that the tiny cracks

on Atlantis pose no problem during liftoff or flight. Atlantis' launch target of April 4 will likely slip a few days to allow workers to replace and test an electronics component which provides guidance information and repair four heat resistant tiles. Brown, FLORIDA TODAY, p. 1B, March 8, 1991, Malone, KSC NEWS RELEASE NO. 28-91, March 8, 1991.]

March 8: **DELTA LAUNCH SUCCESS**

"What a beautiful sight as she lifts off," said McDonnell Douglas launch commentator **Ray Adams** about the 6:03 p.m. launch of a Delta 2 rocket from Cape Canaveral Air Force Station. An hour after the launch, the Delta's payload was deployed in geosynchronous orbit. The spacecraft, owned by the International Maritime Satellite Organization, is the second of a four-part network which will enhance mobile telephone, data transmission and voice message services to 30,000 INMARSAT users. The $75 million INMARSAT will become operational in about six weeks. The last two satellites in the network will be launched later in the year by the European Space Agency. [Brown, FLORIDA TODAY, p. 9A, March 9, 1991, Date, THE ORLANDO SENTINEL, March 8, 1991, Date, THE ORLANDO SENTINEL, p. A-3, March 9, 1991.]

ATLANTIS MOVES TO VAB

The Space Shuttle Atlantis was moved today from the Orbiter Processing Facility to the Vehicle Assembly Building where the Orbiter will be mated with its external tank and two solid rocket boosters. The launch of Atlantis and its mission to deploy the Gamma Ray Observatory has been from April 4 to April 5. The delay was due to the need to solve a problem with an electronics box, according to Kennedy Space Center spokeswoman **Lisa Malone**. Work continued meanwhile to prepare the Gamma Ray Observatory for its trip to the launch pad where it will be inserted into Atlantis' cargo bay. The GRO, which weighs 17-tons, will be the largest spacecraft ever carried by a Shuttle. Shuttle workers also began removing cracked parts from Columbia's door hinges. The hinges will be shipped to a Rockwell International facility in California where repairs will be made; the repairs are not expected to delay Columbia's May launch. Though cracks have been found in the door hinges of all three Orbiters, those found in Discovery were considered the most serious and will force NASA to roll the Shuttle back to the VAB. [Banke, FLORIDA TODAY, p. 9A, March 9, 1991.]

March 9: **SPACEPORT FLORIDA EMERGES**

Ed O'Connor, Director of Spaceport Florida, has been in the Florida Capitol this past week drumming up support for the State's commercial space venture. "We're getting a tremendous amount of support," he said today. Legislation sponsored by Representative **Charlie Roberts** (D-Titusville, FL) will increase the authority's autonomy and give it more freedom in financial and political matters. Roberts said of the authority's present operating conditions, "If we want to pay a bill, we've got to send it to Commerce. That's such a stilted way of doing business. We don't want to be seen as a little subdivision." Roberts' bill would allow Spaceport

Florida to condemn property for construction projects, such as expanding its facilities; it would allow the authority to access money set aside for major education construction projects if the authority conducts a project with a state university; Spaceport Florida could sell tax-exempt bonds to raise revenue. [Nagy, FLORIDA TODAY, pp. 1B-2B, March 10, 1991.]

March 11: **ATLANTIS ROLLOUT: MARCH 14**

Atlantis was mated to its external tank and solid rocket boosters over the weekend and continues today to undergo electrical and connections tests in preparations for its rollout to the launch pad on the evening of March 14, according to Kennedy Space Center spokesman **Bruce Buckingham**. Liftoff is tentatively scheduled for April 5. Discovery has been returned to the Vehicle Assembly Building an will shortly be moved over to the Orbiter Processing Facility. Workers will begin demating Discovery from its stack March 12. [Banke, FLORIDA TODAY, p. 4A, March 11, 1991, Brown, FLORIDA TODAY, p. 5A, March 12, 1991.]

[] **CONTROLLED BURN AT KSC**

The smoke which obscured the view of Kennedy Space Center from across the Indian River in Titusville, Florida, this morning was the result of a controlled burn undertaken to control the growth of unwanted vegetation, according to **James Clark**, law enforcement officer for the Merritt Island National Wildlife Refuge. He said that an area of marshland south of State Road 402 and along the Indian River was the target of the burn. ["Rangers Burn Refuge Vegetation," FLORIDA TODAY, p. 1B, March 12, 1991.]

March 12: **CRACKS DISCOVERER HONORED**

John Rice, employed by Lockheed Space Operations Co. at Kennedy Space Center, was awarded the NASA Flight Safety Award by Administrator **Richard H. Truly** today. "With his meticulous attention to detail, John Rice shows us the model of a Shuttle processing professional," said **Doug Sargent**, President of Lockheed Space Operations Co. Rice was the individual who identified the cracks in the door hinges on Discovery. Repair of those door hinges will delay the launch of the Orbiter until late April or early May. The Flight Safety Award recognizes individuals who make direct contributions to flight safety. [Halvorson, FLORIDA TODAY, p. 8A, March 13, 1991.]

March 13: **ALS AND SPACEPORT FLORIDA**

A proposed National Launch Development Center would be linked to Spaceport Florida and would lead research on new, less-expensive methods of preparing and flying space vehicles, including the Advanced Launch System. The Air Force and NASA have been working jointly on an ALS which would be supported by a $25 million research complex in Brevard County, Florida. State Representative **Charlie Roberts** (D-Titusville) said, "This compares to the announcement that we're going to have a space center, that we're going to have an Apollo Program, that's

there's going to be a Space Shuttle." The proposed NLDC would help the government lower the cost of payloads and would provide commercial firms with a place to learn better ways to do business in the international marketplace. Col. **Roger Colgrove**, who heads the federal government's Advanced Launch Development Program, said, "From a government perspective, that's very important. From a commercial point of view, it's a matter of survival." Colgrove's group is trying to design both the ALS vehicle and its processing procedures simultaneously. He said, "What we want to do is get in early and find out what works and what doesn't." As currently envisioned, the research complex would be constructed with funds derived from the sale of Spaceport Florida bonds and would include a hangar large enough to hold a test vehicle the size of an external tank when it is horizontal. Plans also call for individual laboratories, an auditorium and computer centers and the entire complex would be available for use by government, industry and university researchers. [Brown, FLORIDA TODAY, pp. 1A & 2A, March 13, 1991.]

GRO READY FOR PAD

NASA's Gamma Ray Observatory was ready this morning to be moved to Launch Complex 39B at Kennedy Space Center, according to KSC spokesman **George Diller**. The 17-ton observatory will make the ten mile journey to the pad in a 65-foot-tall cargo canister; the trip from the satellite processing facility will take 4 1/2 hours. Once at the pad, the satellite will be transferred to a satellite preparation room. Liftoff for Atlantis is scheduled for April 5. [Banke, FLORIDA TODAY, p. 8A, March 13, 1991.]

March 14:

NEW HINGE CRACKS

The replacement door hinge borrowed from Endeavour to enable Discovery to make its STS 39 mission has "the same design flaw" found on other Shuttles, according to NASA officials. The crack is sufficiently small that it is not expected to prevent Discovery's launch in late April or early May of this year. "It's not a big deal. It's certainly safe. It's a little bitty crack. Little starter cracks don't affect the operation, the structural integrity or anything. They make you scratch your head," said **William Lenoir**, Associate Administrator for Spaceflight at NASA. Lenoir was at Kennedy Space Center today for a meeting and press conference at the Press Site Dome. "It's something inherent in the design and that's what we have to change. We don't believe it's a manufacturing problem." NASA had planned to replace all four of Discovery's hinges with those taken from Endeavour, whose construction is nearly finished in California. The borrowing was necessary because there are no other replacements. The new hinges arrived at Kennedy Space Center last week. Meanwhile, there was a minor processing accident in the Vehicle Assembly Building before Discovery was rolled over to its hangar in the Orbiter Processing Facility. In the VAB, the Orbiter was being lowered to the ground; workers apparently misjudged the height causing Discovery's wheels to hit the ground too soon and bounce slightly. No damage was reported. [Brown, FLORIDA TODAY, p. 1A, March 15, 1991, Date, THE ORLANDO SENTINEL, March 15, 1991, "Crack Found in Substitute Shuttle Hinge," THE NEW YORK TIMES, p.

A13, March 15, 1991.]

DELAYS JUGGLE LAUNCH SCHEDULE

The delay in launching Discovery has caused a number of changes in NASA's 1991 schedule.

Revised 1991 Schedule

Shuttle	Mission	Payload	Date*
Atlantis	STS 37	Gamma Ray Observatory	April 5
Discovery	STS 43	TDRS-E Communications Satellite	April 25
Columbia	STS 40	Spacelab Life Sciences	May 25
Atlantis	STS 42	Tracking and Data Relay Satellite	July 25
Discovery	STS 48	Upper Atmosphere Research Satellite	September 19
Atlantis	STS 44	Defense Support Program	November 25

"The [Upper Atmosphere Research Satellite] has to be airborne before the end of December," said **William Lenoir**, NASA Associate Administrator for Spaceflight at a Kennedy Space Center press conference today. "One of the objectives is to catch the birth and formation of two cycles of the ozone hole forming over Antarctica in the wintertime. If the mission gets off after December, it misses one of the cycles." Delayed until January 1992 is the Spacelab International Microgravity Laboratory mission which had previously been set for December 1991. [Halvorson, FLORIDA TODAY, p. 2A, March 14, 1991, Halvorson, FLORIDA TODAY, p. 2A, March 15, 1991.]

March 15:

ATLANTIS ROLLOUT

"We have a big weekend ahead of us," said Kennedy Space Center spokesman **Bruce Buckingham** today after Atlantis was rolled out to its launch pad today. A number of tasks remain to be accomplished before the Orbiter is ready for its April 5 launch:

(1) The Gamma Ray Observatory must be loaded into Atlantis' cargo bay; the 17-ton spacecraft arrived at the pad on March 13.

(2) The five-member crew of Atlantis must arrive at the space center March 17 to take part in pre-launch training and briefings. The crew includes: Commander **Steve Nagel**; Pilot **Ken Cameron**; and Mission Specialists

Jerry Apt, Jerry Ross and **Linda Godwin.**

(3) Pad technicians will check the three main engines of Atlantis for leaks and load fuel.

(4) The launch pad will be cleared for a five-minute test firing of one of the Orbiter's auxiliary power units, necessitated by NASA rules. [Brown, FLORIDA TODAY, March 14, 1991, Banke, FLORIDA TODAY, p. 1A, March 16, 1991.]

DISCOVERY LAUNCH DECISION

To fly or not to fly, that is the question which NASA will resolve about the Space Shuttle Discovery next week. The Orbiter has fuel line door hinges which are cracked; replacements for the door hinges will come from Endeavour which is now under construction in California. One problem: workers have found a tiny crack in one of Endeavour's door hinges; managers are also looking into the possibility of using door hinges from Columbia which are now being repaired for cracks, according to NASA spokesman **Bruce Buckingham.** [Date, THE ORLANDO SENTINEL, p. A-18, March 16, 1991.]

March 16:

MCCARTNEY MEETS COMMUNITY LEADERS

Kennedy Space Center Director **Forrest S. McCartney** will host some 350 community leaders at Spaceport USA March 22. Activities will begin with a walk-through of an Orbiter mock-up and an 8:30 breakfast at the Orbit Cafeteria. At the meeting McCartney will discuss current plans and future programs of NASA; McCartney's remarks will be followed by a showing of the new IMAX film "The Blue Planet" and an optional tour of the space center. ["McCartney to Meet Local Leaders," FLORIDA TODAY, p. 10E, March 17, 1991.]

QUAYLE CANCELS SPACE CONGRESS SPEECH

Vice President **Dan Quayle** canceled plans to speak to the 28th annual Space Congress (Cocoa Beach, FL) April 23-26. He had tentatively agreed to deliver the keynote address at the Congress, but said that other commitments forced him to cancel. Executive Secretary of the National Space Council **Mark Albrecht** will speak instead of Quayle. Other speakers at the Congress include Brig. Gen. **Jimmey Morrell**, Commander of the 9th Space Wing at Patrick Air Force Base; **Arnold Aldrich**, NASA Administrator for Aeronautics and Space Technology; **Steven Hawley**, former astronaut and Associate Director, Ames Research Center; **Edward O'Connor**, Executive Director, Spaceport Florida Authority; Lt. Gen. **Thomas Moorman**, Air Force Space Command; **John Klineberg**, Director, Goddard Space Flight Center; Lt. Gen. **Donald Cromer**, Commander, Air Force Systems Division; **Barbara Morgan**, NASA Teacher-In-Space Designee; Col. **Michael Spence**, Commander, 655th Aerospace Test Group, CCAFS; **Richard Kohrs**, Director, NASA's Space Station Freedom Program. The Space Congress is sponsored annually by the Canaveral Council of Technical Societies. ["Quayle

Cancels Trip to Cocoa Beach; Albrecht to Address Space Congress," FLORIDA TODAY, p. 9E, March 17, 1991.]

ENDEAVOUR ENGINE PASSES TEST

The second of Endeavour's three main engines have completed acceptance tests at Stennis Space Center in Mississippi. When final inspections are completed, the engine will be shipped to Kennedy Space Center; the Orbiter Endeavour is expected to arrive at the space center in May. The first of the three main engines passed its tests at Stennis last year. The first flight of Endeavour is currently scheduled for May 1992. ["Endeavour Engine Passes Tests," FLORIDA TODAY, p. 10E, March 17, 1991.]

SHUTTLE CLOSES PLAYALINDA BEACH

Playalinda Beach at Canaveral National Seashore will be closed to the public until after the launch of STS 37 in early April. Atlantis is now on the pad and the access road to the beach falls within a three-mile security zone surrounding Launch Complex 39B. The beach will be reopened to the public within 24 hours of the launch, now expected to come on April 5. ["Shuttle Closes Playalinda Beach," FLORIDA TODAY, p. 1B, March 17, 1991.]

CAPE CANAVERAL PAD FACELIFT

Anti-rust repair work is underway at Launch Complex 17A at Cape Canaveral Air Force Station. "We probably won't get the whole tower done, but we're doing a permanent fix for the things we are doing," according to Lt. Col. **Randy Moyer**, Commander of the 1st Space Launch Squadron, the unit responsible for launching Air Force Delta rockets from CCAFS. "We'd like to get in to 17B and do similar work, but our initial look showed that pad 17B is not as bad as 17A," Moyer said. [Banke, FLORIDA TODAY, p. 10E, March 17, 1991.]

March 17: ASTRONAUTS ARRIVE AT KSC

Bad weather at Kennedy Space Center and low fuel kept most of Atlantis' five-member crew from landing its T-38 planes at the Shuttle Landing Facility; they were diverted instead to Patrick Air Force Base. Commander **Steve Nagel**, Pilot **Ken Cameron** and Mission Specialists **Linda Godwin** and **Jay Apt** landed at PAFB; Specialist **Jerry Ross** who had more fuel in his T-38, waited aloft and landed at KSC about 7:15 p.m. Ross' four colleagues were driven to the space center and their T-38 planes were flown to KSC by other pilots. While at KSC, the crew will practice landing at the Shuttle Landing Facility and receive briefings about the status of Atlantis and, perhaps, inspect the cracked door hinges of the Orbiter. The hinges have been cleared for flight by NASA. The crew will also train for emergency escapes from the launch pad by driving an M-113 armored personnel carrier and participate in a practice countdown involving the entire Kennedy Space Center launch team. The Flight Readiness Review will be held beginning March 21. [Banke, FLORIDA TODAY, p. 1A, March 18, 1991.]

NEW SATURN V EXHIBITION FACILITY

NASA and TW Recreational Services have selected Morris Architects (Orlando, FL) to direct a design team to provide the conceptual plan for a major new KSC tour site involving the Saturn V rocket and other Apollo era artifacts. Morris Architects was chosen for contract negotiations to provide preliminary design concept drawings and specifications for the new Saturn V exhibit. The facility is planned for phased construction at an expanded Complex 39 Shuttle launch viewing site. Other members of the design team include: Waisman Dewar Grout Carter, Inc. (Vancouver, British Columbia); Bob Rogers & Company, Inc. (Burbank, CA); Levitan Design Associates (New York, NY); Glatting Lopez Kercher Anglin, Inc. (Orlando, FL); and TLC, Inc. (Orlando, FL). TW Recreational Services, Inc., which operates Spaceport USA for the Kennedy Space Center, will manage the contract leading to a conceptual design for an estimated $30 million tour exhibit site. "This will be the most significant enhancement of the public visitor tour since its inception," said NASA Visitor Center Office Chief **Arnold Richman**. "This project will not only ensure the preservation of the major artifact of the Apollo-Saturn program, it will ensure that the human adventure of that period, the drama of this nation's commitment to the manned lunar landings, will be experienced and appreciated by future generations." The Saturn V rocket, one of only three actual flight vehicles left over from the Apollo program, is presently displayed at the southwest corner of the Vehicle Assembly Building parking lot; at that location, the rocket is exposed to long-term environmental threats to its preservation. The new exhibit facility will also include the Apollo lunar lander and the simulated Apollo-era firing room show currently housed at the Flight Crew Training Facility in the industrial area at the space center. The relocation of the Saturn V and Apollo artifacts into a covered facility at the new site, located about two miles north of the VAB, will ease traffic congestion caused by the high volume of bus tours. The project is expected to be paid for with revenues from bus tour ticket prices and will be built in phases beginning in 1993-1994. [Varnes, KSC NEWS RELEASE NO. 35-91, March 18, 1991, Meguiar, SPACEPORT USA RELEASE NO. NTO583, March 21, 1991.]

March 18: **WATER IN ATLANTIS ENGINE COMPARTMENT**

Weekend rains dumped ten gallons of water inside the Space Shuttle Atlantis' rear engine compartment. Officials said the water entered the compartment because temporary covers, not flight doors, are now affixed to the Shuttle. The water was mopped up and is not expected to delay the launch now targeted for early April. A Terminal Countdown Demonstration Test for Atlantis' STS 37 mission begins today and runs through tomorrow. Also today, workers began installing modified door hinges on Discovery; the hinges were taken from Columbia. Discovery's door hinges were removed so cracks found there could be studied. [Halvorson, FLORIDA TODAY, p. 2A, March 19, 1991.]

WHITE HOUSE BACKS SPACE STATION

"We need, and must build, a space station optimized for life science research as

our first major step into the last great frontier and adventure. We should not accept compromises of this ultimate goal," said **Allan Bromley**, assistant to President Bush. Bromley spoke following a meeting he attended of the National Space Council, chaired by Vice President **Dan Quayle**. The council's review was part of a unified effort to support a revised space station plan before Congress in early April. Bromley went on to say that he agreed science alone could not justify the station; scientific research and technology development, along with studies on the effects of microgravity on human beings, he said, do justify the expenditure of taxpayer dollars. [Halvorson, FLORIDA TODAY, p. 1A, March 19, 1991.]

March 19: **ACCIDENTS SNARL KSC TRAFFIC**

Traffic accidents involving ten cars held up rush-hour traffic at Kennedy Space Center this morning. The automobile accidents resulted in minor injuries to one woman, Evelyn Headrick, an employee of Pan American Airways. Ms. Headrick was treated and released from Parrish Medical Center (Titusville, FL). The accidents occurred at 6:45 a.m. in the eastbound lanes of the NASA Causeway over the Indian River. Three citations were issued by NASA security to drivers for unlawful speed and failure to use due care. One citation was issued for careless driving, according to NASA spokesman **Karl Kristofferson**. "It appears that some people were speeding and changing lanes on the bridge. Some cars were rear-ended and people just couldn't stop," said Kristofferson. He said the area was cleared for traffic by about 9:15 a.m. ["2 Accidents Snarl KSC Traffic," FLORIDA TODAY, p. 1B, March 20, 1991.]

[] **ATLANTIS CREW EXCITED ABOUT MISSION**

The STS 37 crew met the press today at Kennedy Space Center and Commander **Steve Nagel** pronounced his crew "excited." Mission Specialist **Jerry Apt** added, "We've got an observatory that will look back to the beginning of time, and we'll be doing the first spacewalk in 5 1/2 years, so I think it's going to be great." The astronauts are at Kennedy Space Center to take part in the Terminal Countdown Demonstration Test and practice emergency egress procedures at the launch pad. The rest of the crew includes Pilot **Ken Cameron** and Mission Specialists **Linda Godwin** and **Jerry Ross**. Nagel said the crew was not concerned about the tiny cracks in Atlantis' door hinges. "On the basis of all the briefings and discussions we've had, I'm quite comfortable flying with these hairline cracks. They present no safety issue at all," Nagel said. Technicians at Kennedy Space Center today also prepared to move a Spacelab Life Sciences module into the Orbiters' processing hangar for installation in Columbia. Payload Manager **Mike Kinnan**, said the Spacelab module will be moved to the processing hangar and loaded into Columbia's cargo bay later this week. [Halvorson, FLORIDA TODAY, p. 7A, March 20, 1991, Date, THE ORLANDO SENTINEL, March 20, 1991.]

March 20: **KSC SPACE STATION BUDGET CUTS**

The restructuring of the Space Station Program is expected to cost Kennedy Space Center about twenty percent of its share of the program's budget, officials

said today. "We don't feel the cuts have been that significant," said KSC's Space Station Project Manager **Dick Lyon**. "Everybody feels there's [a] better chance of pulling the project off with its reduced size. People feel more positive about the program." Space Station project spending at KSC will be reduced from $65 million to $55 million, Lyon said. The overall FY 1992 KSC share was to have been $85 million and that is expected to be reduced by $10 million. The twenty percent cut will be felt through 1999, managers said. The Space Station Processing Facility will now house four instead of eight checkout areas. Harris Space Systems Corp.'s Project Manager Bill McCaslin said that cuts will be made to the company's contract to design the space station checkout system and to supply necessary equipment, but that a full estimate was not yet available. McCaslin did say that the cuts would come primarily in materials and not in design work. Harris employs some 260 people under its KSC contract. Construction on the SSPF is to begin next week and is not expected to be affected by the cuts. Other areas will be affected, however. A separate processing facility where hazardous materials were to be handled will be deleted. An Air Force complex will be used instead. Construction of a logistics facility will be postponed from the mid 1990s until 1999 and a maintenance depot's construction will be postponed indefinitely. Also postponed is the employment of additional workers to process space station hardware. [Brown, FLORIDA TODAY, p. 2A, March 21, 1991.]

WHITE HOUSE APPROVES SPACE STATION PLAN

Vice President **Dan Quayle** traveled to Capitol Hill today to endorse NASA's latest Space Station Program plan on behalf of the Bush Administration. "The question is," Quayle said, "is America going to lead the way to space? It's part of the American spirit to be pioneers. I am convinced the Congress will go ahead with the space station; it may take some encouragement." Director of the Office of Management and Budget, **Richard Darman** said, "Now what we need to do is build a base of enthusiastic support." Senator **Barbara Mikulski** (D-MD) said, "I think the Congress...is going to be committed to the redesign." [Groer, THE ORLANDO SENTINEL, p. A-2, March 21, 1991.]

COLUMBIA LAUNCH DELAYED

Columbia's STS 40 mission in May will be delayed at least a week, according to NASA officials, so workers can realign posts that hold solid rocket boosters onto the Shuttle's mobile launch platform. "There will be some hit to the schedule. We're talking several days rather than weeks or months," said **Lisa Malone**, Kennedy Space Center spokeswoman. "The whole [Shuttle] is resting on those posts," she said and noted that proper alignment of the posts is critical to a successful launch. Tests showed that the launch platform posts were improperly aligned. Two booster segments have been removed from the MLP to allow workers to begin making adjustments. The segments will be replaced March 23. [Halvorson, FLORIDA TODAY, p. 8A, March 21, 1991.]

GOOD COUNTDOWN SIMULATION

"We had a good simulation. There were no problems. We would have launched had it been the actual launch day," said Kennedy Space Center spokesman **Bruce Buckingham** of the just completed Terminal Countdown Demonstration Test. The Atlantis crew climbed aboard the Shuttle for the final three hours of the simulation today. Meanwhile, technicians continued testing replacement door hinges on Discovery. The hinges, taken from Columbia and modified, replaced cracked door hinges removed earlier from Discovery; the Orbiter is expected to be returned early next week to the Vehicle Assembly Building where it will be mated with its external fuel tank and twin solid rocket boosters. [Halvorson, FLORIDA TODAY, p. 8A, March 21, 1991, Date, THE ORLANDO SENTINEL, p. A-18, March 21, 1991.]

March 21: **NEW SHUTTLE SCHEDULE ISSUED**

NASA managers today announced adjustments to modify the February 1991 Mixed Fleet Manifest. The modifications to the manifest were necessary after the STS 39 mission, scheduled for March with Space Shuttle Discovery, was postponed due to cracks on the Orbiter's external tank door drive mechanism housing. The flights now projected for calendar year 1991 begin with Space Shuttle Atlantis and the Gamma Ray Observatory flying in April. Following repairs to the door drive mechanism housing, Discovery will fly the STS 39 mission in May. The projected date for STS 40/Spacelab Life Sciences mission aboard Shuttle Columbia remains in May. Columbia will be taken off line as planned for structural inspections and modifications for Extended Duration Orbiter capability following completion of the STS-40 mission.

The Tracking Data Relay Satellite mission originally scheduled to fly on Discovery in July is now on Atlantis in August. The Defense Support Program mission remains on Atlantis but will move from August to December. These two adjustments preserve the agency's capability to fly Discovery with the Upper Atmosphere Research Satellite payload during its required science window with launch projected now for October. The International Microgravity Laboratory mission which was planned for December 1991 will become the first flight in calendar year 1992. The mixed cargo flight of the Tethered Satellite System and the European Space Agency's European Retrievable Carrier originally scheduled for February on Shuttle Discovery will move to August 1992 and will fly on Space Shuttle Atlantis. Flights in the mid-1992 time frame remain in their original manifested positions with Atlas-1 in April, the Intelsat reboost mission in May which will involve the first flight of Space Shuttle Endeavour and the U. S. Microgravity Laboratory in June. Spacelab-J and the mixed cargo flight of the U. S. Microgravity Payload and the Laser Geodynamics Satellite also remain as scheduled for September 1992. The Canadian Experiments payload also is joining this mission. Adjustments to the manifest beyond September 1992 are still being examined and will be announced later.

1991 Shuttle Launches

Date	Mission	Vehicle	Payload
April 1991	STS 37	Atlantis	GRO
May 1991	STS 39	Discovery	AFP 675/IBSS
May 1991	STS 40	Columbia	SLS-1
August 1991	STS 43	Atlantis	TDRS-E
October 1991	STS 48	Discovery	UARS
December 1991	STS 44	Atlantis	DSP

1992 Shuttle Launches

Date	Mission	Vehicle	Payload
February 1992	STS 42	Discovery	IML-1
April 1992	STS 45	Atlantis	ATLAS-1
May 1992	STS 49	Endeavour	INTELSAT-1
June 1992	STS 50	Columbia	USML-1
August 1992	STS 46	Atlantis	TSS-1/EURECA
September 1992	STS 47	Endeavour	Spacelab-J
September 1992	STS 52	Columbia	USMP/LAGEOS /CANEX

[Hess, Campion, NASA NEWS RELEASE NO. 91-44, March 21, 1991.]

SPACE STATION: CUTS COST JOBS

Cutting the cost and size of the Space Station Freedom will cost private industry a thousand jobs, according to NASA officials; no Brevard County Kennedy Space Center workers are expected to be laid off, though. **Dick Lyon**, KSC Space Station Project Manager, said that several hundred expected jobs will be either delayed or canceled. Associate Administrator for Spaceflight **William Lenoir** said, "The facts are in the fiscal climate in which we find ourselves today the proposed budget from last year was not attainable. We took the directions from Congress...to heart. We've cut costs, simplified the design and reduced the complexity of the project." He also said that Boeing and McDonnell Douglas are cooperating in renegotiating contracts which will cost Boeing to lose 500 jobs and McDonnell Douglas to lose 470 subcontractor jobs. "The companies," Lenoir said, "are on board. They are behind this." Lyon said that KSC will have its share

of the Space Station budget pared by about $445 million through 1997 and more than half that amount will eventually be returned to the program once the Space Station is fully operational in 1999. He said that most of the KSC cutbacks come from putting of building and staffing warehouse and maintenance facilities. "Before the redesign," he said, "most of the Space Station hardware was to be delivered to KSC by 1997. That includes all the spares. We had to have a place to put it. Now, because the manufacturing stages have been stretched out, the companies can stock spares on site" until construction is complete. [Hasson and Brown, FLORIDA TODAY, p. 10A, March 22, 1991, Date, THE ORLANDO SENTINEL, March 22, 1991.]

[] SPACELAB MODULE DAMAGED

A processing accident at Kennedy Space Center caused damage to a Spacelab module scheduled for a May launch aboard Columbia. The launch is not expected to be postponed, however, because there is already a week's delay planned for realigning posts which hold the solid rocket boosters on the mobile launch platform. Workers were using a crane to lift the Spacelab module from a test stand in the KSC Operations and Checkout Building when the accident occurred, according to space center spokesman **Mitch Varnes**. Apparently, a worker mistakenly removed one of the three metal pegs used to hold the module in the test stand; the module tilted about 18 inches and banged into a tray full of electrical cables as it was being lifted. The accident caused a tear the size of a quarter and a 7-inch long scuff was noted in one of the Spacelab's insulating blankets. Varnes said that the blanket will either be repaired or replaced. He said, further, that managers still hoped to move the module into a Shuttle hangar and install it in Columbia's cargo bay this weekend. Booster segments on the mobile launch platform will be restacked starting this weekend. [Halvorson, FLORIDA TODAY, p. 10A, March 22, 1991, Date, THE ORLANDO SENTINEL, March 22, 1991.]

March 22: RETURN ENTERPRISE: MCCARTNEY

"We ought to get Enterprise back down here. This is where it belongs," Kennedy Space Center **Forrest S. McCartney** told community leaders today at Spaceport USA. "I think having it sit in a hangar on the edge of Dulles (airport) doesn't serve the nation." Enterprise was located at KSC for four months in 1985 but was shipped to Dulles for housing in a National Air and Space Museum hangar in December 1985. The shipment occurred because of an agreement between the Smithsonian Institution (of which the museum is a part) and NASA; the agreement calls for hardware no longer needed by the space agency to be offered to the Air and Space Museum. Since 1985, Enterprise has been at Dulles awaiting congressional approval of a $90 million appropriation to house both the Shuttle and other historic aircraft. "I don't think we'd loan it out," said **Martin Harwit**, Director of the Air and Space Museum. "We have never loaned Enterprise out because of the danger of transporting it. If we lost Enterprise, it would be a national tragedy." Enterprise was not built for spaceflight. It's entire career had been as part of Shuttle landing tests at Edwards Air Force Base (CA) in the late

1970s and as a pathfinder for tests at Shuttle launch pads both at KSC and at Vandenberg Air Force Base. **Lin Ezell**, Assistant Director for Collections Management at the Smithsonian, said that his institution had been contacted by officials at KSC to ask how the return of Enterprise to the space center could be arranged. "We don't make permanent loans," Ms. Ezell said. "But we do make finite loans, usually for five-year periods, that can be extended." Officials at the space center want to make Enterprise a center piece of a new $30 million exhibit to be built at the Shuttle launch viewing site two miles north of the Vehicle Assembly Building. The facility is already slated to hold the Saturn V rocket now just outside the VAB; additionally, it would hold a lunar lander and a simulated Apollo-Era firing room now located in the Flight Crew Training Facility in the space center's industrial area. Speaking of the new facility, KSC's **Arnold Richman** said, "This will be the most significant enhancement of the public visitor tour since its inception. This project not only will ensure the preservation of the major artifact of the Apollo-Saturn Program, it will ensure that the human adventure of that period, the drama of this nation's commitment to the manned lunar landings, will be experienced and appreciated by future generations." [Halvorson, FLORIDA TODAY, pp. 1B-2B, March 23, 1991, SEE ALSO: March 17: New Saturn V Exhibition Facility.]

BETTER SAFETY REPORTS NEEDED

The Aerospace Safety Advisory Panel said in its annual report today that workers at Kennedy Space Center may fear punishment for reporting accidents. The panel said that better communication between managers and workers following incidents could eliminate the perception at the space center that disciplinary actions for errors are too severe. KSC Director **Forrest S. McCartney** said today: "I never have problems with any objective report about our operations here. We welcome constructive criticism as a way to make sure our operations remain effective, efficient and safe." The panel went on to say, "By overreaching, NASA has stretched its scientific, engineering and administrative capabilities excessively, thereby creating an environment where safety concerns compete with operational commitments, such as schedules."

Among the recommendations made by the panel:

*Develop the ability to automatically land a Shuttle in case the crew is incapacitated.

*Appoint boards to investigate "close calls" in addition to accidents, which already are probed.

*Make sure there is an ample supply of hard-to-find spares for the Shuttle's aging and obsolete systems.

*Develop a better spacesuit for space station astronauts. [Banke, FLORIDA TODAY, p. 1A, March 23, 1991.]

March 25: **ATLANTIS MAIN ENGINE TEST**

"It's the last of our engine tests prior to launch," said Kennedy Space Center spokeswoman **Lisa Malone**, concerning a critical test of an Atlantis main engine which is to be conducted today. She went on to say that the test involves cycling engine valves, checking engine timing and calibrating various engine sensors. Meanwhile, key NASA and Shuttle contractors begin their Flight Readiness Review for STS 37 today; Discovery was towed from the Orbiter Processing Facility to the Vehicle Assembly Building for mating with its external tank and solid rocket boosters; rollout to Launch Complex 39A is expected to occur April 1. [Brown, FLORIDA TODAY, p. 1A, March 25, 1991, Halvorson, FLORIDA TODAY, March 26, 1991.]

March 26: **SPACE STATION FACILITY GROUNDBREAKING**

Today NASA officials broke ground for construction of the $70 million Space Station Processing Facility which will become the workplace for some 1400 persons at Kennedy Space Center. "The skyline around here is really going to change. This will be the biggest facility that we have built since the Apollo days" according to KSC Deputy Director **Gene Thomas**. The three-story, 457,000-square-foot facility will be completed in three years and will house laboratories, computer control centers and communications and electrical rooms. The facility construction will be undertaken by Metric Constructors (Tampa, FL) and will employ 500 people beginning next week. [Varnes, "Groundbreaking for KSC Space Station Facility Slated for March 26," KSC NEWS RELEASE NO. 32-91, March 14, 1991, Halvorson, FLORIDA TODAY, p. 1A, March 27, 1991, Date, THE ORLANDO SENTINEL, p. A-4, March 27, 1991.]

March 27: **STS 37 LAUNCH ADVISORY**

NASA managers today set April 5, 1991, as the target date for Shuttle Mission STS 37. The launch date decision came at the conclusion of NASA's two-day Flight Readiness Review held at Kennedy Space Center. Spokeswoman **Lisa Malone** said, "The date's been set and we're marching forward. We've got a lot of work left, but we'll be ready to pick up the countdown next week." Countdown commences at 5:30 a.m. April 2; the astronauts arrive for the mission later that day. The five-member crew includes Commander **Steve Nagel**, Pilot **Ken Cameron** and Mission Specialists **Linda Godwin**, **Jay Apt** and **Jerry Ross**. This will be the 39th flight of the Space Shuttle system and will involve deployment of the Gamma Ray Observatory by the Shuttle Atlantis and its crew. The flight will also see the first "spacewalk" performed by Shuttle astronauts - Ross and Apt - since the return to flight in 1988. The "spacewalk" is the first of a series to prepare astronauts and ground crews for the construction and operation of the Space Station. The launch window on April 5 opens at 9:18 a.m. EST with the mission projected to last just over 5 days, with the landing expected April 10 at Edwards Air Force Base (CA). Shuttle Director **Robert L. Crippen** said, "The launch team has done a super job in getting us ready to fly STS 37. With the delay in Discovery and the STS 39, the team had a challenge to meet and they came through right on schedule."

[Campion and Malone, KSC NEWS RELEASE, March 27, 1991, Halvorson, FLORIDA TODAY, p. 1A, March 28, 1991, Date, THE ORLANDO SENTINEL, March 28, 1991.]

March 28: **SPACESUITS ABOARD ATLANTIS**

Preparations for the April 5 launch of Atlantis continued without a hitch today as spacesuits were packed aboard the Orbiter. The $10 million suits will be used by spacewalking astronauts **Jerry Ross** and **Jay Apt**. Actually, three spacesuits - one as a spare - were installed in the Space Shuttle's airlock. The seven main components of the suits are: a hard vest known as an upper torso, a helmet, sleeves, gloves, pants, boots and a backpack with life-support systems. Each suit weighs about 270 pounds on Earth and a third of that weight is the backpack with its oxygen, radio, computer and a water circulation system to cool the outfit. The Launch Complex 39B has been closed except for essential workers to allow for the testing of explosive devices used to separate Atlantis from its solid rocket boosters and external tank. Onboard propellant tanks must still be pressurized in another hazardous operation. [Halvorson, FLORIDA TODAY, p. 4A, March 29, 1991.]

March 29: **WINDS WORRY SHUTTLE MANAGERS**

"We're not expecting the weather to interfere with work at the launch pad, but we'll keep a close eye out," said Kennedy Space Center spokeswoman **Lisa Malone**. She said that winds of 14 miles per hour would not be a great concern, but that stronger winds would cause technicians and safety officials to decide whether pad work could continue. She also said that thunderstorms and lightning expected on the weekend could halt some types of pad activities, especially those using electricity. Currently, the projected forecast calls for winds between 14 and 29 mph at Launch Complex 39B, where Atlantis is awaiting its April 5 five-day mission which is set to begin at 9:18 a.m. The STS 37 crew was isolated in crew quarters at Johnson Space Center (Houston, TX) and have begun getting adjusted to their onboard schedule which calls for them to wake each day at 2 a.m. [Banke, FLORIDA TODAY, p. 5A, March 30, 1991.]

March 30: **HOLIDAY PAUSE AT 39B**

The pad crew at Launch Complex 39B had the Easter weekend off from the work of preparing Atlantis for its STS 37 mission which is due to begin at 9:18 a.m. April 5. The countdown begins at 5:30 a.m. April 2; the crew arrives later that day. Kennedy Space Center spokesman **Karl Kristofferson** said of the holiday work schedule, "We're minimizing the number of people we have working on Easter Sunday. We'll only have a couple hundred people working at launch pad 39B." Meanwhile, in the Vehicle Assembly Building, workers are reading Discovery for its rollout early on April 1; launch for STS 39 is expected to come April 25. [Halvorson, FLORIDA TODAY, p. 6A, March 31, 1991, Banke, FLORIDA TODAY, p. 1A, April 1, 1991.]

SPACELAB TESTING BEGINS

Testing has begun on the components for the first International Microgravity Laboratory mission which is to be launched next February aboard Discovery. The mission will be the first in a series designed to bring together the resources of several space agencies around the world. Contributors to the mission are: the European Space Agency, the National Space Development Agency of Japan, the Canadian Space Agency, the French National Center for Space Studies and the German Space Agency. Current tests are to verify the compatibility of flight experiments with the Spacelab module. ["Spacelab Testing Begins," FLORIDA TODAY, p. 10E, March 31, 1991.]

March 31: SPACEPORT USA ATTENDANCE

During the month of March 1991, 247,532 persons visited Spaceport USA; the year-to-date attendance stands at 651,017 visitors. Beginning April 11, the tourist attraction's hours of operations extend from 9:00 a.m. until 7:30 p.m.[SPACEPORT USA NEWS RELEASE NTO5084, April 1, 1991.]

APRIL

April 1: **AIR FORCE BLUE TOUR RESUMES**

The Blue Tour, discontinued for several weeks at Cape Canaveral Air Force Station due to the war in the Persian Gulf, will resume April 6, according to officials at Kennedy Space Center. The tour originates at Spaceport USA west of KSC and includes visits to Mercury and Gemini launch facilities, NASA's original mission control building and the Air Force Space Museum two hours later. Spaceport USA General Manager **D. L. Hennessy** said, "While we're glad to have the Blue Tour resume, its absence did not cause a major disruption of our visitor services. A majority of our visitor guests request the Red Tour of Complex 39, where the Space Shuttle is processed and launched." The Red Tour, which also starts at Spaceport USA, takes in historic sites at KSC. Spaceport USA will be open extended hours from 9 a.m. to 7 p.m. beginning April 11. ["Tour of NASA Sites Resumes After Hiatus," FLORIDA TODAY, p. 1B, April 2, 1991, "Historic Tour Operations Resume at Kennedy Space Center Spaceport USA," SPACEPORT USA NEWS RELEASE NT0584, April 1, 1991, "Tour of Launch Sites Resumes On Saturday," THE ORLANDO SENTINEL, April 3, 1991.]

DISCOVERY ROLLS OUT, JOINS ATLANTIS

"Things couldn't be better," said Kennedy Space Center spokeswoman **Lisa Malone** about the fact that both Discovery and Atlantis are now on launch pads at the space center. Discovery completed its rollout to Launch Complex 39A by 9 a.m. today. At Launch Complex 39B, workers continued to prepare Atlantis for launch April 5 at 9:18 a.m.; weather concerns put the likelihood of an on-time launch at 50-50 due to the expected arrival of a cold front and rain. Launch controllers will be able to delay the liftoff until 1:56 p.m. before scrubbing for the day. Weather forecasts indicate that launch conditions increases to 80 percent favorable April 6 and 90 percent favorable on April 7. Tomorrow Atlantis' crew of Commander **Steve Nagel**, Pilot **Ken Cameron**, and Mission Specialists **Linda Godwin**, **Jay Apt**, and **Jerry Ross** arrives at the space center for two days of emergency landing practices and briefings. Bad weather prevented the U. S. Army's Golden Knight parachute demonstration team from making a planned jump over Launch Complex 39A; it was rescheduled for the following day. [Halvorson, FLORIDA TODAY, p. 1A, April 2, 1991, Date, THE ORLANDO SENTINEL, p. A-7, April 2, 1991, Sanchez, FLORIDA TODAY, p. 1A, April 2, 1991.]

April 2: **SHUTTLE CREW ARRIVES**

"Somebody told me not to say something as trite as 'We're ready to go fly.' But I couldn't think of anything better; we actually are ready to go fly," said STS Commander **Steve Nagel**, 44, when he and the rest of the Atlantis crew arrived at Kennedy Space Center today. Flying in formation aboard their T-38 training jets the crew of Nagel, **Ken Cameron**, **Linda Godwin**, **Jerry Ross** and **Jay Apt** touched down at the Shuttle Landing Facility about 3:45 p.m. The countdown for the mission began at 5:30 a.m. this morning and proceeded smoothly; NASA Test

Director **Al Sofge** said, "There's no bad news; things are looking good." Weather conditions have improved due to a delay in the expected arrival of a cold front on the Space Coast. The launch window on April 5 extends from 9:18 a.m. till 1:56 p.m.; by the close of the window there is expected to be a 90 percent chance of favorable conditions for launch. [Banke, FLORIDA TODAY, p. 1A, April 3, 1991, Hoversten, USA TODAY, p. 11A, April 3, 1991, Date, THE ORLANDO SENTINEL, April 2, 1991, Date, THE ORLANDO SENTINEL, April 3, 1991.]

PARATROOPERS AT KSC

The U. S. Army Parachute Team, also known as the Golden Knights, landed near Launch Complex 39A at 8:30 this morning. Their goal was to photograph a tight circle of eight paratroopers above the launch pad which is now occupied by the Space Shuttle Discovery. Lt. Col. **Kirk Knight** said, "We hope the photos will turn out good and everybody will enjoy a picture of the Army parachute team and the Shuttle." The jump had originally been scheduled to coincide with the rollout of Discovery but had been postponed due to high winds. The touchdown outside the pad's perimeter fence was marred by high winds which caused most of the parachutists to miss their precise marks. [Banke, FLORIDA TODAY, p. 1A, April 3, 1991.]

April 3:

EG&G, UNION AGREEMENT

KSC Base Operations Contractor EG&G Florida Inc. reached agreement today with members of the Transport Workers Union, Local 525, on a contract calling for a 4.1 percent annual pay raise and changes concerning break, meal and rest periods. At Kennedy Space Center, the Union covers 110 EG&G workers who are firefighters, fire technicians, fire inspectors, drivers, crew chiefs and paramedics. The contract, which runs for four years, expires March 31, 1995. ["EG&G, Union Reach Wage Accord," FLORIDA TODAY, p. 12C, April 4, 1991.]

WEATHER STILL A CONCERN

A strong low-pressure system moving toward Florida that is expected to bring rain showers or thunderstorms by Saturday could still impact April 5's launch because of winds gusting between 12 and 23 mph. Air Force weather watchers predict a 60 percent chance that weather will be favorable for the 9:18 a.m. liftoff; that is down 10 percent since yesterday. Chances are expected to improve nearer the close of the launch window at 1:56 p.m. The countdown, however, is proceeding uninterrupted. "It's basically a textbook countdown. As you know in this business, unforeseen problems can arise and cause major or minor glitches," said NASA Test Director **Al Sofge**. Today workers at Launch Complex 39B loaded liquid hydrogen and liquid oxygen into storage tanks aboard Atlantis; the two chemicals are used to provide electricity and drinking water aboard the Orbiter. **Steve Nagel** and **Ken Cameron** spent the day practicing emergency landings and joined the rest of the crew - **Linda Godwin**, **Jerry Ross** and **Jay Apt** - for an examination of crew equipment. [Banke, FLORIDA TODAY, p. 1A, April 4, 1991,

Wilford, THE NEW YORK TIMES, p. A9, April 4, 1991, Date, THE ORLANDO SENTINEL, April 5, 1991.]

April 4: **ATLANTIS: READY FOR LIFTOFF**

As liftoff for Atlantis' STS 37 mission approaches, Air Force meteorologists predict an 80 percent chance of favorable weather; it will be the first Shuttle launch of 1991. Pad technicians were to begin pumping liquid hydrogen and liquid oxygen into the Orbiter's external tank just after 1 a.m. tomorrow. The mission, which features the deployment of the Gamma Ray Observatory and the spacewalks by mission specialists **Jay Apt** and **Jerry Ross**, is expected to conclude April 10 with a landing at Edwards Air Force Base, CA. Pilot **Steve Nagel** will either utilize Atlantis' new brakes or try landing the Orbiter without braking on the north end of Rogers Dry Lake; it all depends on which way the wind is blowing. [Banke, FLORIDA TODAY, pp. 1A-2A, April 5, 1991.]

April 5: **STS 37 LAUNCH A 'BEAUTY'**

Liftoff of Atlantis was delayed four minutes this morning while launch controllers switched operations to allow them to execute an RTLS (Return to Launch Site) maneuver, if needed, from the opposite direction on the Shuttle Landing Facility at Kennedy Space Center. The change would have permitted enhanced visibility for such an emergency landing. Launch came, then, at 9:23 a.m. from Launch Complex 39B just as the clouds over the pad parted; in nine minutes the Space Shuttle was in orbit above the Earth. "We're off to a great mission. Today's a happy day for us, but we have a lot of work ahead," commented NASA Administrator **Richard Truly**; he also confessed an envy for the crew saying, "I wish I were on it." The STS 37 mission came just a week short of ten years after the launch of STS 1 on April 12, 1981. NASA officials said the tiny cracks on the door hinges of Atlantis posed no problem for the Orbiter during its liftoff. "We felt good about it, but it's an even you like to put behind you," said Shuttle Launch Director **Robert B. Sieck**. Two other problems surfaced during the ascent: a system, one of three, which cools the Orbiter's auxiliary power units was momentarily clogged with ice during liftoff and one of the Shuttle's 44 steering jets failed. The thruster's plumbing was thought to be clogged by engineers; orbiter maneuverability was not threatened because the remaining 43 steering jets evidenced no problems and can compensate the failed jet. Sieck also said, "The only thing we had to contend with was the weather." New visibility rules worked smoothly; they were instituted after a problem arose with the last Shuttle mission, Columbia's STS 35 flight. [Brown, FLORIDA TODAY, pp. 1A-2A, April 6, 1991, White, FLORIDA TODAY, p. 3A, April 6, 1991, Duryea, ST. PETERSBURG TIMES, pp. 1A-2A, April 6, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, April 6, 1991, Conway, THE ORLANDO SENTINEL, p. A-5, April 6, 1991, Haire, THE ORLANDO SENTINEL, p. A-4, April 6, 1991.]

April 9: **TORNADO HITS NEAR KSC**

Kennedy Space Center firefighters saw a tornado touch down about five miles

north of KSC, near Playalinda Beach. The sighting led to Brevard County's being placed under a tornado warning beginning at 9:20 p.m., according to meteorologist **Gary Schmocker** of the National Weather Service (Melbourne, FL). The warning ended forty minutes later, at 10 p.m. ["Twister Touches Down Near KSC," FLORIDA TODAY, p. 1B, April 10, 1991.]

April 11: **ATLANTIS MISSION ENDS AT EDWARDS**

A pinpoint landing in California marked the end of Atlantis' STS 37 mission; the flight lasted an extra day because adverse weather on April 10 delayed landing at Edwards Air Force Base for 24 hours. Commander **Steve Nagel** landed Atlantis on Edwards' Runway 33 at 9:56 a.m. EST. Astronaut **Brian Duffy** radioed Nagel saying, "Steve, you and your crew did it all and you made it look easy." Nagel responded, "It turned out to be a real humdinger." Johnson Space Center Deputy Director **Paul Weitz** pronounced the mission a success, "It was an eminently successful mission. We accomplished what we set out to do." [Banke, FLORIDA TODAY, p. 1A, April 12, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-16, April 11, 1991.]

April 12: **STS 1, GAGARIN ANNIVERSARIES**

Today is significant in space history for two reasons; thirty years ago the Soviet Union sent Cosmonaut Yuri Gagarin into space making him the first human being to travel into space; ten years ago the United States launched the Space Shuttle Columbia on the first-ever Shuttle flight, STS 1. [Brown, FLORIDA TODAY, pp. 1A-2A, April 12, 1991, "Soviets Use Anniversary to Boost Space Program," FLORIDA TODAY, p. 2A, April 12, 1991.]

DELTA 2 LAUNCH TODAY

"It would be great if we could get our rocket launched on the same day our friends at NASA celebrate the tenth anniversary of the first Shuttle launch," said McDonnell Douglas Space Systems Co. spokeswoman **Anne McCauley** about the expected launch today of a Delta 2 rocket carrying an American communications satellite to orbit. A technical review was conducted by launch managers yesterday and it was concluded that all systems were go for launch. Liftoff of the Delta 2 carrying its GTE Spacenet cargo is expected to occur between 6:31 and 8:41 p.m. and weather forecasts predict a 90 percent chance of favorable launch conditions. [Banke, FLORIDA TODAY, p. 8A, April 12, 1991.]

NATIONAL ASTRONAUT MEMORIAL

Two members of the U. S. Congress want the Astronaut Memorial at Kennedy Space Center designated as the National Memorial to Astronauts. U. S. Representative **Jim Bacchus** (D-Orlando, FL) and U. S. Senator **Jake Garn** (R-Utah) have filed legislation to that effect in the House and Senate; the identical legislation calls for the Astronaut Memorial currently under construction at Kennedy Space Center to be designated the national memorial for astronauts who

have died in the line of duty. Bacchus said, "This Astronaut Memorial helps us remember what has come before and reminds us of the bright future that space exploration offers to our nation and to all people. Above all, it reminds us of the risks involved in expanding the boundaries of exploration and knowledge and tells us that we must push forward despite these risks," he said. ["2 Lawmakers Call for National Astronaut Memorial," FLORIDA TODAY, p. 8A, April 12, 1991.]

[] **DELTA LAUNCH SUCCESS**

A McDonnell Douglas Delta 2, carrying a GTE communications satellite, was launched tonight at 8:09; the spectacular ascent was visible for miles. The launch itself was delayed for 42 minutes while company engineers in Huntington Beach, CA, analyzed information from weather balloons above the Cape Canaveral Air Force Station in Florida. **Jean Davis**, spokeswoman for GTE Spacenet (McLean, VA), said the launch was "terrific." Launch Commentator **Ray Adams** said, "A happy crew here in the mission director's office as spacecraft separation was confirmed." The $40 million communications satellite, ASC-2, was built by GE AstroSpace Division and owned by GTE Spacenet. [Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, p. A-3, April 13, 1991.]

[] **ATLANTIS: POST-LAUNCH INSPECTION**

Post-launch inspection of the Space Shuttle Atlantis at Edwards Air Force Base (CA) show: (1) the Shuttle's heat protection tiles were damaged in at least 59 places, requiring about a dozen to be replaced; (2) slightly cracked hinges on two doors on the Orbiter's underside fared well during the mission; (3) a paper-thin piece of metal fell from Atlantis after the two doors were opened after landing. The metal strip was part of a system used to keep an electrical charge from building between the Orbiter and external tank; the strip is normally dropped off with the tank some nine minutes after launch, but it did not prevent the doors from functioning properly. [Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, p. A-5, April 13, 1991.]

April 13: **STUDENTS VIEW ATLANTIS LAUNCH**

Students from North Carolina State University and North Carolina A & T State University were on hand April 5 for the launch of Atlantis STS 37 mission. The students recently completed a full-scale engineering research model of a proposed manned space vehicle, the HL-20, under an agreement between NASA's Langley Research Center and the Mars Mission Research Center, a cooperative effort between the two universities. The HL-20 is designed to transport people and cargo into low Earth orbit and would have conventional runway landing capability. The trip was sponsored by Rockwell International. The students from North Carolina State University were: **Greg Alexopoulos, Michael Duncan, Jay Hardin, Robert Long, Alan Shepard, Joseph Steffen, Glenn Scott Tetterton, Kenneth Dean Driver, Don Vess** and **Robert Vess**. Students from North Carolina A&T State University were **Leslie Farley, Carl Jones, John Jones, Lasonja Lan,**

Robert Williams, Dennis Hugley, and **Thurman Exum.** ["Students Treated to Shuttle Launch," FLORIDA TODAY, p. 9E, April 14, 1991.]

April 14: HERCULES AEROSPACE CONTRACT

Hercules Aerospace has been awarded a contract worth between $50 and $100 million to provide upgraded solid rocket boosters for McDonnell Douglas Space Systems Co. Delta 2 rockets. The contract requires Hercules Aerospace to provide 117 boosters - 13 complete flight sets - in 1993 for Delta launches using 9 boosters each from Cape Canaveral Air Force Station. ["Hercules Wins Delta Contract," FLORIDA TODAY, p. 10E, April 14, 1991.]

[] KSC OPEN HOUSE, ANNIVERSARY

Kennedy Space Center celebrated ten years of Space Shuttle launch history with an Open House for employees and their families; attendance was estimated at 30,000. The first Shuttle Pilot **Robert L. Crippen,** who is now Shuttle Program Director, spoke to the crowd saying, "That first launch [April 12, 1981] didn't come easy. There was a lot of blood, sweat and tears that went into it." STS 1 Commander **John Young,** also spoke to the crowd, "This is where the action has been for the last 30 years and where it will be for the next 130 years. The things the Space Shuttle has been able to do have been absolutely fantastic, but you all know about those." He said that KSC will have a continuing role in manned space flight in the years to come. Former KSC Director **Richard Smith** was also in attendance. He said, "I'm more relaxed than I was 10 years ago. It's hard to believe it's been that long. You look around and see all the same faces and realize what makes this place work are the people." [Banke, FLORIDA TODAY, p. 1A, April 14, 1991, "Shuttle Insiders Celebrate 10th Anniversary," THE ORLANDO SENTINEL, p. A-23, April 14, 1991.]

April 15: DISCOVERY LAUNCH DATE SET

"We're ready to go and the Shuttle [Discovery] is ready to go," said Kennedy Space Center spokeswoman **Lisa Malone** in announcing the April 23 launch date for the Orbiter; the launch comes just 18 days after that of Atlantis. Discovery's launch window on the 23rd runs from 7:05 a.m. to 10:31 a.m.; countdown begins at 8:45 a.m. April 20. The seven-member STS 37 crew at about 6:30 p.m.; the crew includes Pilot **Michael Coats,** Pilot **L. Blaine Hammond, Jr.** and Mission Specialists **Guion Bluford, Gregory Harbaugh, Richard Hieb, Donald McMonagle** and **Charles L. Veach.** Meanwhile, launch preparations continue today at Launch Complex 39A; Discovery's computers are being loaded with mission programs and launch pad storage tanks are being filled with the liquid hydrogen and liquid oxygen which will be loaded onto Discovery prior to launch. Atlantis is expected to leave Edwards Air Force Base (CA) April 16 for a one-day flight to Kennedy Space Center, barring ill weather. A refueling stop has been scheduled for Kelly Air Force Base (TX); arrival at KSC should come at 6:30 p.m. [Banke, FLORIDA TODAY, p. 1A, April 16, 1991; Headline Radio News, 1350 a.m., April 17, 1991,

Banke, FLORIDA TODAY, p. 5A, April 13, 1991, Date, THE ORLANDO SENTINEL, April 16, 1991.]

COUNTDOWN STANDARD SET

Shuttle Launch Director **Robert Sieck** was so pleased with the execution of the processing flow and the terminal countdown for the Gamma Ray Observatory mission (STS 37) that he says that it could establish the standard procedure for future flights: milestones were on target in virtually every sequence of events. He said the count never varied more than ten minutes and "was one of the best countdowns" he'd experienced. [Kolcum, AVIATION WEEK & SPACE TECHNOLOGY, p. 25, April 15, 1991.]

April 18:

WEATHER MIGHT STALL ATLAS LAUNCH

There is a 60 percent chance that weather will be favorable for launch of a General Dynamics-built Atlas 1 rocket tonight at 7:14. There is the threat of rain, however. The Atlas will carry a direct broadcast satellite into orbit for the Japanese Broadcasting Co.; the launch is paid for by General Electric. **Charlie Lloyd**, Vice President of General Dynamics Commercial Launch Services Inc., spoke about the prospects of his company in the commercial launch market saying, "In the long-term we see some very favorable things for our commercial launch business." The GE Program Manager **Ron Maehl** said, "It's a very important mission for us in the satellite industry because the Japanese direct broadcast market has really demonstrated the viability of this form of satellite communications." The satellite replaces one lost in an Ariane rocket failure last year. [Brown, FLORIDA TODAY, p. 1A, April 18, 1991.]

BACCHUS: SPEND MORE ON SPACE

Freshman Congressman **Jim Bacchus** (D-Melbourne, FL) called for increased spending for NASA on space exploration and scientific research. "I believe there is unanimous agreement in this House that we must increase our competitiveness in the international marketplace," he said. "But how in the world can we profess a commitment to competitiveness when we fail to invest in one of the few technology areas in which the United States remains a clear international leader?" [Hasson, FLORIDA TODAY, p. 3A, April 18, 1991.]

ATLAS-CENTAUR MALFUNCTIONS; LOST

Six minutes after launch at 7:30 p.m., an Atlas-Centaur rocket went out of control and had to be destroyed along with its multimillion dollar communications satellite payload. "It clearly was a disappointing event for u, but also for our customer," said **Alan Lovelace**, Chairman of General Dynamics Commercial Services, about the unsuccessful mission. The customer Lovelace referred to was the Japanese Broadcasting Co. whose satellite was destroyed. The Atlas rocket's first stage separated properly from its Centaur upper-stage at 4 1/2 minutes into its flight, but two minutes later only one of two Centaur rocket engines ignited causing a loss

of control, according to Mission Commentator **Skip Mackey**. The rocket was blown up on command by Air Force range safety officers to avoid danger to populated areas. Total cost of the launch, and spacecraft was $100 million; the last previous Atlas Centaur failure came in March 1987 when lightning destroyed one of the rockets shortly after launch from Cape Canaveral. The launch had been delayed 16 minutes due to high winds over Cape Canaveral Air Force Station. General Dynamics is focusing its investigation into the failure on a problem with the rocket's engine. [Banke, FLORIDA TODAY, pp. 1A-2A, April 19, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-10, April 19, 1991, "Builder Suspects Engine Failure Spoiled Liftoff," THE NEW YORK TIMES, p. 6. April 20, 1991.]

[] ATLANTIS RETURNS TO KSC, FINALLY

The return of Atlantis to Kennedy Space Center officially ended its Gamma Ray Observatory mission; the Shuttle arrived atop its 747 Shuttle Carrier Aircraft at the Shuttle Landing Facility at 9:37 a.m. The landing occurred just minutes before rain pummeled the KSC area. The Orbiter will be towed to the Orbiter Processing Facility tomorrow morning to be readied for a July mission to deploy a Tracking and Data Relay System satellite. Meanwhile, preparations for Discovery's launch April 23 continue without problems. NASA spokeswoman **Lisa Malone** said, "We're right on schedule and looking forward to a launch on Tuesday." Discovery's rear engine compartment was readied for launch today and the countdown begins April 20 at 8:45 a.m. The seven-man crew also arrives at Kennedy Space Center at about 6:30 p.m. [Banke, FLORIDA TODAY, p. 2A, April 19, 1991, KSC SHUTTLE STATUS REPORT, April 18, 1991.]

April 19: COUNTDOWN READY TO START

"Everything's ready to go," announced Kennedy Space Center spokesman **Bruce Buckingham**; countdown for STS 39 is ready to proceed. The seven-man crew is expected to fly into KSC this evening at approximately 6:30 for final preparations for their eight-day Department of Defense mission. [Brown, FLORIDA TODAY, p. 6A, April 20, 1991.]

April 20: DISCOVERY'S CREW ARRIVES AT KSC

"We're all excited to be here," said STS 39 Commander **Michael Coats** on his arrival today at Kennedy Space Center. "We're very, very proud of this flight. We think it's a tremendous challenge for NASA - probably one of the most challenging flights we've flown." Launch preparations continue to go well, according to NASA Test Director **Al Sofge**. "All we need is some good weather. If you know any prayers please say them, because we'll be anxious to climb in and just do it for one time," said Coats. The STS 39 crew also includes Pilot **Blaine Hammond, Jr.**, backup pilot **Don McMonagle** and Mission Specialists **Greg Harbaugh, Guion Bluford, Lacy Veach** and **Rick Hieb**. [Brown, FLORIDA TODAY, p. 1A, April 21, 1991, SPACE SHUTTLE MISSION STS-39 COUNTDOWN STATUS, April 21, 1991.]

HILMERS REPLACES CARTER IN '92 FLIGHT

Manley "Sonny" Carter, 43, was killed April 5 in a plane crash near Brunswick, GA, that also took the life of former U. S. Senator **John Tower**. Carter will be replaced aboard a 1992 Spacelab mission by veteran Shuttle astronaut **David Hilmers**. That flight is scheduled to launch in February 1992. In announcing the crew change, **Donald Puddy**, Director of Flight Crew Operations at Johnson Space Center, said, "It is with great regret that i have to make this selection under these circumstances. We all miss Sonny Carter; he was a special person and friend who can never be replaced." [Halvorson, FLORIDA TODAY, p. 4A, April 21, 1991.]

April 21:

LAUNCH FORECAST UNFAVORABLE

Shuttle Weather Officer **Ed Priselac** said today that almost every weather condition required for launch is threatened. There are low-altitude clouds which could block visibility; upper-level winds are predicted to be twice as strong as the area's normal 50-knot gusts; thunderstorm clouds which might provide lightning may blow over Kennedy Space Center April 23. Weather for Tuesday's launch of Discovery's STS 39 mission is forecast to be less than favorable with 70 percent chance of violating launch constraints at the opening of the window. There is a 60 percent chance of violating constraints throughout the entire three-hour, 26 minute window. a front located in western Florida and into the Gulf will probably produce low clouds and favorable conditions for showers. April 24's forecast calls for a 60 percent chance of violating launch constraints; April 25's forecast calls for a 40 percent chance of violation. Nevertheless, despite the forecasts, everything at Launch Complex 39A is continuing on schedule today as launch team members work toward the launch of the Space Shuttle Discovery at 7:05 a.m., April 23. The launch window extends through 10:31 a.m. The countdown clock came out of the T-27 hour planned eight-hour built-in hold on time this morning at 8:45. The clock will continue to count down until 4:45 p.m. today at which time it will enter another planned hold. Last night, April 20, final servicing of the STS 39 payload was completed and the payload bay doors were closed today at 8:30 a.m. At the pad today, the Power Reactant and Storage Distribution System on-board storage tanks are being serviced with liquid hydrogen and liquid oxygen reactants. The pad was cleared for this hazardous fueling operation at 9:00 a.m. Following PRSD loading operations, the Orbiter Midbody Umbilical Unit is scheduled to be retracted at about 4:45 p.m. today. Communication activation checks are targeted to begin about 9:00 p.m. The Rotating Service Structure is scheduled to be moved away from the vehicle at 11:45 a.m. April 22. The STS 39 flight crew arrived at Kennedy Space Center about 6:30 p.m. April 20; today the seven-member crew, already divided into two teams to accommodate a 24-hour in-flight work schedule, had their final medical exams and flew training missions in the Shuttle Training Aircraft and T-38 Trainer Aircraft. [**SPACE SHUTTLE MISSION STS-39 COUNTDOWN STATUS**, April 21,1991, Brown, FLORIDA TODAY, p. 1A, April 22, 1991, Date, "Shuttle Slated to Go Tuesday, May Be Delayed," THE ORLANDO SENTINEL, p. A-14, April 21, 1991.]

April 22: **ATLANTIS LANDING NOT PERFECT**

For the first time in 38 Orbiter landings, the Space Shuttle Atlantis put down 200 yards short of its lakebed runway at Edwards Air Force Base two weeks ago; the proximate cause was fluky winds and a late turn. There was no danger to the crew or the Orbiter because of the vast expanse of desert land in the area. At Kennedy Space Center, however, Atlantis would have had only 377 feet to spare on the 1,000-foot Shuttle Landing Facility. Shuttle Program Director **Robert L. Crippen** said, "We have taken some steps to see that we don't have that kind of action again." He said, nonetheless, that the Atlantis landing would not deter NASA from resuming regular landings at KSC next year. Landing at Kennedy Space Center will save NASA about $1 million per flight in cross country transportation costs - once improvements to the Orbiters are fully tested.
According to NASA spokesman **Jeff Carr**, Atlantis touched down 623 feet short of the runway markings on the Edwards runway due to a sudden wind shift and a slightly wide turn by Commander **Steve Nagel**. Carr said Nagel began his turn "a hair too late" and met a drastic wind shift from 105 mph out of the northwest to about 20 mph from the north. Carr went on to say that ground controllers were aware of the wind shift but failed to relay the information to Nagel because they did not know of Nagel's wide turn. "This is the first time we've encountered this kind of thing in wind speed," Carr said. Starting with the landing of Discovery's STS 39 mission, ground controllers will continually update astronauts on changing wind conditions through touchdown; in addition, Shuttle commanders will undergo additional training to help them deal with wind shifts. [Date, THE ORLANDO SENTINEL, pp. A-1 & A-5, April 23, 1991.]

ATLAS ENGINE SHUT DOWN

Both of the engines on the ill-fated Atlas Centaur rocket ignited last week after launch, but one shut down causing the rocket to be destroyed over the Atlantic Ocean. "We are trying hard to determine what happened. Unfortunately, we'll never get the motors back," said **Arthur Wegner**, President of United Technologies' Pratt & Whitney. Until the failure on April 18, 178 Centaur engine had fired in space, all successfully, according to Pratt & Whitney. ["Two Atlas Engines Ignited, 1 Shut Down, Company Says," FLORIDA TODAY, p. 2A, April 23, 1991.]

April 23: **DISCOVERY'S LAUNCH SCRUBBED**

A problem was found in one of Discovery's three main engines this morning at 1:15; launch will be postponed from two to five days. A transducer on a main engine turbopump failed just five-and a half hours before liftoff was to have occurred; NASA spokesman **Joe McRoberts** said liftoff may come no earlier than April 26. If not launched then, the mission must be postponed until next week because the payload must be reserviced after the 26th. Technicians must drain 528,616 gallons of fuel from the Orbiter before workers can enter the cramped rear engine compartment to attempt to pinpoint and fix the problem with the main engine. [Halvorson and Brown, FLORIDA TODAY, p. 1A, April 23, 1991, "Shuttle Discovery Launch Is Scrubbed," USA TODAY, p. 3A, April 23, 1991.]

EG&G AT SPACE CONGRESS

EG&G Fire Services personnel will be on hand at the Space Congress in Cocoa Beach through April 25 to demonstrate gear and equipment used by EG&G firefighters and by the launch pad crew at Kennedy Space Center. Also on display will be EG&G's new Document Imaging Processing System. ["EG&G at Space Congress," THE TRIBUNE, p. 4B. April 24, 1991.]

ALBRECHT AT SPACE CONGRESS

Mark Albrecht, Executive Secretary of the National Space Council, told the 28th Space Congress (Cocoa Beach, FL) that scrapping the $30 billion space station program after it has undergone six years of development and four major design changes would seriously erode public support for future missions to the moon and to Mars. Albrecht delivered the Congress's Keynote Address as a stand-in for Vice President **Dan Quayle** who had a scheduling conflict. Albrecht welcomed debate, but called space station critics "confused." He said judging the space station by the number of experiments it can perform would be misguided. He said that argument would have derailed Christopher Columbus. Albrecht used the opportunity to speak to the Space Congress to pronounce the U. S. space program in "excellent condition, in a class by itself." He said much of the credit for the successful prosecution of the war against Iraq was due to the Global Positioning Satellites which aided allied troops in going through mine fields and kept soldiers in constant communications with their commanders. He said, "No other nation in the world could have done this. No other country has this capability." [Ash, FLORIDA TODAY, p. 1B-2B, April 24, 1991.]

DISCOVERY: FIVE-DAY LAUNCH DELAY

Discovery's STS 39 may be grounded as many as ten days while technicians and engineers work to solve an electrical problem which might have caused an in-flight engine failure. A longer delay would impact Columbia's STS 40 Spacelab mission. **Boyce Mix**, Deputy Manager of the space agency's Shuttle Engine Project Office, said of the problem, "This is a first for us and we don't really understand what happened. We're just going to have to go and see what we find." In the last hours before its scheduled liftoff, a pressure sensor in an engine turbopump failed. Technicians will also attempt to determine whether a wire harness and the engine's main computer need replacing. If only the sensor needs to be replaced, launch could occur April 28 between 7:01 a.m. and 10:21 a.m., Mix said. If the wire harness must be replaced, launch would be delayed until April 29 between 7:00 a.m. and 10:30 a.m. If the engine computer must be changed out, the launch delay could be the middle of next week or later. There are spare parts available for all three contingencies at Kennedy Space Center. When Discovery's problem appeared, engineers noted an incorrect reading from one of two sensors which measure pressure in an engine turbopump; the sensor improperly signaled a dangerous increase in pump pressures. That reading could have caused the Shuttle to shut off one of its main engines in-flight, requiring an emergency landing attempt at the Shuttle Landing Facility at KSC or one of two emergency landing

strips in Spain or in New Mexico. [Halvorson, FLORIDA TODAY, pp. 1A-2A, April 24, 1991, "Shuttle Delay," USA TODAY, p. 3A, April 24, 1991, Date, THE ORLANDO SENTINEL, p. A-1 & A-7, April 24, 1991.]

April 24: **PROBLEMS FIXED; COUNTDOWN RESUMES**

Countdown clocks at Kennedy Space Center will start up today at 8:45 a.m., looking toward an April 28 launch between 7:01 a.m. and 10:21 a.m. Replacement of two suspect parts in a Discovery engine cleared the way for restarting the countdown. KSC spokesman **Bruce Buckingham** said, "The team is confident we've solved our problem." The faulty parts - a sensor and a wire harness - were replaced today when technicians entered the Orbiter's engine compartment. Launch managers have three opportunities to launch Discovery - April 28, 29 and 30 -before its payload must be reserviced. If the payload must be reserviced there will be a further six-day delay. [Halvorson, FLORIDA TODAY, p. 1A, April 25, 1991.]

[] **ENDEAVOUR DEBUTS IN CALIFORNIA**

Endeavour, the replacement Space Shuttle for Challenger, rolls out of its Rockwell International assembly hangar (Palmdale, CA) today amid flag-waving ceremonies. "It's going to look very, very good coming out of the barn," said **John "Tip" Talone**, the KSC manager who is in charge of preparations for transporting Endeavour to the space center next week. The new Orbiter, which may be the last one ever built, has dozens of improvements over its three sister ships. It has a drag chute to make landings safer and allow them to take place routinely at Kennedy Space Center; Endeavour has upgraded navigation, steering and computer systems and it will be equipped to stay in space for up to 28 days. Rep. **Jim Bacchus** (D-Orlando) said, "Ideally I'd like to see us build another Orbiter. I also believe we need to expand the initial efforts to develop a new heavy lift launch vehicle. Realistically, we're going to be facing some very constraining budgetary situations that may make it very difficult to build another Orbiter." Endeavour is expected to arrive at Kennedy Space Center May 2. [Banke, FLORIDA TODAY, p. 1A, April 25, 1991, "Delayed Discovery Set to Go on Sunday," USA TODAY, p. 3A, April 25, 1991, "NASA Touts Its Latest Endeavour," THE ORLANDO SENTINEL, p. 1A, April 26, 1991.]

April 25: **QUAYLE APPROVES BOOSTER PLAN**

Vice President **Dan Quayle**, chairman of the National Space Council, has approved a $10 to $12 billion plan to develop and fly an new space booster that would fly in 1999. The new boosters would be based on the Shuttle's external fuel tank and propelled by up to six improved Space Shuttle main engines. The planned boosters are known as the National Launch System and would eventually replace the Space Shuttle, the military's Titan 4 and other expendable rockets. Congress has been asked to authorize $350 million for the project, but Marshall Space Flight Center Director **Jack Lee** said, "Congress hasn't been very good to us so far." Lee added that if Congress approves the project, main engine

development would begin next year. Launch would be from a refurbished Space Shuttle pad at Kennedy Space Center and a new pad at Cape Canaveral Air Force Station. Lt. Gen. **Thomas Moorman**, Commander of the Air Force Space Command, said, "We envision a family of vehicles that serve a range of needs. NASA hopes plans to have the new launch system operational by the time Space Station Freedom is occupied by astronauts in 1999. The military plans on making use of the system in 2005; the Department of Defense and NASA will share development and management costs. Commander of the Air Force Space Systems Division, Lt. Gen. **Donald Cromer**, said the new launch vehicle should be more reliable, easier to operate and cheaper to fly than current expendable launchers. "We want to make the launch pad analogous to the end of a runway. You fuel and launch in a matter of hours or days, not weeks, months or even a year," he said. [Brown, FLORIDA TODAY, pp. 1B-2B, April 26, 1991.]

CALIFORNIA: ENDEAVOUR JOINS FLEET

The Space Shuttle Endeavour (OV-105) joined NASA's fleet of Orbiters today when it was rolled out of its California hangar to meet the press. NASA Administrator **Richard Truly** was on hand for the event and said, "Endeavour is a beauty, and in this case beauty is more than skin deep." The newest of the four Space Shuttles is a much improved model [see story dated April 24], but the primary difference between Endeavour and its sister ships is its ability to stay in space for up to 28 days, nearly three weeks longer than the longest Shuttle mission so far. Astronaut **Dan Brandenstein**, who will command the Orbiter's first mission in 1992, commented, "Endeavour is the jewel of the fleet." Executive Vice President of Rockwell International's Space Systems Division **Sam Iacobellis** expressed confidence that more Orbiters will be constructed, saying, "Shuttle Endeavour is the latest Orbiter, but it won't be the last." The Augustine Report has suggested, however, that Endeavour be the last Orbiter built. The newest Shuttle is expected to arrive at Kennedy Space Center on May 2 in time for the dedication of the Astronauts Memorial at Spaceport USA. [Halvorson and Banke, FLORIDA TODAY, p. 1A, April 25, 1991, KSC SHUTTLE STATUS REPORT, April 29, 1991.]

DISCOVERY COUNTS DOWN TO LAUNCH

Meteorologists for the Air Force today predicted a 70 percent chance that weather will cooperate with the April 28 attempt to launch the Space Shuttle Discovery at 7:01 a.m.; there is some concern about the possibility of thick, low-level clouds and rain showers in the area. Weather is expected to improve to an 80 percent favorable prediction by the close of the launch window at 10:21 a.m. The faulty sensor on Discovery was removed and another installed along with a new wire harness on April 24. The faulty sensor was flown to Marshall Space Flight Center for testing. "We proved that it was a bad sensor," said Kennedy Space Center spokeswoman **Lisa Malone**. [See story below.] Launch Complex 39A will be cleared of all but essential personnel April 26 while hazardous propellants are loaded onto the Space Shuttle. [Halvorson, FLORIDA TODAY, p. 2A, April 26, 1991, Date, THE ORLANDO SENTINEL, April 26, 1991.]

MSFC TESTS ON SENSOR, HARNESS

Space Shuttle Main Engine Project engineers at NASA's Marshall Space Flight Center have completed their initial examination and testing of the pressure transducer and the electrical wiring harness removed this week from the high pressure oxidizer turbopump of Main Engine number three aboard Space Shuttle Discovery. That transducer malfunctioned during Discovery's countdown April 23 in preparation for the STS 39 Department of Defense mission. According to **Jerry Smelser**, Manager of the Space Shuttle Main Engine Project Office, the transducer and harness arrived at Marshall Center April 24 and underwent tests, during which engineers were able to replicate the problem that occurred during tanking. "We know now that it was the transducer that caused the problem," Smelser said. "The faulty transducer was affected by the cold temperatures, a problem we haven't seen with transducers in any of the previous 39 Shuttle flights." He noted that low temperatures are present in the aft engine compartment during tanking due to the presence of cryogenics in the fuel. Smelser said the faulty transducer was being returned to its manufacturer for further testing to determine why the low temperatures adversely affected it. He indicated that both the transducer and the wiring harness have been replaced on Discovery, which is now being prepared for launch April 28. ["Tests Completed on STS-39 SSME Transducers," MSFC STATUS REPORT, April 25, 1991.]

April 26:

NASA READY FOR LAUNCH

"We're rarin' to go; right now, everything is proceeding as scheduled. We're actually a few minutes ahead of schedule. I don't see any problem with launching on Sunday," said **Eric Redding**, NASA Test Director. The countdown to launch proceeded smoothly through the loading of propellants April 26. Air Force meteorologists put the chances for launch at 80 percent with possible low clouds and rain showers the only constraints on the horizon. Meanwhile, technicians towed the Space Shuttle Columbia from the Orbiter Processing Facility to the Vehicle Assembly Building for mating with its external tank and solid rocket boosters in preparation for a May 24 launch on its STS 40 mission. [Halvorson, FLORIDA TODAY, p. 2A, April 27, 1991, Date, THE ORLANDO SENTINEL, April 27, 1991.]

MANNED SPACE FLIGHT ANNIVERSARY

Plans are on course for the 30th anniversary of manned space flight celebrations. **Howard Benedict**, Executive Director of the Mercury 7 Foundation, promises that the occasion is "going to be a big time." Mercury astronauts **Alan Shepard, Scott Carpenter, Gordon Cooper** and **Wally Schirra** will attend a May 9 ceremony dedicating the $6 million astronaut memorial under construction at Spaceport USA. Among others, the astronaut memorial honors the memory of the late Mercury Astronaut Virgil "Gus" Grissom. On May 10, Shepard will speak at 11 a.m. at Cape Canaveral Air Force Station's Launch Complex 5 where his 15-minute spaceflight originated in 1961. This speech will begin a major effort to preserve and expand the Air Force Space Museum near LC 5. At noon, Shepard

will take part in a recreation of his 1961 countdown and the launch of a 1/14th-scale model of the Redstone rocket near the Kennedy Space Center headquarters. The public is invited to meet Cooper, Carpenter, Schirra and **Deke Slayton** at the U. S. Astronaut Hall of Fame outside the KSC gates near Titusville, FL. [Halvorson, FLORIDA TODAY, p. 2A, April 27, 1991.]

April 27: **ORBITER UPDATE**

Columbia is in the Vehicle Assembly Building at Kennedy Space Center, where technicians are attaching the Orbiters external tank and solid rocket boosters. The Shuttle is scheduled to be rolled to Launch Complex 39B by the end of the week with launch targeted for May 24 on its STS 40 mission. Atlantis is in Hangar No. 2 of the Orbiter Processing Facility where technicians are continuing post-flight inspections and tests. Atlantis is next scheduled for flight in July; the mission is STS 44. Endeavour, NASA's newest Space Shuttle, is to arrive at Kennedy Space Center on May 2. On arrival, the new Orbiter will be towed into the OPF for a brief stay, then be rolled over to the VAB for an extended stay until early August. ["Orbiter Update," FLORIDA TODAY, p. 10E, April 28, 1991.]

FREEMAN WINS CONGRESS AWARD

This year's Space Congress Achievement Award was awarded to **Roy Freeman** (Cocoa Beach, FL), an employee with Rockwell International's Space Systems Division. He was cited for technical excellence and outstanding achievement in the military's launch of the Global Positioning Satellites, which are manufactured by Rockwell. The award was presented by **John Latherow**, Chairman of the Canaveral Council of Technical Societies, which sponsors the Congress. ["Cocoa Beach Resident Wins Achievement Award," FLORIDA TODAY, p. 9E, April 28, 1991.]

April 28: **STS 39 LAUNCH**

"The most sophisticated mission we've launched so far," said **Michael Griffin**, Head of Technology for the Strategic Defense Initiative Organization when speaking of today's 7:33 a.m. launch of STS 39. Today's launch marked the eighth mission for the Department of Defense, but the first that was not secret. Griffin went on to say of the ambitious Pentagon mission: "It will tell us what our targets will look like in the space environment, the environment we would have to fight in." NASA Administrator commented on the launch, saying: "What a great way to end a beautiful month for the space program." This morning's launch came just 22 days after Atlantis was launched on April 6. The only time previously when two shuttles were launched in the same month was January 1986 when STS 61-C and STS 51-L were launched. NASA spokesman **George Diller** said, "We always had a long-term plan to have two vehicles flying from two (launch) pads. It's a comfortable feeling to be getting back to that." The launch of STS 39 today culminated five years of training and several delays for its crew. The mission had originally bees scheduled for November 1990, but it was delayed due to the hydrogen fuel leaks which grounded the fleet for a large part of the year. A March 9 launch date

slipped after cracks were found in hinge mechanisms on two fuel inlet doors on the Orbiter's underside. Then, on April 23, the mission was scrubbed six hours before its scheduled launch because of a false sensor in an engine turbopump.

Today, the countdown proceeded smoothly, although launch was delayed 32 minutes due to a problem with a flight data recorder which turned itself on about 20 minutes before the scheduled 7:01 a.m. liftoff. "It acted like it had a mind of its own," said **Robert B. Sieck**, Shuttle Launch Director. The recorder was shut down and appeared to work perfectly after being reset, Sieck said. The countdown had been held to ensure that the Shuttle's computers did not send a false command to the recorder. An earlier problem with an Orbiter cooling system was resolved by using back-up equipment. The crew: Commander **Michael Coats**, Pilot **Blaine Hammond** and Mission Specialists **Guion Bluford, Donald McMonagle, Richard Hieb, Charles "Lacy" Veach** and **Gregory Harbaugh** rose for the traditional launch day breakfast of steak and eggs at 2:40 a.m.; they dressed and were driven to Launch Complex 39A at about 3:50 a.m. The mission is expected to last eight days, seven hours and 24 minutes with a scheduled landing May 6 at Edwards Air Force Base (CA). [Halvorson, FLORIDA TODAY, pp. 1A & 4A, April 29, 1991, Hoversten, USA TODAY, p. 6A, April 29, 1991, Broad, THE NEW YORK TIMES, p. A11, April 29, 1991, KSC SHUTTLE STATUS REPORT, April 29, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-5, April 29, 1991.]

BOOSTER RETURN UNDERWAY

The solid rocket boosters from the Discovery launch are being towed by the recovery ships to Hangar AF. They are scheduled to arrive at the Hangar at about 5 p.m. today. Safing the boosters is the first order of business. Afterwards, they will be inspected and washed down. Thermal foam and exterior cork will be removed with high pressure water. Disassembly operations are scheduled to take about ten days. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]

April 29:

STS 40 PROCESSING

The STS 40 Shuttle Interface Test on the Orbiter Columbia began this morning. Mating with the external tank has been accomplished as have the electrical and mechanical connections between the vehicle elements and the launch platform. Rollout to Launch Complex 39B is scheduled to begin at 12:01 a.m. May 2; a Terminal Countdown Demonstration Test is scheduled for May 6-7 and the STS 40 Flight Readiness Review will take place May 13 and 14. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]

STS 43 PROCESSING

Sniff checks of Atlantis' orbital maneuvering system motor valves has begun as have preparations to drain residual hypergolic propellants from the onboard storage tanks. Lube oil service for auxiliary power units has been performed and preparations have begun to remove the Orbiter's three main engines which will take place tomorrow. Stacking of the left aft booster, first booster segment for

STS 43, has begun in the Vehicle Assembly Building. Work completed includes removal of external tank umbilical housings; draining of the waste management system; main engine drying operations; removal of the remote manipulator system; replacement of the no. 3 fuel cell and replacement of window no. 1. [KSC SHUTTLE STATUS REPORT, April 29, 1991.]

April 30: **COLUMBIA PREPPED FOR ROLLOUT**

The Space Shuttle Columbia will be rolled out to Launch Complex 39B at 12:01 a.m. May 2 in advance of its May 24 launch on its STS 40 mission. Today the electrical and mechanical connections between the Orbiter and its fuel tank and solid rocket boosters were checked. Atlantis is also being prepared for its next mission, STS 44. During preparations workers tried to open Atlantis' cargo bay doors while they were still latched shut; a motor which opens the doors ran for about three seconds when it was realized that the doors weren't moving and the motor shut off. Lockheed Space Operations Co. spokesman **J. B. Klump** reported no damage to Atlantis, but the company is considering disciplinary actions against the employees involved in the incident. [Brown, FLORIDA TODAY, p. 11A, May 1, 1991.]

MAY

May 1: **STS 40 PREPARATIONS**

Columbia's pre-rollout preparations continue; the Orbiter is scheduled to be rolled to Launch Complex 39B starting tomorrow morning at 12:01. Today work platforms are being rolled away from the Shuttle and the crawler transporter is being readied for the trip to the launch pad. The Shuttle Interface Test to verify critical connections between the vehicle's elements and the launch platform has been completed as has installation of the external tank separation camera. Among the tasks to be accomplished at 39B are: launch pad validations; hot firing of one auxiliary power unit tomorrow night; the extension of the Rotating Service Structure about 4 a.m. May 3. This weekend technicians will conduct a Helium Signature Leak Test of the main propulsion system and the three Shuttle Main Engines; they will also conduct a main engine flight readiness test. The Terminal Countdown Demonstration Test is scheduled for May 6-7 and the Flight Readiness Review remains set for May 13-14. [KSC SHUTTLE STATUS REPORT, May 1, 1991, SEE ALSO: KSC NEWS RELEASE NO. 55-91, May 1, 1991.]

WORK ON ATLANTIS FOR STS 43

Preparations continue to drain residual hypergolic propellants from the onboard storage tanks. Stacking of the second booster segment - the left aft center - is underway in the Vehicle Assembly Building as are routine inspections of the 17-inch disconnect. Installation of a fourth power reactant storage and distribution system tank has been set. Draining of residuals from the auxiliary power unit catch bottles proceeds as do preparations to replace a thruster on the right orbital maneuvering system pod and vent filters in the Orbiter's midbody. Completed work includes the removal of the three Shuttle Main Engines and sniff checks of the orbital maneuvering system motor valves. [KSC SHUTTLE STATUS REPORT, May 1, 1991.]

ENDEAVOUR TRANSPORT PREPARATIONS

Endeavour is being prepared for delivery to KSC this week. Today, the new Orbiter is being mated to the new 747 Shuttle Carrier Aircraft using the Orbiter Lifting Frame. The first leg of the cross country ferry flight, from California to Texas, is scheduled to begin the morning of May 2. A refueling and overnight stop is planned at Ellington Field in Houston, TX. The journey, from Texas to Florida, will continue Friday. Pending favorable weather conditions, Endeavour's estimated time of arrival at Kennedy Space Center is noon May 3. Once demated from the 747, Endeavour will be towed to the Orbiter Processing Facility where the tail cone, ferry flight kit items, the two simulated orbital maneuvering system pods, and mock forward control system will be removed. Endeavour will then be towed to the Vehicle Assembly Building for powered down work. [KSC SHUTTLE STATUS REPORT, May 1, 1991.]

May 2: **COLUMBIA ROLLS TO PAD**

The Space Shuttle Columbia headed for Launch Complex 39B last night at 11:26 and was hard down at the pad early this morning. A practice countdown for the nine-day STS 40 mission is scheduled for early next week. The crew includes: Commander **Bryan O'Connor**, Pilot **Sidney Gutierrez**, Mission Specialists **Tamara Jernigan**, **Margaret Rhea Seddon** and **James Bagian**, and Payload Specialists **Francis Andrew Gaffney** and **Millie Hughes-Fulford**. ["Columbia Moved to Launch Pad," FLORIDA TODAY, p. 6A, May 2, 1991.]

TECHNICIANS MEMORIAL DEDICATED

Kennedy Space Center officials today officially dedicated a memorial to technicians killed while working at the space center. "People make the events happen here; hardware does not get processed by itself. We move around hazardous things, and all of this does not come without risk," said KSC **Forrest S. McCartney**. Seven persons' names are on the memorial located in the IMAX Theatre at Spaceport USA. The memorial features a bronze statue of an eagle, an astronaut helmet and a hard hat. Those listed are: **Forrest Cole** and **John Bjornstad**, who died in 1981 after entering the Space Shuttle Columbia's rear engine compartment while it was filled with gaseous nitrogen; **Sidney Dagle**, **Lot Gable** and **John Fassett**, who died April 14, 1964, when a solid-rocket motor they were working on ignited; **W. B. Estes**, killed May 16, 1968, at Launch Complex 39A after being struck by an unattached water line inadvertently subjected to high pressure; **Clarence Hailey**, who suffered a fatal fall on July 27, 1989, inside the KSC Utility Annex next to the VAB. Credited with persuading KSC managers to establish the memorial is retired Rockwell International worker **Guenter Wendt**. [Banke, FLORIDA TODAY, p. 6A, May 2, 1991.]

MANLEY CARTER'S NAME ADDED TO MEMORIAL

The name of the late astronaut **Manley "Sonny" Carter** will be added to the Astronaut Memorial which is scheduled to be unveiled at Spaceport USA next week. "Everybody felt very strongly he met the criteria. He was on duty, going to give a speech representing the Astronaut Office," said Kennedy Space Center Public Affairs Director **Chuck Hollinshead**, who is on an advisory panel to the Astronauts Memorial Foundation which built the monument. Carter, was killed in an airplane crash on April 5 along with former Texas Senator **John Tower** and 21 others; the crash is currently under investigation. **Richard Truly**, NASA Administrator wrote a letter to the AMF urging that Carter's name be added to the memorial. AMF Chairman **Alan Helman** said, "We're pleased we're in a position to recognize Sonny. The memorial is designed to be able to add names as time goes on. Hopefully, we'll never have to do it again." Carter's name will be represented temporarily on the memorial by a gold star until it can be replaced with permanent recognition on the first anniversary of his death. [Brown, FLORIDA TODAY, p. 6A, May 2, 1991.]

ENDEAVOUR'S CROSS COUNTRY TRIP

Endeavour's departure from Palmdale, CA, has been delayed due to adverse weather in the flight path from California to Texas. The main concern today is turbulence over the Rocky Mountains. Endeavour will remain on the ground until conditions improve. Officials are keeping a close eye on the weather. The ferry flight could begin tomorrow morning [May 3] pending favorable weather conditions. Yesterday, the Orbiter was successfully mated to the new 747 Shuttle Carrier Aircraft. [KSC SHUTTLE STATUS REPORT, May 2, 1991.]

HOUSE OK'S NASA SPENDING

The U. S. House of Representatives voted 361 - 36 to approve a NASA budget of $14.9 billion next year; the figure includes $20 million for the Spaceport Florida Authority. President **Bush** had requested $15.7 billion. The legislation provides a 10% increase over 1991. Among other items included in the legislation were: President Bush's full $2 billion request for the Space Station in 1992. Melbourne Democrat Rep. **Jim Bacchus** commented on the bill's passage, "I'm especially happy with the strong support for the space station and also for the $20 million launch improvements for the Florida Spaceport Authority." NASA has already expended $5.5 billion on the Space Station Program and expects the total cost at completion to be $24.5 billion. Rep. **Barbara Boxer** (D-CA), who heads the Government Operations Transportation Subcommittee, predicts the cost of completing the Space Station to be $180 billion. [Hasson, FLORIDA TODAY, p. 9A, May 3, 1991, Crawford, THE ORLANDO SENTINEL, p. A-9, May 3, 1991.]

May 3:

ENDEAVOUR'S TRANSCONTINENTAL JOURNEY

The Space Shuttle Orbiter Endeavour, and its 747 Shuttle Carrier Aircraft touched down at Biggs Army Air Field near El Paso (TX) at 11:22 a.m. EDT to complete the first leg of its flight from Palmdale (CA) to the Kennedy Space Center. Weather conditions are not favorable for continuing the flight today and Endeavour will remain overnight at El Paso. At this time, weather conditions are somewhat marginal for continuing the eastern journey on May 4. Ferry flight managers have scheduled weather briefings this evening and again tomorrow morning before making a decision on proceeding on toward KSC. On its arrival at Biggs, workers noticed a small panel on top of Endeavour's crew cabin was open. The panel covers a T-shaped handle that, when pulled, pops off the two square windows on top of the Orbiter, giving the astronauts inside an emergency escape route. It is thought that the panel may have opened enroute to Texas, but there was no apparent damage and workers closed it. [SPACE SHUTTLE ORBITER ENDEAVOUR STATUS REPORT, May 3, 1991, Banke, FLORIDA TODAY, p. 5A, May 4, 1991, Banke, FLORIDA TODAY, p. 6A, May 5, 1991.]

KSC CLOSED TO PUBLIC ON MAY 9

The Kennedy Space Center will be closed to the public until 1 p.m. on May 9, for the dedication of the Astronauts Memorial, a tribute to the nation's astronauts who

have died in the line of duty. Only badged employees, news media and specially invited guests will be permitted into the center through the customary access points at Gate 2 on State Road 3 on the south end of the center and Gate 3 just off U. S. Route 1 two miles south of Titusville, FL. The dedication of the memorial is scheduled to begin at 11 a.m. Among the participants in the hour-long ceremony is Vice President **Dan Quayle**. The memorial was erected by The Astronaut Memorial Foundation on a six-acre site at Spaceport USA, the Kennedy Space Center's visitor center. To assure the dignity of the dedication, no vehicular traffic will be permitted on the NASA Causeway running past the visitor center from 10:45 a.m. until the conclusion of the ceremony. Normal traffic flow will resume at 1 p.m. Spaceport USA will open to the public shortly after 1 p.m. for bus tours of KSC. [KSC NEWS RELEASE NO. 56-91, May 3, 1991.]

May 4: **ENDEAVOUR MOVES MAY 5**

The Space Shuttle Endeavour will remain on the ground at Biggs Army Air Field near El Paso tonight before continuing its cross country journey to Florida tomorrow. Current plans are for Endeavour to travel atop its 747 Shuttle Carrier Aircraft from Biggs to Kelly Air Force Base (San Antonio) as early in the day as central Texas weather will permit. Weather in that region is expected to clear by midday. A decision to continue the trip to Florida or to remain overnight at Kelly will be made based on further weather assessment and available time. At this time, Houston area weather is not expected to support an appearance at Ellington Field on May 5. Should Endeavour remain in San Antonio Sunday night, a decision will be made early May 6 on the routing of the flight for that day. [NASA NEWS RELEASE NO. 91-037C, May 4, 1991.]

May 5: **THE JOURNEY CONTINUES**

The Space Shuttle Endeavour atop its 747 Shuttle Carrier Aircraft is expected to stop over briefly May 6 at Ellington Field (Houston, TX) on its way to the Kennedy Space Center, Florida. The reason for the detour to Ellington is that Johnson Space Center, the NASA field center responsible for the construction of the Orbiter, is near Ellington and officials there would like to give JSC employees a chance to see a Shuttle in their backyard, according to NASA spokeswoman **Barbara Schwartz**. Endeavour will arrive in Houston at approximately 10 a.m. CDT and remain until 2 p.m. before flying on to Columbus AFB (MS), where it will stay the night. Poor weather along the route has slowed the transcontinental trip from Palmdale, CA. The Orbiter and 747 have made stops at Biggs Army Air Field (El Paso, TX) and Kelly Air Force Base (San Antonio, TX) where it spent the night of May 5. At Kennedy Space Center, Endeavour will spend a year being readied for its first mission and will undergo extensive tests and inspections, according to KSC spokeswoman **Lisa Malone**. A few weeks before its first launch, the testing phase will culminate at Launch Complex 39B with a 20-second test firing of Endeavour's three main engines. Endeavour's Processing Manager **John "Tip" Talone**, said of the testing process, "The challenge at KSC is the turn-around processing of previously flown Orbiters with plenty of miles already on them. Processing a first flow of a brand new Orbiter, once you get it assembled and

everything ready to go, should be pretty smooth. We fully expect Endeavour will be that way." The assembly Talone referred to concerns the absence of parts from Endeavour which were removed for installation in the other three Orbiters as replacement for problem parts. Removing those parts prevented Rockwell International, Endeavour's manufacturer, from conducting some tests at the Palmdale facility. [Banke, FLORIDA TODAY, p. 6A, May 5, 1991, NASA NEWS RELEASE NO. 91-037F, May 5, 1991.]

DISCOVERY LANDS TODAY

Discovery completes its STS 39 mission today at 2:50 p.m. EDT with a landing at Edwards Air Force Base (CA). Weather conditions at Edwards are predicted to be perfect. Discovery's orbital maneuvering engines will fire at 1:48 p.m. EDT to slow the Orbiter for its descent. Meanwhile, Endeavour, aboard its 747 Shuttle Carrier Aircraft will leave Kelly Air Force Base (San Antonio, TX) at 10 a.m. May 6 for a four-hour stay at Ellington Field (Houston, TX) and then fly to Columbus Air Force Base (Columbus, MS) for an overnight stay before proceeding to Kennedy Space Center on May 7 where it is expected to arrive before noon. At Kennedy Space Center today, Columbia's STS 40 crew of seven arrived to take part in May 7's terminal countdown demonstration test. [Banke, FLORIDA TODAY, p. 1A, May 5, 1991, Banke, FLORIDA TODAY, p. 1A, May 6, 1991.]

May 6: **HANG-FIRE ON JOUST/PROSPECTOR**

An attempt was made today to launch the Joust/Prospector launch vehicle at 8:55 a.m. The ignition signal was sent, however, the motor did not ignite. The launch team is continuing the back-down procedure to safe the vehicle. Once the vehicle has been safed, an investigation will be initiated to determine the cause of the hang-fire. The Joust/Prospector sounding rocket and its payload, worth about $1 million, was scheduled to liftoff for a short suborbital trip into space and deployment of ten experiments. Manufactured by Orbital Science Corp.'s Space Data Division (Chandler, AZ), the vehicle is powered by a Thiokol Castor 4 motor. The small rocket would launch from the rail launcher at complex 20 which was last used by the Army's Starbird rocket last December. The launch would have been the fourth for the University of Alabama consortium, one of 16 NASA Centers for Commercial Development of Space. Three previous flights occurred in New Mexico. [Banke, FLORIDA TODAY, p. 1A, May 6, 1991, Joint Statement: University of Alabama in Huntsville; Orbital Sciences Corporation; NASA Office of Commercial Programs; U. S. Air Force, May 6, 1991.]

DISCOVERY LANDS AT KSC

Discovery landed today at Kennedy Space Center at 2:55:36 p.m. EDT on Runway 15 after traveling 3.47 million miles around the world. The Orbiter's uneven landing - the seventh at KSC since the beginning of Shuttle flights in 1981 - caused damage to one tire, but KSC Director **Forrest S. McCartney** was optimistic about future Florida landings, saying, "We just hope they keep doing it. I look at it as a very positive step forward in the program." Flight controllers diverted the

landing to KSC because of higher than acceptable winds at Edwards Air Force Base, CA. Minutes after the approach of the Orbiter was announced by two loud sonic booms, the 106-ton Space Shuttle glided first north, then south to a landing on the Shuttle Landing Facility. From Mission Control in Houston, astronaut **Ken Bowersox** radioed to the crew: "Welcome back to sunny Florida, and congratulations on an outstanding mission." NASA Test Director **Rob Kelso** said, "The Shuttle's performance was nothing short of extraordinary. We accomplished just about everything that we went into space to do. We knew this flight was going to be ambitious and a real test of everyone involved. And I can tell you there is a deep satisfaction among the crew and everyone at NASA." Discovery was towed to Orbiter Processing Facility Bay 1 at 9 p.m. where post-flight deservicing operations are expected to begin shortly. [KSC SHUTTLE STATUS REPORT, May 7, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 7, 1991.]

STS 40 PROCESSING/SPACELAB

Preparations are underway to load hypergolic propellants onboard the Space Shuttle Columbia for its upcoming STS 40 mission. Propellants will be loaded into the Orbiter's orbital maneuvering system and reaction control system storage tanks. Auxiliary power units and solid rocket booster hydraulic power units will be serviced with hydrazine as part of this operation May 9. Work has also begun on applying foam to the solid rocket boosters' aft skirts. The Terminal Countdown Demonstration Test begins tomorrow (May 7) with a simulated main engine cutoff at 11:34 a.m. EDT. At the same time, the STS 40 crew have been completed emergency egress training exercises. Launch pad validations have been completed also. The Flight Readiness Review for STS 40 will occur May 13 and 14. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]

STS 43 LAUNCH PROCESSING

Work in progress on the Space Shuttle Atlantis for its STS 43 mission includes checks of the main propulsion helium system and thermal protection system operations. Work remaining to be done includes auxiliary power unit leak and functional tests, power reactant storage and distribution system tests and tests of the Tacan System and S-Band Antenna. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]

May 7:

LOW TROPHY FINALISTS

Eight finalists have been chosen for the 1991 George M. Low Trophy - NASA's Quality and Excellence Award. The finalists are:

EG&G Florida, Inc. (Kennedy Space Center, FL)

Grumman Technical Services Division (Titusville, FL)

Honeywell, Inc., Space and Strategic Systems Operations (Clearwater, FL)

Computer Sciences Corp., Applied Technology Division (Houston, TX)

Cray Research, Inc., Manufacturing Division (Chippewa Falls, WI)

Thiokol Corp., Space Operations (Brigham City, UT)

TRW Space and Technology Group (Redondo Beach, CA)

Unisys Space Systems Division (Houston, TX)

The award recognizes both NASA's prime contractors, subcontractors and suppliers for outstanding achievements in quality and productivity improvement and total quality management (TQM). Key goals of the award are to internalize quality and productivity practices and TQM processes throughout NASA and the agency's contractors and to transfer performance improvement methods of the award recipients to others. [NASA NEWS RELEASE NO. 91-70, May 7, 1991.]

ENDEAVOUR'S ARRIVAL

The Space Shuttle Endeavour arrived, atop the new 747 Shuttle Carrier Aircraft, at KSC's Shuttle Landing Facility this morning at 9:28 a.m. EDT after the final leg of the five-day ferry flight. Welcoming the new Orbiter to Kennedy Space Center was its Director **Forrest S. McCartney** who said, "This is the home of the Orbiters. This is where they all roost. Isn't she pretty? The tile's all shiny and black. She's shiny all over. I just wish there was another one coming." Endeavour's arrival marks the first time since January 1986 that NASA has had four Orbiters at the Kennedy Space Center. KSC processing teams are scheduled to demate the Orbiter from the 747 by early this morning. Endeavour will be towed to the Vehicle Assembly Building overnight. Eventually the tail cone, ferry flight kit items, the two simulated orbital maneuvering system pads, and mock forward reaction control system will be removed. [Brown and Halvorson, FLORIDA TODAY, pp. 1A-2A, May 8, 1991, KSC SHUTTLE STATUS REPORT, May 7, 1991, Halvorson, FLORIDA TODAY, p. 2A, May 7, 1991.]

DISCOVERY: POST-FLIGHT PROCESSING

Work is underway to offload residual propellant from the fuel cell storage tanks and to install access platforms in various areas including the aft compartment. The payload bay doors will be opened May 10 and post-flight inspections will commence. Thermal barriers between tiles will be replaced on the Orbiter's underside. About twice as many fillers as usual will have to be replaced because of over-temperature conditions experienced during the Orbiter's re-entry. Initial indications are that about 10 tiles will need to be replaced as a result of the over-temperature conditions. [KSC SHUTTLE STATUS REPORT, May 7, 1991.]

May 8: **DISCOVERY'S LANDING DAMAGED TIRES**

Damage to Discovery's tires, according to NASA officials was due more to an off-balance landing than to a planned braking test. Landing at 240 miles per hour, Discovery's right landing gear touched down on Kennedy Space Center's Shuttle Landing Facility about 215 feet before the left gear touched the runway. Commander **Michael Coats** applied the Orbiter's new carbon brakes hard after the vehicle had traveled 6,136 feet down the 15,000 foot runway; the right-hand brakes were more vigorously applied than were those of the left gear. "The key was to demonstrate the landing capabilities on the Orbiters - the brakes and the steering, and to gain confidence in that new configuration," said KSC Launch Director **Robert B. Sieck**. In combination, these activities caused one of the Space Shuttle's tires to shred, according to NASA spokesman **James Hartsfield**. He said that three of the tire's 17 layers wore away; engineers say that the tire would have exploded if as many as ten layers had worn through. A new Shuttle tire, less susceptible to wear, may be available to the four-member fleet as early as December. Kennedy Space Center Director **Forrest S. McCartney** said, "It probably looked a whole lot worse than it was; it's not normal to go through the top few ply." Damage to the tire will not delay preparations for Discovery's next mission - STS 43, set for July - because the tires are routinely replaced between flights. Otherwise, inspections showed that the Orbiter returned from space in good shape, although the intense heat of re-entry did damage some tiles, according to KSC spokeswoman **Lisa Malone**. There was no danger to the vehicle or the crew, she said. [Banke, FLORIDA TODAY, p. 6A, May 9, 1991, Halvorson, FLORIDA TODAY, p. 2A, May 7, 1991, See story on May 7, Brown, FLORIDA TODAY, p. 6A, May 8, 1991.]

COLUMBIA'S LAUNCH PROCESSING

Columbia will be ready for launch May 22, according to NASA managers. A minor accident in the Spacelab module which was discovered today will not delay the launch. A portable emergency oxygen bottle and mask had fallen from its mount into a safety net in the module. If a loss of pressure in the Spacelab occurred, the astronauts would make use of the oxygen as they evacuated the module. The Spacelab was not damaged; officials speculated that the bottle likely fell when Columbia was raised into the vertical position for mating. or during its rollout to Launch Complex 39B. [Banke, FLORIDA TODAY, p. 6A, May 9, 1991.]

PROSPECTOR ROCKET INVESTIGATION

A second attempt to launch the 50-foot Prospector rocket at Cape Canaveral Air Force Station will not be made until the middle of next week, officials said today. Engineers require more time to understand why the Orbital Sciences Corp. rocket failed to ignite during the initial attempt May 6. Some of the ten experiments on board must be reserviced before the next launch effort. The cargo was removed today for that servicing. [Brown, FLORIDA TODAY, p. 2A, May 7, 1991, Banke, FLORIDA TODAY, p. 6A, May 9, 1991.]

May 9: **ASTRONAUT MEMORIAL DEDICATED**

"We dedicate this monument to the memory of strong, courageous, smart and daring astronauts who pursued an adventurous dream and who died in peaceful service to their country," said Vice President **Dan Quayle** at a ceremony for the astronauts at Kennedy Space Center's Spaceport USA. "Think of what they might tell us if they were here today. I believe they would say, 'Carry on, America. Continue on our path. Live the dream. Build the future. That is what America will do. And like this inspiring space mirror that bears their names, our pioneering spirit and our willingness to dream will be our lasting tribute to them." A dedication plaque reads: "Whenever mankind has sought to conquer new frontiers there have been those who have given their lives for the cause. This Astronauts Memorial, dedicated May 9, 1991, is a tribute to the American men and women who have made the ultimate sacrifice, believing the conquest of space is worth the risk." Four T-38 training jets flew over the crowd attending the ceremony; one suddenly pulled away, leaving a hole in the formation. This "missing man" maneuver was NASA's tribute to the 15 astronauts who died on duty. The most recently deceased astronaut - **Manley "Sonny" Carter** - was to have flown in the formation before his fatal plane crash last month. Participants in the flyover maneuver were astronauts **David Hilmers, William Readdy, Stephen Oswald, Andrew Allen, Eugene Cernan** and **Ron Grabe.**

"I think it most appropriate to have the memorial located here at Kennedy Space Center, where the workforce not only can look at it and reflect on the sacrifices made, but also rededicate themselves to the work at hand," added KSC Director **Forrest S. McCartney** in his brief remarks to the crowd of 2,000 in attendance at the dedication ceremony. NASA Administrator **Richard H. Truly** and Astronaut Memorial Foundation Chairman **Alan Helman** also spoke at the ceremony. The monument is made of black granite and is called "Space Mirror;" it stands 42 1/2 feet tall and is 50 feet wide. It stands in front of KSC's Spaceport USA. The monument honors 15 astronauts, including Manley Carter who died last month. The others memorialized are the seven Challenger astronauts, three Apollo astronauts and four astronauts who died in training jet crashes. [See story below.] **Lorna Onizuka**, widow of Challenger astronaut **Ellison Onizuka**, said, "It reminds me of seeing the Shuttle at the launch pad at night. It's special in the sense that this is a memorial for all 15 families to share. A lot of them have had individual memorials and tributes, but I think this is nice in the sense that we now have all of their spirits together." **Ellen Jarvis**, whose stepson **Gregory Jarvis**, was killed in the Challenger accident, said, "This was a very overwhelming ceremony for us and we sincerely thank the people of Florida for making this possible." **Carl McNair**, whose son **Ronald McNair**, also died on Challenger, said, "A lot of fathers have lost sons and nothing good has come out of it. I look at this and I think of all the good that will come." Also on hand for the ceremony was **Grace Corrigan**, mother of Challenger astronaut S. **Christa McAuliffe**. [Brown, FLORIDA TODAY, pp. 1A-2A, May 10, 1991.]

MEMORIALIZED ASTRONAUTS

The fifteen astronauts killed in the line of duty and memorialized today on the Space Mirror are:

***Theodore Freeman**, 34. Killed outside Houston (TX) on October 31, 1964. Air Force captain and engineer.

***Elliot See, Jr.**, 38. Killed in St. Louis (MO) on February 28, 1966. Engineer chosen as Gemini 9 command pilot.

***Charles Bassett II**, 34. Killed with See. Air Force captain and engineer chosen as pilot of Gemini 9.

***Clifton Williams Jr.**, 35. Killed en route to Mobile, AL, on October 5, 1967. Marine major and engineer.

***Virgil "Gus" Grissom**, 40. Killed in Apollo 204 fire on the launch pad. Air Force lieutenant colonel and engineer. Mercury astronaut. Command pilot of Gemini 3.

***Edward White II**, 36. Killed in Apollo 204 fire. Air Force lieutenant colonel and engineer. Pilot of Gemini 4. Performed the first U.S. spacewalk in 1965 flight.

***Roger Chaffee**, 31. Killed in Apollo 204 fire. Navy lieutenant commander and engineer. Never flew in space.

***Francis "Dick" Scobee**, 46. Challenger astronaut. An engineer. Flew in space once in 1984. Commander of Challenger's last flight.

***Michael Smith**, 40. Challenger astronaut. Navy captain and engineer. Pilot for Challenger's final flight, his first.

***Ellison Onizuka**, 39. Challenger astronaut. Air Force lieutenant colonel and engineer. Flew in space once in 1985, STS 51C.

***Judith Resnik**, 36. Challenger astronaut. Engineer. Flew in space in 1984 on STS 41D.

***Ronald McNair**, 35. Challenger astronaut. Physicist. Flew in space in 1984 on STS 41B.

***S. Christa McAuliffe**, 37. Challenger astronaut. High school teacher, making her first spaceflight.

***Gregory Jarvis**, 41. Challenger astronaut. Engineer making his first spaceflight.

***Manley "Sonny" Carter**, 43. Killed in plane crash en route to a speech for NASA.

Flew on STS 33. ["15 Space Pioneers Gave Lives Over 30-Year Trek," FLORIDA TODAY, p. 2A, May 10, 1991, Liston, ASTRONAUT STATUS GUIDE, KSC Archives.]

May 10: SHEPARD FLIGHT ANNIVERSARY

"Thank you again for a hell of a ride," Mercury astronaut **Alan Shepard** told a crowd of 200 near the Cape Canaveral Air Force Station site where his Mercury Redstone rocket lifted him into space 30 years ago today. Speaking at the occasion was **Ernie Malnassy**, a founder of the U.S. Air Force Space and Missile Museum. "The Air Force does not have enough construction money to build anything here to help preserve the exhibits. The history of our space program is going down the tubes," Malnassy said. Shepard agreed, "All of us aren't going to be around forever, and we're going to need to encourage youngsters to follow in our footsteps." A recreation of the Shepard launch was held using a model rocket and the event was attended by Shepard's Mercury colleagues: **Wally Schirra, Gordon Cooper, John Glenn, Scott Carpenter, Deke Slayton** and **Betty Grissom**, widow of **Virgil "Gus" Grissom**. The Gannett Foundation later in the day hosted a reception for the Mercury astronauts at Bernard's Surf Restaurant (Cocoa Beach, FL). The Mercury Seven Foundation, a nonprofit organization founded by the original Mercury astronauts, has awarded ten scholarships in science and engineering to the following persons: **James Moore, Deborah Swarts, Richard Pinehart, Jr., Eric Sharpe, Kathy Shellenberger, W. Scott Tamblyn IV, Debora Fairbrother, Gregory Turenchalk, Edward Felten** and **Kevin Rutland**. [Banke, FLORIDA TODAY, p. 1A, May 11, 1991, "Mercury 7 Group Awards Scholarships," FLORIDA TODAY, p. 9E, May 12, 1991.]

May 11: GENERAL DYNAMICS CONTRACT

NASA has awarded General Dynamics a contract worth $112 million to launch a space science satellite from Cape Canaveral Air Force Station in 1995, the space agency announced. The rocket will carry NASA's Solar and Heliospheric Observatory to an egg-shaped orbit above Earth; the spacecraft's on-board propulsion system will then move the satellite into a position about one million miles from the Sun. The SOHO spacecraft will investigate the physical processes which form and heat the solar corona. ["General Dynamics Wins NASA Contract," FLORIDA TODAY, p. 10E, May 12, 1991.]

[] LOCKHEED BOOSTER RECORD

Lockheed Space Operations Co. has set a new record for processing a Space Shuttle solid rocket booster stack at Kennedy Space Center; they have readied Columbia for launch in 22 days instead of the usual 26 or 27 days, according to company spokesman **J. B. Klump**. ["Lockheed Sets Booster Record," FLORIDA TODAY, p. 10E, May 12, 1991.]

[] MICROGRAVITY LAB TEST

In Kennedy Space Center's Operations and Checkout Building, the International

Microgravity Laboratory has passed tests conducted by astronauts and ground controllers. The tests simulated conditions which will Spacelab will experience in space aboard Discovery early next year. According to Mission Manager **Robert McBrayer** of MSFC, "The payload - both the Spacelab elements and the experiment hardware - performed with minimal problems. The testing gave us very good information on the actual payload characteristics. We're comfortable that the systems and software are functioning properly." The mission's next milestone will come this fall when tests are conducted to insure the experiments are properly hooked up in their Spacelab carrier. The STS 42 crew includes: Commander **Ronald Grabe**, Pilot **Steven Oswald**, Mission Specialists **Norman Thagard, David Hilmers**, and **William Readdy** and Payload Specialists **Roberta Bondar** and **Ulf Merbold**. [Halvorson, FLORIDA TODAY, p. 9E, May 12, 1991.]

JULIE BROWN WINS SNOOPY

Julie Brown (Cape Canaveral, FL) who works in Kennedy Space Center's Launch Control Center has been awarded a Silver Snoopy from NASA astronaut **Curt Brown**. She is responsible for producing and maintaining major customer review presentations and provides computer graphics support to several NASA and contractor organizations. ["Cape Canaveral Resident Wins NASA Silver Snoopy," FLORIDA TODAY, p. 9E, May 12, 1991.]

May 13:

FLIGHT READINESS REVIEW: STS 40

NASA began its Flight Readiness Review for Columbia's STS 40 mission today at Kennedy Space Center. Current schedules call for the Orbiter to be launched May 22; it will carry the Spacelab module with experiments aboard to research the effects of space on living things. The official launch date is traditionally set at the conclusion of the FRR. Meanwhile, launch preparations are continuing according to schedule. Ordnance has been installed on the Shuttle. [Banke, FLORIDA TODAY, p. 1A, May 13, 1991.]

UARS ARRIVES AT KSC TODAY

NASA's Upper Atmosphere Research Satellite (UARS), scheduled to be launched aboard the Space Shuttle Discovery's STS 48 mission this fall, is scheduled to arrive at Kennedy Space Center today. UARS was shipped by barge down the Atlantic coast from Salem, NJ, by the spacecraft designer and builder, General Electric's Astro-Space Division (East Windsor, NJ, and Valley Forge, PA). At KSC, UARS will arrive at the barge canal turn basin adjacent to the Vehicle Assembly Building; the spacecraft will be offloaded and taken to the Payload Hazardous Servicing Facility (PHSF) located in the KSC Industrial Area where it will undergo final preparation and testing. On or about July 24, UARS will be transferred to the Vertical Processing Facility (VPF) for the start of the integrated tests to verify its compatibility with the Orbiter. On approximately August 13, the spacecraft will be transported to Launch Complex 39A for installation into Discovery where a final battery of tests will be undertaken to verify connections with the Orbiter and the spacecraft's readiness for launch this fall. UARS is the first of a long-term,

national program of space research into global atmospheric change and a leading element of the space agency's Mission to Planet Earth. The spacecraft will provide the comprehensive database needed to understand changes in the upper atmosphere and "for policy decisions to address the human role in such changes." The Upper Atmosphere Research Satellite is managed by Goddard Space Flight Center (Greenbelt, MD) for NASA's Office of Space Science and Applications. [NASA NEWS RELEASE NO. 91-88, May 10, 1991.]

COLUMBIA LAUNCH DATE OFFICIAL: MAY 22

At the end of the first day of the STS 40 Flight Readiness Review, NASA managers have made it official; Columbia will launch May 22 during a window extending from 8 a.m. until 10 a.m. "We're not working any problems that would prevent us from going on that day. Everything looks good," said KSC spokesman **Karl Kristofferson**. Landing is expected to occur nine days later on May 31 at Edwards Air Force Base, CA. If the launch does proceed as scheduled, it will set a NASA record - the third shuttle flight in 47 days. The previous record was three in 54 days in October-November 1985. The countdown for the mission will begin May 18, a few hours earlier than usual because workers at Launch Complex 39B need more time to load the Spacelab module into Columbia's cargo bay along with equipment and supplies. Also included in the manifest are 30 rats and 2,400 tiny jellyfish. The STS 40 crew is expected to arrive May 19 at about 1:30 p.m. The seven-member crew includes Commander **Bryan O'Connor**, Pilot **Sidney Gutierrez**, Mission Specialists **Rhea Seddon, James Bagian** and **Tamara Jernigan**; Payload Specialists are **Drew Gaffney** and **Millie Hughes-Fulford**. [Banke, FLORIDA TODAY, p. 1A, May 14, 1991, "Next Shuttle Launch Could Set A Record," USA TODAY, p. 3A, May 14, 1991, STS-40 LAUNCH ADVISORY, May 13, 1991.]

STS 40 PROCESSING PROGRESS

Work in progress in preparation for next week's launch of Columbia's STS 40 mission includes: closeouts of the aft main engine compartment; delivery and offloading of liquid oxygen and liquid hydrogen into launch pad storage farms and the Flight Readiness Review underway at Kennedy Space Center. Work scheduled for completion includes Launch Control Center preparations to begin the countdown May 18; Extravehicular Mobility Unit checkout; and aft main engine closeouts. All ordnance devices have been installed and checks have been made of firing circuits; hypergolic propellants have been loaded into the Shuttle's Orbital Maneuvering System and Reaction Control System storage tanks. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]

ATLANTIS STS 43 PREPARATIONS

In KSC's Orbiter Processing Facility's High Bay 2, leak and functional checks have begun on the auxiliary power units; pre-launch testing has also begun on the TDRS spacecraft payload in the Vertical Processing Facility. The removal of the forward reaction control system has been scheduled as have lube oil service for the auxiliary power units and functional tests of the orbital maneuvering system

pods. Completed processing work includes the removal and replacement of a suspected leaky thruster on the right orbital maneuvering system pod. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]

DISCOVERY POST-FLIGHT OPERATIONS

Currently being removed from Discovery's cargo bay are the primary STS 39 payloads. Completed work includes the removal of STS 39 brakes and tires; these were shipped back to their respective vendors for analysis. Sleep stations and waste containment systems have also been removed. Remaining to be completed: removal of main engine heat shields. The STS 48 payload - the Upper Atmosphere Research Facility - has arrived at the space center. Meanwhile, the newly arrived Space Shuttle Endeavour has been jacked off the floor and leveled. Preparations are underway for removal of the ferry flight tail cone. [KSC SHUTTLE STATUS REPORT, May 13, 1991.]

PROSPECTOR LAUNCH RESCHEDULED: JUNE 5

The launch of a 50-foot Prospector rocket has been rescheduled for June 5 from Cape Canaveral Air Force Station. A first attempt failed on May 6 when an electrical problem prevented ignition of the rocket's solid rocket motor, said **Scott Webster**, President of Orbital Science Corp.'s Space Data Division (Chandler, AZ), manufacturer of the booster. Discovery's launch on May 22 and a Delta 2 launch scheduled for May 29 have delayed the second attempt to launch Prospector. The commercial rocket will carry ten experiments for the University of Alabama's (Huntsville, AL) Consortium for Materials Development in Space, one of 16 NASA Centers for Commercial Development of Space. ["Prospector Launch Rescheduled," FLORIDA TODAY, p. 2A, May 14, 1991.]

NASA SYSTEMS ANALYSIS OFFICE CREATED

NASA Administrator **Richard H. Truly** today announced the establishment of a new Systems Analysis and Concepts Office at NASA Headquarters and designated **James D. Bain** as its Director. The creation of the office is another step in NASA's implementation of the recommendations made in December 1990 by the Advisory Committee on the Future of the U. S. Space Program, which is also known as the "Augustine Committee." In a separate recommendation, the Augustine Committee proposed the establishment of an independent cost analysis function to serve the Administrator and his immediate office. In response to that recommendation, Truly has decided to significantly augment the independent cost capability recently initiated by the NASA Comptroller. This group will report administratively to the Comptroller and provide independent assessments to the Administrator and his immediate office, to include the new Systems Analysis and Concepts Office. Bain previously served as Executive Secretary to the Augustine Committee and is currently staffing the implementation of the Committee's recommendations within NASA. [NASA NEWS RELEASE NO. 91-74, May 13, 1991.]

May 14: **RUNWAY NOT DANGEROUS: O'CONNOR**

Astronaut Bryan O'Connor, who is commanding Columbia's upcoming STS 40 mission, says the runway at Kennedy Space Center is not dangerous despite its rough surface which contributes to tire wear. "I'm satisfied that the runway at Kennedy is safe," said the astronaut who served as chairman of NASA's Space Flight Safety Panel from September 1986 through February 1989. He said the investigation which followed Discovery's recent rough landing at KSC showed that tire wear occurred after Discovery had braked to between 34 and 46 mph; the Orbiter had touched down at 242 mph. "That runway is rough," O'Connor said, "and it does wear the outside tread of tires. But if what we're talking about is losing the outside tread of the tire at 34 mph,...I don't consider that to be a safety problem." [Halvorson, FLORIDA TODAY, p. 2A, May 15, 1991.]

COLUMBIA LAUNCH PREPARATIONS

Launch countdown preparations continue for Columbia's STS 40 mission. Purges of the external tank are underway as are closeouts of the aft compartment and the solid rocket boosters. Final ordnance installation is scheduled for May 16 and the aft compartment will be closed for flight May 17. The countdown starts May 18 at 5 p.m. The STS 40 crew arrives May 19 at 1:30 p.m. and launch is set for 8 a.m. May 22. There were no significant issues of concern in yesterday's Flight Readiness Review. Installation and testing has been completed on the two spacesuits placed onboard the Orbiter for contingency purposes. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

STS 43 PROCESSING: ATLANTIS

Removal of Atlantis' forward reaction control system is underway. Other work in progress for the STS 43 mission includes: auxiliary power unit (APU) leak and functional tests; power reactant storage and distribution system testing; checks of the main propulsion system helium system; thermal protection system operations; and functional tests of the waste containment system. A leaking thruster on the right orbital maneuvering system pod has been replaced. Still to be completed are the lubrication of the auxiliary power units and functional tests of the orbital maneuvering system pods. The STS 43 solid rocket boosters have also been in processing: technicians are mating the left forward motor segment to the stack and are performing joint closeouts. Still to be completed on the SRBs: stacking the left forward assembly/nose cone to the booster and stacking the right aft segment to the launch platform on May 16. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

DISCOVERY PAYLOADS REMOVED

STS 39 payloads have been removed from the Space Shuttle Discovery. Technicians have begun removal of the Orbiter's heat shields, checks of the orbital maneuvering system and reaction control system motor valves, preparations to deservice lube oil from the auxiliary power units, main propulsion

system leak and functional tests, post-flight inspections and thermal protection system operations. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

[] **STS 49 PROCESSING: ENDEAVOUR**

The newest Space Shuttle - Endeavour - is undergoing preparations to remove its tail cone by the end of this week and the installation of access to the forward, mid and aft sections of the Orbiter. Also in progress is the removal of ferry flight fixtures. [KSC SHUTTLE STATUS REPORT, May 14, 1991.]

May 15: JOUST 1 UPDATE

The launch of Prospector, a commercial suborbital rocket carrying 10 materials and biotechnology experiments, is set for June 5 from Launch Complex 20 at the Cape Canaveral Air Force Station, FL. The launch is set for 7 a.m. (EDT) and will have a three-hour launch window. The mission entitled Joust 1 is sponsored by the University of Alabama in Huntsville's Consortium for Materials Development in Space (UAH CMDS), Orbital Sciences Corp., Space Data Division, under a contract with the UAH CMDS, will provide the rocket and launch services. Orbital Sciences engineers have determined that an apparent malfunction in the safe and arm device was the cause of a hangfire of the Prospector rocket on May 6 from Launch Complex 20 at Cape Canaveral Air Force Station. The safe and arm device, located below the rocket's service module, is responsible for preventing an accidental ignition of the rocket. When in an armed position, the device allows a firing pulse to pass and ignite the rocket. A new flight-ready safe and arm device will be installed before the June 5 launch attempt is made. The Prospector will provide about 13 minutes of microgravity time for the experiments. The UAH CMDS is one of NASA's 16 Centers for the Commercial Development of Space. UAH CMDS Associate Director **Francis Wessling** said the payload has been removed from the rocket and work to refurbish the experiments is underway. Most of the work is replenishing chemicals and replacing biological samples used in the experiments. He also said the work could include recharging batteries used to power the experiments. "We're ready to fly," said Wessling. "The principal investigators will be returning shortly to Florida to complete their work and will have no problem in meeting the June 5 launch date." ["Joust 1 Program Update," NASA/KSC PRESS RELEASE ,May 15, 1991.]

May 16: 39B CLOSED FOR ORDNANCE INSTALLATION

Launch Complex 39B will be closed today while technicians install explosive devices and pressurize the Orbiter's onboard power system. Kennedy Space Center spokeswoman **Lisa Malone**, speaking of launch preparations, said, "Everything's going right on schedule. We're pressing forward to start the countdown clock at 5 p.m. The team is looking forward to Columbia's launch next week." She said technicians would remove covers from the Orbiter's 44 steering thrusters tomorrow and take down work platforms from around the Shuttle's three main engines. Today technicians finished pressurizing onboard storage tanks containing toxic chemicals used to power Columbia's orbital maneuvering systems

and continued readying the Orbiter's rear engine section for launch; workers are installing insulation and removing access platforms. [Brown, FLORIDA TODAY, p. 2A, May 16, 1991, Banke, FLORIDA TODAY, p. 5A, May 17, 1991.]

NOW CONSTRUCTION CONTRACT

NOW Construction, Inc. (Titusville, FL) has been awarded a $380,800 contract for the construction of an addition to the Occupational Health Facility (OHF) at Kennedy Space Center. The small business firm will have 180 days to complete the 5,000-square-foot, concrete reinforced addition, which will be used for office space. The contract also calls for the installation of modular office furniture. [NASA KSC NEWS RELEASE NO. 60-91, May 16, 1991.]

HAMILTON ROOFING, INC. CONTRACT

Hamilton Roofing, Inc. (Palm Bay, FL) has been awarded a $215,121 contract for the third and final phase of roofing work on the Headquarters Building at Kennedy Space Center. Under the fixed price contract, the small business firm has 120 days to replace the built-up roof system on the fourth floor and adjacent third floor areas of the Headquarters Building. The company had also been awarded an earlier contract for roofing work on the east and west wings of the building. Built in the early 1960's the Headquarters Building is one of several major structures of that era scheduled for renovation. [NASA KSC NEWS RELEASE NO. 59-61, May 16, 1991.]

COLUMBIA STS 40 STATUS

Final ordnance installation has been completed for Columbia's STS 40 mission which is due to begin at 8:00 a.m. May 22. Work already underway includes pressurizing the Orbiter's hypergolic propellant tanks and closeouts of the aft compartment and solid rocket boosters. Launch Complex 39B will be reopened for final launch preparations this afternoon. Work remaining to be done includes installing the doors on the aft compartment - set for May 17; The start of the launch countdown is scheduled to begin at 5 p.m. May 18 and the STS 40 crew is expected to arrive at Kennedy Space Center about 1:30 p.m. May 19. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

STS 43 ATLANTIS WORK PROGRESS

Leak and functional tests of the auxiliary power units have been completed on Atlantis and the Orbiter's brakes have been installed. The external tank umbilical door hinge housings must yet be installed; APU lube oil service will be made this week. On May 18, Atlantis' three main engines will be installed and functional tests of the Orbiters OMS pods will be made next week. Work in progress includes leak and functional tests of the water spray boilers; hot lube oil flush of the auxiliary power units; power reactant storage and distribution system testing; checks of the main propulsion system helium system; thermal protection system operations; functional tests of the waste containment system; installation of the

landing gear flight wheels and tests of the Orbiter's flight control system. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

DISCOVERY STS 48 PROCESSING

The Space Shuttle Discovery continues to undergo processing in the Orbiter Processing Facility High Bay 1. A thruster on the right orbital maneuvering system pod is being replaced currently; it was found to be leaking May 15. Heat shields are being removed; checks are being made of the orbital maneuvering system and reaction control system motor valves; preparations have begun to deservice lube oil from auxiliary power units and to conduct main propulsion system leak and functional tests. Additional post-flight (STS 39) inspections are being carried out as well as thermal protection system operations and main engine drying operations. Also underway are preparations to offload residual hypergolic propellants. [KSC SHUTTLE STATUS REPORT, May 16, 1991.]

May 17:

NEW LAUNCH DIRECTOR AT KSC

James Harrington will be substituting for **Robert B. Sieck** as Shuttle Launch Director when Columbia begins its STS 40 mission on May 22. Sieck will be away from Kennedy Space Center celebrating the marriage of his daughter Anne and will be missing his first Shuttle launch since the return to flight of Discovery on its STS 26 mission in 1988. Preparations for the launch of Columbia are on track; the crew is expected to arrive at about 1:30 p.m. on May 19. [Banke, FLORIDA TODAY, p. 2A, May 18, 1991.]

KSC WORKERS TREATED FOR RASHES

A white powdery substance was noticed in Discovery's mid-fuselage area today while technicians were removing thermal blankets from the payload bay. Ten Lockheed Space Operations Co. employees performing this job at Kennedy Space Center's Orbiter Processing Facility complained of itchy, rash-like skin irritations on their arms and faces and some complained of respiratory problems, according to KSC spokeswoman **Lisa Malone**. They were sent to the Occupational Health Facility where they were treated and released. Discovery's bay has been vacuumed and an environmental engineer is analyzing the substance. Malone later said that preliminary analysis indicated that the substance was either titanium-oxide or titanium-silicate, both of which are non-toxic. She said further that the substance probably came from one of the heat-resistant blankets or a primer coat of paint on the Shuttle. The Orbiter was undergoing post-flight processing following its landing at KSC May 6 at the conclusion of its STS 39 mission. Discovery's next flight is expected to come in September. ["Dust in Discovery," NASA/KSC NEWS RELEASE, no number, May 17, 1991, 1:30 p.m., "KSC Workers Treated for Rashes," FLORIDA TODAY, p. 2A, May 18, 1991.]

May 18:

COUNTDOWN FOR STS 40 CONTINUES

The countdown for Columbia's STS 40 mission continues on schedule for its May

22 launch, according to KSC spokesman **George Diller**. Columbia's rear engine compartment and two solid rocket boosters are now ready for launch; payload bay doors will be closed today. Propellant loading onboard the Orbiter will also begin today; the liquid oxygen and liquid hydrogen are used to provide electricity and drinking water. "The early weather outlook appears favorable with an 80 percent chance of acceptable weather at the scheduled launch time," said Diller. A temperature of about 72 degrees with winds from the east at 9 to 14 miles per hour are forecast along with two layers of scattered clouds and visibility for seven miles. "The only concern," Diller said, "is a slight chance of an early morning rainshower moving on shore from the Atlantic." [Banke, FLORIDA TODAY, p. 1A, May 19, 1991, Memo to PIOS/Press From George Diller/NASA-KSC, May 17, 1991.]

GEORGE M. LOW AWARD FINALISTS

Two Kennedy Space Center contractors have been chosen as finalists for NASA's top quality and productivity award - the George M. Low Award - NASA announced recently. EG&G Florida, Inc. (Cocoa,FL), Base Operations Contractor, was named a finalist for the 1991 Award for the third consecutive year. Also selected as a finalist was Grumman Technical Services Division (Titusville, FL), a subcontractor on the Shuttle Processing Contract. The award is named for former NASA Acting Administrator George M. Low and recognizes performance among the agency's contractors and subcontractors. The winner will be announced in October. ["KSC Contractors Up for Award," FLORIDA TODAY, p. 10E, May 19, 1991.]

25 YEARS OF SERVICE TO KSC

Union Carbide Industrial Gases Inc.'s Linde Division (Mims, FL) has been providing liquid oxygen and liquid nitrogen to Kennedy Space Center for the past 25 years. KSC Director **Forrest S. McCartney** recognized their achievement by the plant a KSC Group Achievement Award. He commended their years of safe operation without a lost work day case and noted the Linde plant's drivers' record of traveling more than 6.6 million accident-free miles. The company also provides liquified gases to hundreds of industrial plants in Florida and Georgia. ["Mims Plant Marks 25 Years Serving NASA," FLORIDA TODAY, p. 9E, May 19, 1991.]

GETAWAY SPECIALS RIDE AGAIN

"It feels good to be back on the Shuttle again," said **Clarke Prouty**, Getaway Special Mission Manager for NASA at Goddard Space Flight Center (Greenbelt, MD). Columbia will be carrying Getaway Special experiment packages for the first time on any Shuttle since the Challenger accident in 1986. The program is designed "to provide anyone with the opportunity to fly a small, self-contained experimental payload on a Shuttle mission and to do so for a very low cost," Prouty said. Columbia will carry twelve such experiments. [Halvorson, FLORIDA TODAY, p. 9E, May 19, 1991.]

May 19: **STS 40 CREW ARRIVES AT KSC**

"We're all ready to go. Light 'em," said Mission Specialist **Tammy Jernigan**, flashing a thumbs-8- sign to journalists on hand at the Shuttle Landing Facility today. "We hope you'll have your fingers crossed for clear skies and smooth sailing Wednesday morning," added **Rhea Seddon**, also a Mission Specialist. Columbia's STS 40 crew of seven arrived at Kennedy Space Center today at . The other members of the crew include Commander **Bryan O'Connor**, Pilot **Sid Gutierrez**, Mission Specialist **James Bagian** and Payload Specialists **Drew Gaffney** and **Millie Hughes-Fulford**. At Launch Complex 39B, technicians are preparing to load hazardous fuels aboard the Orbiter. The STS 40 mission will be NASA's third in seven weeks and the 41st since launches began April 12, 1981. The STS 40 mission is also the first in which as many as three women have been members of a single Shuttle crew. [Halvorson, FLORIDA TODAY, p. 1A, May 20, 1991.]

STS 40 POSTPONED: HARDWARE PROBLEMS

Officials at Kennedy Space Center have decided today to postpone the liftoff of STS 40 until June 1 at the earliest while the launch team replaces and retests the 9 temperature transducers, the multiplexer demultiplexer and general purpose computer number 4. After failure analysis recently conducted by the vendor in New Hampshire, officials decided to replace the nine cryogenic temperature transducers in the main propulsion system. There is a concern they could break off as the propellant is flowing through the main propulsion system and wind up in the main engines. The multiplexer demultiplexer (MDM) is one of 23 and is located in the Orbiter's aft compartment bay 5. MDMs receive and translate data from the Orbiter's general purpose computers to critical systems. This particular MDM FA 2 controls functions for solid rocket boosters, Orbiter hydraulic systems, ordnance devices and the orbital maneuvering system and reaction control system. General purpose computer number 4 is one of 5 and is located in the Orbiter's crew cabin. The temperature transducers, or sensors, are six inches long and shaped like a cigarette; they measure the temperature of liquid oxygen and liquid hydrogen as they flow from the external tank to the three main engines. They are manufactured by RDF Corp. (Hudson, NH). NASA engineers feared that a weld defect could cause a sensor to break free and drop into the fuel lines, potentially causing a shuttle failure. Columbia's processing manager, **Bascom Murrah**, said, "If one did let go, it would be a bad day. It's just too risky...because there is nothing in between the probes and the pumps on the engine. The pump couldn't withstand that kind of problem, so I think we would lose an engine for sure." He said that NASA was notified of the potential problem early this morning as the countdown approached 30 hours before liftoff. RDF Corp. said that tests on a sensor which failed during a Columbia fueling test in September 1990 showed that the unit had a cracked weld. That specific sensor was replaced, but later analysis suggested that all of the sensors might be suspect.

Murrah said he did not know why the analysis "failed to surface until when it did; it shouldn't happen, but it did and we've got to fix that problem." RDF spokesman **Randy Gauthier** said his company had no comment on the analysis or the late

notification of NASA. The space agency said that its early decision to scrub the launch proved its post-Challenger safety system worked. "The mission management team was formed following the Challenger accident to deal with just such problems at a very high level," said NASA Test Director **Mike Leinbach**. Preparations to replace the MDM, temperature transducers and general purpose computer number 4 are underway as workers gain access to the aft compartment. Work has also begun to reconnect the Orbiter midbody umbilical to the Shuttle. This unit was used to deliver reactants to the Orbiter's fuel cell storage tanks and will be used to offload propellants. Ordnance devices will also be disconnected. Columbia's communications systems have been activated; the tail service masts on the launch platform have been prepared for launch; these masts are means through which liquid oxygen and liquid hydrogen propellants are loaded into the external tank. The crew of STS 40 will return to Johnson Space Center (Houston, TX) early tomorrow morning for more training. Mission Commander **Bryan O'Connor** said, "The crew is disappointed we couldn't go on time. We were ready to go up and do this mission. We understand that there are a lot of things that can go wrong on the Shuttle, and we're glad the Cape team is attacking the problems as thoroughly as they are. [KSC SHUTTLE STATUS REPORT, 1 p.m., May 21, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, May 22, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 23, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-11, May 22, 1991.]

[] **SPACE MIRROR CRACKED**

Tiny cracks have been spotted in four stones in the Space Mirror, the newly dedicated Astronauts Memorial; the granite blocks will have to be replaced, according to AMF spokeswoman **Debbie Laing**. "We think it's a problem that can be easily fixed. It's something that came up that nobody could plan for," Laing said. The designers of the $6.2 million memorial knew about the cracks as early as February, but repairs could not have been completed before the May 9 dedication. NASA's Ed **Harrison** knew about the cracks, too. "We want it to be corrected and they've agreed to correct it, but it doesn't distract from the memorial's attractiveness," Harrison said. Laing said that the monument's designers believe that the clear acrylic that fills each letter of the astronauts' names is expanding because of the heat and that is putting pressure on the surrounding stone. So far, six cracks - each leading from the corner of a letter to the edge of a panel - have been discovered. [Brown, FLORIDA TODAY, p. 1B, May 22, 1991, "New Astronaut Memorial Flawed," USA TODAY, p. 3A, May 22, 1991, Date, THE ORLANDO SENTINEL, p. A-11, May 22, 1991.]

May 22: **STS 40: LAUNCH PREPARATIONS**

Kennedy Space Center processing teams are continuing work on a processing schedule which could lead to launch of Columbia on Saturday, June 1. The two-hour launch window opens at 8 a.m. EDT. Preparations are underway to replace the nine propellant temperature transducers, the multiplexer demultiplexer (MDM) and the number 4 general purpose computer. Workers are scheduled to disconnect ordnance devices from 8 p.m. to midnight tonight. The pad will be

closed to all non-essential personnel during this operation. Replacement of all components is scheduled to begin at midnight tonight after the pad has been reopened and will continue through tomorrow. Retest of the transducers and the GPC is scheduled to be completed by tomorrow (May 23) afternoon. Retest of the MDM requires more time and is scheduled to continue through Saturday (May 25). Launch countdown preparations will also begin Saturday; ordnance devices will be reconnected and closed out for flight next week. The countdown is scheduled to begin May 28 at 5 p.m. with the countdown clock at the T-43 hour mark. [KSC SHUTTLE STATUS REPORT, 4 p.m., May 22, 1991.]

SENSOR CRACKS ON STS 37 & 39

Dan Germany, Johnson Space Center Shuttle Office Head, said that if he had known about sensor cracks in time he would have halted the countdowns for both STS 39 and STS 37. The metallurgy report which indicated the cracks was not available before those launches, even though the analysis was complete by then. RDF Corp. (Hudson, NH) which manufactured the temperature transducers (sensors) which were found to have cracks on Columbia had completed its analysis of the sensors as early as April 1. The company did not notify NASA about the cracked weld until early on May 21, just 32 hours before Columbia was to launch. In the meantime both Discovery and Atlantis had been launched. Concern about the sensors began in September 1990 when the space agency was concerned about hydrogen leaks on Columbia and Atlantis. Engineers noted that one of Columbia's fuel-line sensors leaked slightly, so the sensors were sent to the Orbiters manufacturer Rockwell International. Then Rockwell sent the sensors to the wrong subcontractor - Eaton Corp. (CA) - where it stayed for four months. "Somebody thought they knew where [the sensor] goes to and just didn't take the time to look it up," according to Shuttle Orbiter Division Director (JSC), **Keith Hudkins**. The actual sensor manufacturer - RDF Corp. - did not get the sensors until January 1991.

Germany said the error occurred because the sensor evidenced only a small leak and not a crack; that resulted in a low priority being assigned. He said that now all problems with a "criticality 1" rating would be assigned high priority and be tracked much more closely. Criticality 1 hardware is any part whose failure could destroy an Orbiter. When RDF finished its analysis on April 1, it consulted with Rockwell and agreed to send the suspect part to a metallurgy lab for more study, according to Germany. That report was completed May 20 and reported to Rockwell within hours; Rockwell reported to NASA right away and the countdown was halted. Germany said, "We dodged a bullet on that. The weld was cracked all the way around...It was just a matter of time before that tip had broken off." He said cracks found on Discovery's sensors were not as severe as those on Columbia's transducers and were not judged as likely to sever. Space Shuttle engineers are giving thought to removing entirely some sensors located immediately above the Orbiter's main engines. "If, technically, we can get by without the sensors, we'll go do that," Germany said. Other sensors in the system are not deemed much of a problem because of their location. Meanwhile, workers have removed insulation which surrounds the sensors in preparation for removing

all nine and replacing them with either spares or plugs. [Date, THE ORLANDO SENTINEL, pp. A-1 & A-19, May 23, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, May 23, 1991, Brown, USA TODAY, p. 1A, May 23, 1991, "NASA Says Error In Shipping Part Delayed A Liftoff," THE NEW YORK TIMES, p. A8, May 23, 1991.]

May 23: **SPCC GROUNDBREAKING**

NASA's Kennedy Space Center will host a groundbreaking ceremony for a Space Shuttle Processing Center (PCC) at 1 p.m., (Tuesday) May 28. The PCC will be a three-story, 99,000-square-foot facility dedicated to Space Shuttle Orbiter testing, launch team training and Launch Processing System (LPS) maintenance. The building will provide Space Shuttle engineers and technicians with state-of-the-art areas to improve and maintain their skills during pre- and post-flight processing flows. Each of the PCC's three floors is designed to serve a specific purpose. The facility's first floor will consist of offices, workshops and laboratories for the maintenance and testing of LPS and related equipment. The second floor will contain additional office space as well as areas for launch team training and computer software production. Orbiter control rooms will dominate the PCC's third floor. Three control rooms are planned for use in supporting ongoing Space Shuttle processing inside the three Orbiter Processing Facility high bays. The ceremony's featured speakers will include Kennedy Space Center Director **Forrest S. McCartney**, KSC Director of STS Management and Operations **Jay Honeycutt** and KSC's Director of Engineering and Development **Walter Murphy**. The PCC will be located between the Orbiter Processing Facility and Operations Support Building in the Launch Complex 39 area. The $8.9 million facility was designed and will be built by The Haskell Co. (Jacksonville, FL) Construction is set to begin on May 29, and the building is scheduled to be operational by June 1, 1992. ["Groundbreaking for Shuttle Processing Control Center to be May 29,", May 23, 1991.]

[] **PAYLOAD CANISTER FACILITY GROUNDBREAKING PLANNED**

A groundbreaking ceremony for KSC's Canister Cleaning and Rotation Facility (CCRF) will be held at 10 a.m. (Friday) May 24. The multi-purpose CCRF will be used for cleaning and maintaining the two environmentally controlled canisters which are used for housing Space Shuttle payloads during moves from their processing facilities to the launch pad or Space Shuttle Orbiter. The CCRF will also be used to rotate the 65-foot-long payload canister from a horizontal to vertical configuration or vice-versa, depending on payload requirements. Payload canisters currently must be transported from their processing areas to the Vehicle Assembly Building to be rotated as requirements necessitate. The CCRF will be built in the immediate area of existing payload processing facilities, resulting in more cost-effective and streamlined operations. "The Canister Cleaning and Rotation Facility will be a tremendous asset to the whole program," remarked KSC's Director of Payload Management and Operations **John Conway**. "It will make the processing of payloads a safer and more efficient operation." Featured speakers for the groundbreaking ceremony include KSC Director **Forrest S. McCartney**, KSC Director of Engineering Development **Walter Murphy**, KSC

Director of Payload Projects Management **JoAnn Morgan** and Conway. The CCRF will consist of an approximate 7,000-square-foot high bay outfitted with a 100-ton overhead bridge crane for rotating the payload canister and the facility will be located in the KSC Industrial Area. The $5.3 million CCRF was designed by and will be built by Ivey's Construction, Inc. (Merritt Island, FL). Construction is set to begin May 24, and the building is scheduled to be operational by mid-summer 1992. ["Groundbreaking for KSC Payload Canister Facility Set for May 24," May 23, 1991, "Payload Canisters to Get New Home," FLORIDA TODAY, p. 10E, May 26, 1991.]

COLUMBIA'S SENSORS REMOVED

All nine fuel-line sensors have been removed from the Space Shuttle Columbia. Managers have decided to leave out three of four temperature sensors in Columbia's liquid hydrogen lines and plug the holes for the June 1 launch. **Henry Pohl**, Director of Engineering at Johnson Space Center (Houston, TX) said, "If we can take them out, we ought to take them out. But you have to look at all the avenues to make sure you don't fix one thing and complicate something else." The fourth sensor is in a position where it could be caught by a safety net installed for that purpose. Simultaneously, other Kennedy Space Center workers replaced a computer and a computer interface unit. KSC spokeswoman **Lisa Malone** said that sensors from both Atlantis and Endeavour will also be removed and inspected. NASA Administrator **Richard H. Truly** is unhappy that it took so long for Launch Managers to learn of the sensor analysis; they received a metallurgy report just 32 hours before launch was to have taken place. "From a safety point of view on upcoming flights, we're not concerned at all. From a procedural point of view, we're damn concerned how this one faked us out," Truly said. [Date, THE ORLANDO SENTINEL,p. A-3, May 24, 1991, Brown, FLORIDA TODAY, p. 10A, May 24, 1991, "Shuttle Problems," USA TODAY, p. 3A, May 24, 1991, "NASA Debates Removing Sensors on Space Shuttle," THE NEW YORK TIMES, p. A16, May 24, 1991.]

May 24:

STS 40 COUNTDOWN TO START

The countdown clock for the 11th flight of the Orbiter Columbia, and the 41st Space Shuttle launch, is set to begin at 9 p.m. EDT, May 28, at the T-43 hour mark. This countdown is longer than most and includes 40 hours of built-in hold time leading up to the opening of the launch window at 8 a.m. EDT on June 1. The launch window extends to 10 a.m. EDT. Extra time built into this countdown is to allow for the installation of several time critical experiments including the 20 rodents which will ride in the Spacelab module and 10 in the Orbiter's middeck. The last two built-in holds will be 10 minutes in duration and will occur at the T-20 minute mark, or at 7:20 a.m., and at the T-9 minute mark, or at 7:41 a.m. During the final hold, the flight crew and ground team receive the NASA Launch Director's and the Mission Management Team's final "go" for launch. ["STS-40 Launch Countdown Will Restart May 28, NASA/KSC NEWS RELEASE NO. 68-91, May 24, 1991.]

NASA REVIEW OF SENSOR PROBLEM

Following a meeting today with senior management of NASA's space flight and safety programs, Administrator **Richard H. Truly** said the agency will conduct a prompt and thorough review concerning the recent discovery that a fuel sensor removed from Space Shuttle Columbia last fall was cracked. He emphasized, however, that he is confident Columbia is fully capable and safe for the upcoming launch of STS 40/Space Life Sciences-1. "We have appointed an expert panel to review how the sensor problem was handled from start to finish," Truly said. "Equally important, we want to determine where any deficiencies exist in NASA's system for handling such issues. I guarantee that any and all necessary changes will be made. NASA will continue to place the greatest emphasis on mission safety and reliability." Truly said he expected preliminary findings to be announced by NASA management at a briefing May 30. The NASA Administrator said the sensor problem has been corrected on Columbia and poses no risk to the Shuttle and its crew of seven, which will undertake a 9-day life sciences mission involving many important, first-time experiments. Launch, which was originally scheduled for May 22, is now tentatively scheduled for June 1. In addition to Truly, today's meeting included **William B. Lenoir**, Associate Administrator for Space Flight; **Robert L. Crippen**, Director, Space Shuttle; and **George A. Rodney**, Associate Administrator for Safety and Mission Quality. ["NASA to Review Sensor Problem, Truly Says Columbia 'Ready to Fly'," NASA/KSC NEWS RELEASE NO. 91-79, May 24, 1991.]

STS 43 PROCESSING PROGRESS

Work in progress upon Atlantis for its STS 43 mission includes a gimbal test of the orbital maneuvering system engines; thermal protection system operations; potable water servicing; water spray boiler leak and functional tests; main engine and main propulsion system tests; functional tests of the orbital maneuvering system; tests of the forward reaction control system at the Hypergolic Maintenance Facility; and auxiliary power unit lube oil servicing. Tests of the ultra high frequency communications system have been completed. Work scheduled for next week includes a functional test of the external tank door; installation of the forward reaction control system; tests of the nose wheel steering system and anti-skid brake tests are planned. [KSC SHUTTLE STATUS REPORT, May 24, 1991.]

DISCOVERY PROCESSING: STS 48

Main engine flight readiness tests and flow checks of the main propulsion system helium regulators have been completed on the Space Shuttle Discovery. Work continuing includes window polishing; preparations to remove the three Shuttle main engines; thermal protection system operations; and inspections of the Orbiter's hydraulic system. Shuttle main engines must be removed next week. [KSC SHUTTLE STATUS REPORT, May 24, 1991.]

May 25: COLUMBIA'S SENSORS REPLACED

"Everything's still on schedule [for the launch June 1 of Columbia]," according to Kennedy Space Center spokesman **Bruce Buckingham** today. Faulty equipment has been removed from the Orbiter; replacements have been installed and tested. The countdown for STS 40 begins May 28 at 9 p.m. The countdown is expected to be four hours shorter for this second attempt, because some work does not need to be repeated, according to KSC spokeswoman **Lisa Malone**. NASA's Shuttle Program Managers decided to plug suspect sensors rather than replace them. One plug did not work properly and was scheduled for retesting and possible replacement. That work is not expected to delay the launch of Columbia on June 1 between 8 and 10 a.m., EDT. Five liquid oxygen sensors were replaced on Columbia, though there has been no evidence of damage on any of these sensors. Four hydrogen sensors on Discovery are thought to be suspect. NASA engineers are convinced that there is a sufficient record of flight experience to allow future Shuttle missions to fly without the potentially dangerous sensors. Kennedy Space Center will be largely shut down in observance of Memorial Day (May 27), but work will resume May 28 with the countdown starting in the evening. Sunday (May 27) technicians installed explosive devices on the Orbiter and tested a replacement component. [Brown, FLORIDA TODAY, p. 1A, May 26, 1991, Brown, FLORIDA TODAY, p. 1A, May 27, 1991.]

May 28: COLUMBIA COUNTDOWN STARTS TODAY

Preparations are underway to begin the countdown tonight at the T-43 hour mark for Columbia's STS 40 mission. Work continues on closing out the Orbiter's aft compartment, removing protective covers from components in the aft compartment, final inspections of the compartment and closeouts of the solid rocket boosters. Finished processing work includes a retest of the multiplexer demultiplexer (MDM), replacement of six cryogenic propellant temperature transducers and three plugs in the liquid hydrogen 12-inch feedlines. Successful leak tests of the temperature transducers and the plugs have been completed as have a retest of the newly installed general purpose computer and a reconnection and retest of the Orbiter's ordnance devices. The crew of STS 40 is scheduled to arrive once more at Kennedy Space Center May 29 at 3 p.m. Launch remains scheduled for 8 a.m. EDT June 1 when there is a probability of acceptable weather. The following day, Saturday, there is a 80 percent probability of favorable launch weather. For the overall window on June 1 (from 8 a.m. until 10 a.m.) there is a 95 percent chance of being within weather commit criteria. Work completed in the processing of Atlantis for its STS 43 mission includes servicing the potable water system and auxiliary power unit lube oil. Remaining to be completed are tests of the external tank door; nose wheel steering and brake anti-skid tests. On Discovery - in preparation for its STS 48 flight - work on the midbody continues as do preparations to remove the three Shuttle main engines and checks of the forward reaction control system. On Endeavour purges of the freon coolant loop are progressing as is installation of platforms in the midbody and aft compartment. [KSC SHUTTLE STATUS REPORT, May 28, 1991.]

PLAYALINDA BEACH CLOSES

Playalinda Beach will reopen to visitors during daylight hours the day following the launch of the Space Shuttle Columbia on its STS 40 mission and will remain open until further notice. Other Canaveral National Seashore beaches such as Apollo Beach are not affected by Space Shuttle launch operations. ["Playalinda Beach to Reopen After STS-40 Launch," NASA/KSC NEWS RELEASE NO. 63-91, May 28, 1991, Bumpus-Hooper, THE ORLANDO SENTINEL, pp. B-1 & B-4, May 26, 1991.]

COLUMBIA READY TO FLY

"We're looking great for Saturday [June 1]. I know of no technical problems that we're working at all," said Kennedy Space Center Director **Forrest S. McCartney** said today. Echoing the remarks was KSC spokeswoman **Lisa Malone**, who said, "All the work is done, and we're ready to go." Countdown clocks began at 9 p.m. at the T-43 hour mark, pointing toward an 8 a.m. launch Saturday. All of the Orbiter's sensors have been replaced; technicians have also replaced a faulty general purpose computer and a multiplexer demultiplexer. The crew for STS 40 returns to KSC about 3 p.m. tomorrow. The only reason for a delay until Sunday (June 2) would be if there is a delay until May 30 in today's launch of a Delta 2 rocket from Cape Canaveral Air Force Station. NASA and the Air Force, which operates the Eastern Test Range at Cape Canaveral Air Force Station, have agreed to give McDonnell-Douglas Space Systems Co. a second launch attempt this week if bad weather or a minor technical problem halts today's Delta launch. In that event, Air Force workers would need about two days to prepare range safety equipment for a Shuttle launch attempt. [Banke, FLORIDA TODAY, p. 1A, May 29, 1991, "New Parts for Shuttle Pass Final Test Before Countdown," THE NEW YORK TIMES, p. A10, May 29, 1991, "Shuttle on Target," USA TODAY, p. 3A, May 30, 1991, "Columbia Parts OK as Countdown Starts," THE ORLANDO SENTINEL, May 29, 1991.]

May 29:

STS 43 PREPARATIONS

A number of processing activities are currently underway for Atlantis' STS 43 mission: installation of the forward reaction control system; thermal protection system operations; main engine and main propulsion system tests; functional tests of the orbital maneuvering system pods; replacement of the low pressure oxidizer turbo pump on Shuttle main engine number 1; and positioning of the aerosurfaces. Closeouts of the STS 43 solid rocket boosters have begun and cables are being routed for the boosters. Discovery is undergoing removal of Shuttle main engines 1 and 2; functional tests of the forward reaction control system; thermal protection system operations; and deconfiguration of the payload bay. Shuttle main engine number 3 has already been removed and the Orbiter's power system has been validated. [KSC SHUTTLE STATUS REPORT, May 29, 1991.]

ATS: SUBCONTRACTOR OF YEAR

Atlantic Technical Services (ATS) has been awarded Subcontractor of the Year in the Southeast by the U.S. Small Business Administration. At Kennedy Space Center, ATS provides mail distribution services to more than 260 buildings over a 42-mile route. **Roger Gribble**, Acting Regional Administrator for the SBA, said, "This is a top-flight operation when you see what goes on in day-to-day operations." **Jim Dubay**, EG&G Florida President and the person who nominated ATS for the award said, "A reliable mail system is critical to the information needs of the many organizations at the Kennedy Space Center. And ATS has a staff that gets the job done." Founded in 1971 by **Eschol Walker**, the 47-employee company is directed at KSC by **Al Nelson**, Project Manager and Postmaster of the space center's post office. [Byrd, FLORIDA TODAY, p. 12C, May 30, 1991.]

DELTA LAUNCHES ALASKAN SATELLITE

"We see the vehicle going right down the middle of the path. That's the way we like to see them fly," said **Ray Adams**, launch commentator for today's successful launch of a McDonnell Douglas Delta 2 rocket at 6:55 p.m. The launch was delayed 31 minutes for the replacement of a broken launch-pad camera which was needed to watch for liquid oxygen leaks while the rocket's first stage was being filled with the propellant. "The communications era has really opened the state for our people. It's more than just a convenience; it's a lifeline service," said **Tom Jensen**, spokesman for Alascom Inc., Alaska's long-distance telephone provider. "In the next 60 to 90 days, all of Alaska will be using that [Aurora II] satellite to communicate," he said. When upper-level winds changed directions, Air Force officials required 300 VIP spectators to move to another viewing site to avoid possible falling debris if the rocket exploded or had to be destroyed. The next Delta mission is scheduled for June 26, an Air Force navigation satellite. [Banke, FLORIDA TODAY, p. 4A, May 30, 1991, Date, THE ORLANDO SENTINEL, May 29, 1991, Date, THE ORLANDO SENTINEL, p. A-3, May 30, 1991.]

STS 40 CREW ARRIVES, AGAIN

The STS 40 crew returned to Kennedy Space Center today at 3 p.m. Columbia's Commander **Bryan O'Connor** said, "We hope this time we can get up there and do some science for our country and space program. The crew is ready." NASA Test Director **Mike Leinbach** said, "If the hardware stays good to us, we'll be ready to go Saturday [June 1] morning." Columbia's Pilot is **Sid Gutierrez**; the Mission Specialists are: **James Bagian**, **Tammy Jernigan**, and **Rhea Seddon**; the Payload Specialists are: **Drew Gaffney** and **Millie Hughes-Fulford**. The crew's four medical specialists - Bagian, Seddon, Gaffney and Hughes-Fulford - will work in the payload bay's Spacelab module conducting heart, lung, blood and other tests on each other to help scientists better understand how humans adjust to space. [Brown, FLORIDA TODAY, p. 4A, May 30, 1991.]

May 30: BARGE CANAL BRIDGE STALLS TRAFFIC

"I had 15,000 people backed up from here to Nova Scotia, and let me tell you these people get irritated," said Bridgetender **Pat Casey**, Brevard County Road and Bridge Division. The bridge malfunctioned at 4:30 and left one side of the draw bridge stuck 5 inches above the road's surface. Hundreds of rush-hour Kennedy Space Center workers were held up for 25 minutes. After Casey had raised the bridge to allow a tugboat and a barge to pass, the bridge locked and the control board lost power, she said. "It could have been a multitude of things that caused it - they're not really sure. But it has been remedied and is working fine now," Casey said. Traffic was directed by the Florida Highway Patrol during the incident. ["M. I. Bridge Stalls Traffic," FLORIDA TODAY, p. 1B, May 31, 1991.]

[] EQUIPMENT FAILURES INVESTIGATION CONTINUES

An investigation continues today into potential Space Shuttle equipment failures and reporting procedures as Columbia is being readied for an 8 a.m. launch June 1. Forecasts indicate a 70 percent chance of favorable weather for liftoff on time. Today, technicians at Kennedy Space Center will load 30 rats and 2,478 jellyfish into a Spacelab module in the Orbiter's cargo bay and middeck lockers. The countdown proceeded normally throughout the day; the newly installed temperature sensors and computer parts have been extensively tested. The previous attempt to launch Columbia on May 22 was called off 30 hours before liftoff when managers learned of a report raising safety questions about the Orbiter's fitness for flight; a temperature sensor had been found defective. In addition, there were unrelated computer equipment problems. "We would prefer that our procedures had enlightened us and alarmed us about the potential problem sooner than it did," said **William Lenoir**, NASA Associate Administrator for Spaceflight. He said NASA engineers had missed the questionable nature of the sensors' design and that the probes should not have been certified for flight. He said also that the space agency should have been notified earlier about the sensor problem. "In retrospect, we didn't recognize the potential severity of the problem as early as we should have," Lenoir said. **George A. Rodney**, who heads the Office of Safety and Mission Quality for the space agency, said, "The issue of why it (the sensor problem) happened is a very serious issue. Our systems didn't minimize the risk as well as we had hoped they would." Rodney also said that the system would be improved to make sure equipment problems no longer "sneak up and bite us" as they did last week. [Brown, FLORIDA TODAY, p. 9A, May 31, 1991, "Weather Likely 'Go' for Columbia Launch," THE ORLANDO SENTINEL, p. A-1, May 31, 1991.]

JUNE

June 1: **STS 40 SCRUBBED; RESET FOR JUNE 5**

The launch of Columbia on its STS 40 mission was scrubbed this morning at about 7:15 a.m. EDT when one of three inertial measurement units (IMUs) was deemed unacceptable for launch. The mission was originally scheduled to be launched May 22. The IMUs are the heart of the Orbiter's navigation system and all three are necessary for launch. The accelerometers in IMU No. 2 were behaving erratically early this morning. IMU No. 2 will be replaced starting later today. The 58 pound unit is located on the Orbiter's flight deck just forward of the control and display panels. Each IMU is about 10 inches high, 11.5 inches wide and 22 inches long. "We're disappointed this happened. We came back here thinking the Orbiter was ready to go," said Commander **Bryan O'Connor**. "I think we all realize that there are millions of parts involved in this vehicle and that it's a miracle when we do launch." Kennedy Space Center Launch Director **Robert B. Sieck** said, "We're going to attack it, fix it and get on with flying this machine. In this business, it takes a lot of patience, and disappointment is something we deal with."

Liquid oxygen and liquid hydrogen propellants are being drained from the external tank today; residual hydrogen will be allowed to boil off until tomorrow morning. Liquid oxygen and liquid hydrogen storage farms at the pad will be replenished on June 2 and June 3. Columbia's fuel cell storage tanks will be topped off with liquid oxygen and liquid hydrogen reactants on June 3. STS 40 Commander Bryan O'Connor and Pilot **Sid Gutierrez** will be flown by STA to Edwards Air Force Base, CA, tomorrow. They will practice landing approaches on the primary landing site's runways and return to Kennedy Space Center tomorrow night. The rest of the crew - **Tammy Jernigan, Rhea Seddon, James Bagian, Drew Gaffney** and **Millie Hughes-Fulford** will remain at KSC for the June 5 launch attempt. Payload specialist **Drew Gaffney** will leave the catheter in place in a vein near his heart. The 30 rodents and 2,500 tiny jellyfish will be replaced in the Orbiter middeck and in the Spacelab. These operations will be conducted in parallel with the IMU replacement. Pending the successful completion of planned work, the launch countdown is scheduled to resume at the T-11 hour mark at about 5:40 p.m. EDT June 4. Launch is planned for 8 a.m. EDT June 5. At a pre-flight briefing May 31, Space Shuttle Director **Robert L. Crippen** had declared NASA ready to launch Columbia. Shuttle Launch Director **Robert B. Sieck** said, "We feel good about the hardware. It's behaving well; the repair work is all behind us." [KSC SHUTTLE STATUS REPORT, June 1, 1991, Banke and Halvorson, FLORIDA TODAY, pp. 1A-2A, June 2, 1991, Brown, FLORIDA TODAY, p. 1A, June 4, 1991, Leary, THE NEW YORK TIMES, p. 8, June 1, 1991.]

WILEY NAMED MISSION ASSURANCE DIRECTOR

Warren Wiley has been named Director of Mission Assurance at Kennedy Space Center; the position is a new one at the space center and is located within the Safety, Reliability and Quality Assurance Directorate at KSC. Wiley has been

employed by NASA since 1971 and has served as Chief of the Orbiter Main Propulsion System Section at KSC and later as Chief of the Main Propulsion and Fuel Cell Branch and Chief of the Fluids Systems Division. Immediately prior to assuming his new job, Wiley was Deputy Director of Vehicle Engineering. [Banke and Halvorson, "NASA Veteran Named to New KSC Post," FLORIDA TODAY, p. 9E, June 2, 1991.]

June 2: **STS 40 LAUNCH SCRUB TURNAROUND**

Operations at Launch Complex 39B continue this morning as workers move ahead with launch scrub turnaround procedures. Work to replace the faulty inertial measurement unit that failed yesterday and prompted the scrub of mission STS 40 has been completed and engineers have begun the IMU retest. By Monday evening, the IMU calibrations should be complete. The launch of the Space Shuttle Columbia and the Spacelab Life Sciences mission STS 40 is currently targeted for 8 a.m. June 5. Ten of thirty rodents were removed from two animal enclosure modules last night at about 5 p.m. The approximately 2500 jellyfish were also removed at that time. Removal of the other 20 rats, located in the research and animal holding facility in the spacelab module in Columbia's payload bay is scheduled to begin at 10 p.m. tonight. Other work at the pad today includes circulating an inert gas into the external tank to keep it dry. Additional liquid oxygen is scheduled to be delivered to the pad today; a delivery of additional liquid hydrogen will arrive at the pad tomorrow. The Orbiter mid-body umbilical unit has been mated to Columbia and the connections leak checked. Fuel cell topping off operations are scheduled for early June 3. [KSC SHUTTLE STATUS REPORT, June 2, 1991.]

June 3: **COUNTDOWN RESUMES**

"We will have a chance of showers anytime on Wednesday (June 5), but the best chance of thunderstorms will be in the afternoon hours," said Meteorologist **Rodney Smith** of the National Weather Service office (Melbourne, FL). The countdown for STS 40 is set to resume today at 1 a.m. for the space agency's third attempt to launch the Columbia whose No. 2 IMU has been replaced. Launch is set for 8 a.m. June 5. The countdown will begin a day earlier than had been announced to make it easier to coordinate today's modified schedule of pre-launch work, according to KSC spokesman **Bruce Buckingham**. Testing and calibration of the new IMU is set to begin about 8 a.m. today; results will be available June 4. [Banke, FLORIDA TODAY, p. 1A, June 3, 1991.]

June 4: **LSO'S SARGENT TO RETIRE**

Douglas Sargent, President of Lockheed Space Operations Co., will retire August 1 and be replaced by **Gerald Oppliger**, who has been Vice President and Assistant Program Manager for KSC Shuttle Operations since 1987. Kennedy Space Center Director **Forrest S. McCartney** said of Sargent, "his contributions to the return to flight" since the Challenger accident have been significant. "Oppliger," McCartney continued, "has been [Sargent's] deputy and is no stranger to us. I'm certain he

will pick it up without missing a single beat." Oppliger said he did not plan to change operations at present, describing the promotion as a "fantastic opportunity. We'll just continue the operation as it's been going." [Boylan, FLORIDA TODAY, p. 18C, June 4, 1991.]

1992 SPACELAB LAUNCH ON TRACK

Equipment housing experiments for a future Spacelab flight has completed a major series of tests at Kennedy Space Center, keeping the Shuttle mission on track for a March 1992 launch. The Atmospheric Laboratory for Applications and Science (Atlas 1) will be the first Spacelab mission solely dedicated to studying the Earth's atmosphere and how changes in the sun affects the sky. "The payload is in excellent shape," said **Anthony O'Neil**, Mission Manager, "I believe the Atlas-1 experiments, Spacelab hardware and software performed exceptionally well during the tests and are ready to support the mission sequence test" which is scheduled to run for five days beginning June 10. It will test the entire payload as it is expected to operate on a typical day in orbit. Five astronauts and two payload specialists, commanded by **Charles Bolden**, will fly the seven-day mission. ["Spacelab Mission On Track," FLORIDA TODAY, p. 10E, June 2, 1991.]

PROSPECTOR LAUNCH DELAYED BY SHUTTLE

A Prospector rocket carrying 10 experiments will have to wait two days to be launched; the delay is caused by the Wednesday (June 5) launch of Columbia taking precedence. The Prospector launch is now scheduled to occur between 7 a.m. and 10 a.m. June 7. An investigation into the failed launch attempt on May 6 showed that a device designed to prevent accidental ignition of the rocket did not rotate into the proper firing position. "If you're going to have a failure, that's probably the best kind of failure, whereas if you have to destroy a missile, you end up starting all over from scratch." The "safe and arm" device has been replaced. Orbital Sciences Corp. spokeswoman **Barbara Zadina** said, "Everything should be ready to go. We're confident that we have a good crew out there and that they've done a good job identifying and fixing the problem." [Brown, FLORIDA TODAY, p. 2A, June 4, 1991, Halvorson, FLORIDA TODAY, p. 10E, June 2, 1991.]

COUNTDOWN STATUS

Technicians at Launch Complex 39B are performing a repair on a small portion of the insulation of the External Tank being flown on the STS 40 mission. During a walkdown of the pad this morning, it was noticed that the foam insulation covering a plate had debonded. The insulation area measures four and one-quarter inches on a side and is 1.35 inches in thickness. It is located near the forward attach point for the Orbiter and External Tank. NASA spokesman Ed **Campion** said, "The concern is that the insulation might come loose during ascent and pieces could fly back and damage the tiles on the Orbiter." The patch was glued back on the tank at 2 p.m. and touched up again about 6 p.m. It is now expected that the Rotating Service Structure at the pad will be rolled back between 6 and 7 p.m. in preparation for the tanking operation to begin shortly

before midnight. Off-line tests of the curing process are underway and data from those tests will be reviewed as part of the decision-making process on whether to proceed with tanking. The tests will provide data on bonding strength at different cure times. A decision on proceeding with the tanking operation will be made late this evening. This morning, Commander **Bryan O'Connor** and Pilot **Sid Gutierrez** practiced approaches to the Shuttle Landing Facility in the T-38 jets. Meteorologists for the Air Force were watching a cool front moving in from Canada which increased the chance of excessive cloudiness, lightning and thunderstorms over Launch Complex 39B. The probability of acceptable weather at 8 a.m. June 5 is 50 percent. For the overall window, there is a 60 percent chance of being within launch weather commit criteria. One of thirty laboratory rats will miss the flight because the water dispenser in its cage was malfunctioning. [STS-40 COUNTDOWN STATUS, 4 p.m., Tuesday, June 5, 1991, KSC SHUTTLE STATUS REPORT, June 4, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 5, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-11, June 5, 1991, "Shuttle Launch," USA TODAY, p. 3A, June 5, 1991, Leary, THE NEW YORK TIMES, p. A12, June 5, 1991.]

[] **STS 43 PROCESSING: ATLANTIS**

Work in progress on the Space Shuttle Atlantis includes thermal protection system operations, main engine and main propulsion system tests, functional tests of the orbital maneuvering system pods, hookups of the low pressure fuel turbopump on Shuttle main engine no. 3 and a wing positive pressure test. Functional tests of the galley have been completed. Installation of heat shields around the three main engines and of the getaway special beam in the payload bay remain to be accomplished. [SHUTTLE STATUS REPORT, June 4, 1991.]

[] **DISCOVERY, ENDEAVOUR PROCESSING: STS 48**

A number of processing operations are underway for Discovery's STS 48 mission: tests of the fuel cells, leak and functional tests of the water spray boilers, main propulsion system tests, thermal protection system operations, deconfiguration of the payload bay. Scheduled work includes replacement of the nose landing gear axle. Work in progress on the Space Shuttle Endeavour includes main propulsion system leak checks, thermal protection system operations, work in the environmental control life support system and removal of the 2 and 4 inch lines in the liquid hydrogen main propulsion system. [SHUTTLE STATUS REPORT, June 4, 1991.]

June 5: **COLUMBIA: THIRD TIME'S THE CHARM**

Space Shuttle Program pioneer Columbia finally made it into space today with a 9:25 a.m. liftoff from Launch Complex 39B. The twice delayed STS 40 carried into orbit seven astronauts - four men, three women - along with 29 rats and 2,478 jelly fish on a nine-day medical research mission. Launch Director **Robert B. Sieck** said, "We're certainly pleased to have Columbia, the crew and all the critters in orbit. Speaking at a news briefing, NASA Administrator **Richard H. Truly** noted

that NASA "has been launching a safe and successful space shuttle flight every month-and-a-half for two years and eight months." That success, he said, proved that the space agency could operate large projects and make use of the Space Shuttle to support the proposed Space Station. The full House of Representatives is to vote on funding for the Space Station June 6. The STS 40 mission was originally scheduled to be launched May 22 when concern about the Orbiter's temperature fuel sensors safety scrubbed the liftoff attempt. When a navigation unit failed June 1, the second effort was scrubbed. This morning's launch was threatened by cloudy weather and concern about a 4-inch-square piece of foam insulation on the extern fuel tank. The patch that was put on the tank was considered ready enough for launch and the clouds eventually moved sufficiently to allow the launch. The countdown was halted at the 9 minute mark just before 8 a.m. and was resumed at 9:15. Columbia is expected to launch June 14 at Edwards Air Force Base, CA. [Halvorson and Banke, FLORIDA TODAY, pp. 1A-2A, June 6, 1991. Other feature stories on the launch of STS 40 may be found on p. 10A of the cited issue; Leary, THE NEW YORK TIMES, p. A8, June 6, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-8, June 6, 1991, Broad, "Space Errors Share Pattern: Skipped Tests," THE NEW YORK TIMES, pp. B-5 & B-8, June 11, 1991.]

June 6: **SPACE STATION REVIVED**

The U. S. House of Representatives today voted to provide NASA with $1.9 billion of the $2 billion President Bush asked for to fund the Space Station Project. NASA Administrator **Richard H. Truly** said: The totally bipartisan vote in the House of Representatives to continue development of Space Station Freedom was a big victory for all America. It was a vote to remain the leader in space exploration, to inspire and challenge our young people to do better, to reassert our technological leadership [and] to make an investment in America's future, and set the stage for discovery and breakthroughs in medicine, materials, transportation and energy. I am confident that Freedom will win support in the Senate. Much work remains to be done to provide a final FY 1992 budget for NASA that is well balanced between science, manned space flight and exploration, aeronautical research, earth observation and technology development. I remain committed toward that end. The U. S. Senate takes up NASA's proposed 1992 budget in July. [Crawford, THE ORLANDO SENTINEL, pp. A-1 & A-2, June 7, 1991, Crawford, THE ORLANDO SENTINEL, pp. A-1 & A-6, June 9, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 7, 1991, Halvorson, FLORIDA TODAY, June 8, 1991, NASA/KSC NEWS RELEASE NO. 91-88, June 6, 1991, Lawler, SPACE NEWS, pp. 3 & 28, June 10-16, 1991.]

PAD DAMAGE SLIGHT

Scorched paint was the only damage noted on Launch Complex 39B, according to KSC spokesman **Bruce Buckingham.** No damage was reported in the payload changeout room.Pad workers spent today cleaning the pad and began preparations for moving Columbia's mobile launch platform back to the Vehicle Assembly Building no June 13. Discovery's STS 43 mission will be the next flight

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to originate from LC 39B. Columbia's solid rocket boosters were recovered June 5 and returned to Cape Canaveral Air Force Station the next day; Buckingham said little damage was observed in initial inspections of the boosters. Buckingham said the boosters would be cleaned, disassembled and prepared for a future launch. He said that mission managers were discussing a leaking helium tank discovered in Atlantis and whether to replace it. The leak is considered small and may not require replacing the tank. [Banke, FLORIDA TODAY, p. 6A, June 7, 1991, KSC SHUTTLE STATUS REPORT, June 6, 1991.]

PROSPECTOR LAUNCH DELAYED, AGAIN

The launch of Prospector, a commercial suborbital rocket, has been tentatively reset for June 8 at 7 a.m. from Launch Complex 20 at the Cape Canaveral Air Force Station. The Joust 1 mission was scrubbed after poor weather prevented the Orbital Sciences Corp., Space Data Division launch team from completing vehicle processing work June 5. Dr. **Charles Lundquist**, Director of the University of Alabama in Huntsville Consortium for Materials Development in Space (UAH CMDS), said lightning around Launch Complex 20 kept the team away from the launch pad for approximately three hours. Lundquist said the team would resume its work today weather permitting. Because of the weather delay, a simulated countdown scheduled for today will be conducted at 6:30 a.m. June 7. A final decision to pursue a June 8 launch would be made the morning of June 7. Air Force weather forecasters said today that there was a 40 percent chance that weather conditions would be favorable for a launch June 8; weather conditions must also be taken into account for the safe operation of the payload recovery ship which is located in the Atlantic Ocean about 250 miles from the launch site. The Prospector will carry 10 materials and biotechnology experiments approximately 380 miles into space and provide the experiments about 13 minutes of weightlessness before the payload returns to earth for an ocean landing. The Joust 1 mission is sponsored by the UAH CMDS, a NASA Center for the Commercial Development of Space. Orbital Sciences, under a contract with the UAH CMDS, will provide the rocket and launch services. [Banke, FLORIDA TODAY, p. 6A, June 7, 1991, JOUST 1 UPDATE, June 6, 1991.]

STS 43 LAUNCH PREPARATIONS

A number of processing activities are underway on Atlantis in preparation for its STS 43 flight which is scheduled now for a late summer liftoff. Work in progress includes: main engine and propulsion system checks; main engine heat shield installation; thermal protection system tile work; replacement of left OMS engine actuator due to malfunction during gimbaling test; payload integration verification test; Environmental Control and Life Support System servicing; and a landing gear functional test. Completed work includes: a main landing gear strut hydraulic level check; gaseous nitrogen leak check; and installation of the OMS heat shield. Checks and tests remaining to be done are the SSME interface leak checks; payload verification tests and a crew equipment interface test. [KSC SHUTTLE STATUS, June 6, 1991.]

June 7: **POST-LAUNCH CLEANUP**

Columbia's solid rocket boosters arrived today at Hangar AF at Cape Canaveral Air Force Station; there was no noticeable damage observed. Post-launch operations were underway at Launch Complex 39B where auxiliary power unit service carts were being removed. The mobile launcher platform was scheduled to be removed to the VAB high bay 3 on June 10. Columbia is scheduled to land at 1:14 p.m. EDT at Edwards Air Force Base, CA. [KSC SHUTTLE STATUS REPORT, June 7, 1991.]

DISCOVERY CONTRIBUTION TO COLUMBIA MISSION

Discovery's payload bay and payload bay doors were configured to support an extra-vehicular activity demonstration test. This test is required to support possible a EVA on Columbia to repair the left-hand payload bay door aft bulb seal. The test will involve astronaut **Kathy Sullivan** performing the EVA demonstration. Lube oil servicing on the auxiliary power units is underway as are water spray boiler leak and functional tests and main propulsion system and OMS pod system checks. Main engine controller checkouts and TACAN system checks have been scheduled in preparation for Discovery's STS 48 mission. [KSC SHUTTLE STATUS REPORT, June 7, 1991, "Test Is Determining Need of Shuttle Repair," THE NEW YORK TIMES, p. 6, June 8, 1991.]

ATLANTIS LAUNCH PREPARATIONS

The payload integration and verification test has been completed for the STS 43 mission of Atlantis, now scheduled for July 25. Work in progress included preparations to replace main propulsion system helium tank number 4 following a leak test failure; main engine heat shield installation; main engine and main propulsion system checks; thermal protection system tile work; Environmental Control and Life Support System servicing and a landing gear functional test. Orbiter hydraulic operations are scheduled as are SSME interface leak checks, crew equipment interface tests and main landing gear functional tests. [KSC SHUTTLE STATUS REPORT, June 7, 1991, Banke, FLORIDA TODAY, pp. 10E & 9E, June 9, 1991.]

WAVES DELAY PROSPECTOR LAUNCH

The launch of a Prospector sounding rocket has been delayed until June 9 at the earliest because of high waves in the Atlantic Ocean. For recovery of the rocket's experiment payload to be successful, waves must be six feet or less. Air Force forecasters predict that waves are expected to remain high through the weekend. [Banke, FLORIDA TODAY, p. 4A, June 8, 1991.]

AMES WINS PUBLIC SERVICE MEDAL

M. H. "Red" Ames, Boeing Space Operations Project Engineer, has been awarded a NASA Public Service Medal for contributions to the U. S. space program.

Kennedy Space Center Deputy Director **James A. "Gene" Thomas** presented the award to Ames. **Dean Helling**, General Manager of Boeing's Engineering Support Contract at KSC, said, "We are very proud of Red and his unrelenting efforts toward the successful completion of many NASA/Boeing projects." Ames was cited by NASA for successfully leading an effort to upgrade a device used to test lifting equipment at KSC's Launch Equipment Test Facility. ["Boeing Engineer Wins NASA Award," FLORIDA TODAY, p. 9E, June 9, 1991.]

June 9: **PROSPECTOR AIMS FOR JUNE 14 LAUNCH**

Prospector was ready to launch this morning when a technical problem could not be solved quickly and the launch was scrubbed. "It was most disappointing because the countdown was proceeding the scrub was so clean," said **Scott Webster**, President of Orbital Science Corp.'s Space Division (Chandler, AZ). About forty minutes before its scheduled 7 a.m. launch, workers prepared to connect two wires aboard the rocket when it was discovered that one had more electrical energy running through it than launch rules allowed. The cause of the high voltage readings is now attributed to batteries which power the flight termination system. Officials now say that June 14 is the earliest possible date for the next launch attempt, because an ocean recovery ship will not be available until that date. [Banke, FLORIDA TODAY, p. 4A, June 10, 1991, Halvorson, FLORIDA TODAY, p. 4A, June 11, 1991.]

June 10: **UCF AIDS SPACE STATION RESEARCH**

A potential Space Station crew return vehicle is being designed and tested in Orlando by engineering students at the University of Central Florida (UCF). The Assured Crew Return Vehicle (ACRV) is an escape vehicle that would enable sick or stranded astronauts to return safely to Earth in the event a Space Shuttle rescue mission was unable to reach the crew in a timely manner. NASA has decided that the ACRV will be a critical element of Space Station Freedom prior to it becoming a permanently manned facility. UCF's involvement with the ACRV began in the 1989-90 school year when about 30 senior-level engineering students worked on potential designs for the rescue and recovery subsystems of the crew return vehicle. Using the Apollo capsule as the basis for their concept, the students designed a detailed ACRV which was later constructed on a one-fifth scale by the 1990-91 senior engineering class. Balance and drop tests were conducted in a local swimming pool and a water test facility at Oregon State University to simulate ocean conditions over a period of five days. The project was headed by Dr. **Loren Anderson** of UCF; he said, "[The ACRV] took a lot of abuse, but it worked like we planned and came out all right from the testing. It was a valuable test for the project and an invaluable experience for the students." KSC's ACRV Manager, **Glenn Parker**, has worked closely with Anderson and assisted and monitored the college's work on the project. "The work they've done over there at UCF has been absolutely great," remarked Parker. "We've had to give them quite a bit of guidance, but the students are so committed and dedicated that it's been well worth the effort." Anderson said he expects students to continue to work on the ACRV project for at least the next school year. "We

have significantly improved our work on the program," Anderson said, "and certainly inspired interest in aerospace engineering as a result of our involvement. We're happy to be a part of the Space Station." [Varnes, NASA/KSC NEWS RELEASE NO. 69-91, June 10, 1991.]

June 11: **SPACE EXPLORATION INITIATIVE STRATEGY**

A Federal study group - the 22-member Synthesis Group -headed by former astronaut **Thomas Stafford**, today proposed a strategy for returning humans to the Moon by 2004 and on to Mars by 2014. "By starting the Space Exploration Initiative now, we can enable America to lead humanity on its inevitable path into space and toward the brighter future it will provide for all," said Stafford at a White House news briefing. Vice President **Dan Quayle**, who spoke at the briefing, said the report "sets the path for permanent, manned exploration of space."
Quayle called the Synthesis Group report the first "serious look ... at how to fulfill the president's objectives in space." Expressing optimism that public support can be generated for the Space Station project, Quayle went on to say, "We've all just gone through a bruising, tough fight on Space Station Freedom. If the Space Station had not gone forward, in my judgment it would have set space exploration back for at least a generation. We all know there are budget limitations," Quayle continued, "But I can assure you that the political will in the [Bush] administration for these types of endeavors will continue." Stafford said his group did not have the resources or mandate to make cost estimates of the exploration ventures, but studies by NASA and other organizations have put the cost at $500 billion or more. Stafford said the whole effort could be got underway for "very modest sums," adding, "No one is being asked to sign a blank check for this effort." [Leary, THE NEW YORK TIMES, p. A10, June 12, 1991, "Study: U. S. Should Return to Moon, Shoot for Mars," THE ORLANDO SENTINEL, pp. A-1 & A-4, June 12, 1991, Isbell, SPACE NEWS, p. 6, June 17-23, 1991.]

June 12: **SUPPORT OPERATIONS DIRECTOR DIES**

James E. Rice, 58, Director of Center Support Operations at Kennedy Space Center died at his home today. KSC Director **Forrest S. McCartney** said of him, "Jim Rice's contributions over his long and distinguished career have been numerous and significant. He is truly one of the pioneers of the Kennedy Space Center and has been a respected colleague of all of us. His loss will be felt by the center and his many friends, but we all feel the better for having had Jim as a companion and team member these many years." James E. Rice is survived by his wife, Arleen Rice (Satellite Beach, FL), and a daughter, Nicole Rice (Cocoa Beach, FL). Services will be conducted June 18 at Trinity Presbyterian Church (Satellite Beach) with a reception to follow immediately. [Bailey, FLORIDA TODAY, p. 3B, June 15, 1991.]

STS 43 PROCESSING: ATLANTIS

Environmental Control and Life Support System servicing has been completed on Atlantis in preparation for its STS 43 mission scheduled for July 25. Orbiter

hydraulic operations, main engine and main propulsion system checks and main engine heat shield installation have also been accomplished. In progress are aft bay closeouts, aerosurface cycling operations, special bulb seal inspections, thermal protection system tile work, structural checks, and preparations for final payload bay cleaning. SSME interface leak checks are scheduled as is final payload bay door closing. The TDRS-E payload will be delivered to the pad June 17. Work is also progressing on the external tank and solid rocket boosters being readied for Discovery's upcoming mission. Electrical mates and checkouts are proceeding; replacement of the lower strut and associated line cable is underway as are strut closeouts and foaming operations. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

STS-48/UARS PROGRESS

Main propulsion system checks, S-Band antenna system checks and deployment of the remote manipulator system to vertical have been completed in the processing of Discovery for STS 48 which will deploy the Upper Atmosphere Research Satellite (UARS) in the early fall. Landing gear functional tests are proceeding as are Orbital Maneuvering System (OMS) functional checks, onboard fuel cell tests and the water spray boiler 48-hour decay checks. Main engine controller checkouts, hydraulic and flight control checkouts and auxiliary power unit leak and functional tests remain to be completed. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

ENDEAVOUR PROCESSING: STS-49

The 17-inch disconnect has been installed on the newest Orbiter Endeavour and the 2-inch and 4-inch liquid hydrogen lines have been removed. Checks of the disconnect and main propulsion system ar in progress; thermal protection system work is also proceeding. [KSC SHUTTLE STATUS REPORT, June 12, 1991.]

June 14:

TORNADO ALERT AT KSC

Work was halted briefly at Kennedy Space Center today when a tornado was sighted over the Banana River, south of the space center. The tornado warning sounded at 10:50 a.m.; employees moved into hallways and other secure locations. The warning was canceled at 11:05 a.m. and no damage or injuries were reported, according to KSC spokesman **Bruce Buckingham**. ["Tornado Puts KSC On Alert," FLORIDA TODAY, p. 2B, June 15, 1991.]

COLUMBIA LANDS IN CALIFORNIA

"Now that was a great mission," Shuttle Program Director **Robert L. Crippen** said after Columbia landed at Edwards Air Force Base (CA) at 11:39 a.m. this morning. "Some people tell me," Crippen added, "Columbia's got a few years on it, but machines don't behave any better than that." Astronaut **Stephen Oswald**, speaking from Mission Control (Houston, TX) spoke to the crew of the 11-flight Orbiter, "Welcome back and congratulations on a super flight." **Arnauld**

Nicogossian, Director of NASA's Life Sciences Division, remarked after the landing, "We are starting to have little glimpses of new things. Some of the things that we thought were true are not true anymore; for example, how the body senses gravity and what is the memory in our body to retain that sense. I know there's a lot of happy people looking forward to analyzing the data." Within 30 minutes of landing the crew disembarked into a specially equipped van and immediately began physical examinations as part of another week of experiments and investigations. The information gleaned from the mission and the post-landing examinations is expected to pave the way for longer missions aboard Space Station Freedom and the planned flights to the moon and to Mars. [Brown, FLORIDA TODAY, p. 1A, June 15, 1991, Brown, FLORIDA TODAY, p. 5A, June 15, 1991.]

June 15: **COLUMBIA: MINOR FLIGHT DAMAGE**

Columbia returned to Earth with some minor damage; the re-entry charred and melted a door on the Orbiter's underside which covers the fuel lines connecting the Shuttle to its external tank. Heat did not penetrate the interior of the Orbiter. Officials speculate that a thermal protection system tile came off during launch. Columbia's Processing Manager **Bascom Murrah** said, "We don't really know yet; it's a concern, but it's a minor problem. The vehicle, once we got it up there, just performed flawlessly as far as I'm concerned. I think it was 99 percent hard work and 1 percent luck. We just had an outstanding flight." An early damage assessment showed 118 tiles dented with 22 having gouges larger than one inch. That falls within the normal range of Orbiter damage. The loose weatherstripping inside the Shuttle's payload bay was examined in California. Murrah said, "We don't see anything abnormal. We're not sure we can see much. We will do our main investigation once we get back to KSC." Murrah indicated that Columbia's braking system and tires worked well. The ferry-flight home aboard NASA's Shuttle Carrier Aircraft will begin June 19 at 11 a.m. and take two days, arriving at Kennedy Space Center June 21. The ferry flight will proceed to Biggs Air Force Base (El Paso, TX) initially, where weather will be assessed before proceeding on to Florida. [Banke, FLORIDA TODAY, p. 1A, June 16, 1991, Banke, FLORIDA TODAY, p. 5A, June 19, 1991.]

June 16: **ATLANTIS PAYLOAD WORK PROCEEDS**

Payload work on the STS 43 mission of Atlantis is proceeding smoothly at Kennedy Space Center where preparations were made tonight to move a TDRS satellite to Launch Complex 39A. Atlantis is currently being processed in the Orbiter Processing Facility and will be transferred to the Vehicle Assembly Building June 19 for mating with its solid rocket boosters and its external tank. Rollout to 39A will occur the following week. In California, Columbia is being readied for its return flight to KSC. It is scheduled to leave Edwards Air Force Base June 19 and return to Florida the next day. [Brown, FLORIDA TODAY, p. 2A, June 17, 1991.]

June 17: **TDRS MOVED TO LC 39A**

TRW's Tracking and Data Relay System satellite and its Boeing two-stage booster

were transferred today to Launch Complex 39A to await the arrival of the Space Shuttle Atlantis next week, according to KSC spokesman **George Diller**. At about 11 p.m. tonight, Atlantis will be transferred from the Orbiter Processing Facility (OPF) to the Vehicle Assembly Building (VAB) for mating with solid rocket boosters and an external tank. "Everything is on schedule, or ahead of schedule," Diller said. Liftoff is targeted tentatively for July 25, but launch officials are examining the possibility of moving up the date from three to five days. The official launch date will be set in early July following the STS 43 Flight Readiness Review. [Banke, FLORIDA TODAY, p. 6A, June 18, 1991.]

[] **PROSPECTOR SET FOR LAUNCH, AGAIN**

Prospector, the rail-launched, one-stage sounding rocket, will make its third attempt to liftoff tomorrow morning at 7 a.m. The suborbital rocket carries a package of ten experiments on a short - 13-minute - ride into space. "All systems are go. Everything looks good," said **Laura Ayres**, spokeswoman for the rocket's manufacturer, Orbital Sciences Corp. [Banke, FLORIDA TODAY, p. 6A, June 18, 1991.]

[] **ROAD WIDENING BEHIND SCHEDULE**

KSC officials expect to complete the space center's portion of the North Merritt Island road widening project on State Road 3 by August. County officials say the remainder will take another year. Primary cause of the delays: acquisition of needed property. Several property owners are fighting county attempts to take their land for the road project. [Nagy, FLORIDA TODAY, June 18, 1991.]

June 18: **PROSPECTOR DESTROYED**

Technicians blew up the Prospector rocket when it went out of control shortly after launch. Ten science experiments valued at more than $1 million were lost at sea after a Coast Guard search was called off. The Prospector lifted off late - at 7:34 a.m. - and 25 seconds into flight had to be destroyed when it swerved off course. Cameras recorded a part falling from the rear of the vehicle before it was destroyed. The rocket exploded again on impact in the Atlantic Ocean. No one was hurt in the accident. Recovery efforts for the Joust 1 payload will not be renewed June 19. The payload was apparently destroyed upon impact into the Atlantic Ocean after separating from the rocket. "We realize that failures can happen. That's part of the whole business of putting things in space," said **Charles Lundquist**, Director of the UAH Consortium for Materials Development in Space. "While we're disappointed, we're not in any way discouraged," he said. Officials of Orbital Sciences Corp. said that an investigation is underway. Review of videotapes of the launch showed an irregular burst of flame coming from the rocket's nozzle; the rocket lurched higher at first, then veered lower than its planned path. The new rocket was insured for only part of its costs. Prospector was NASA's second commercial space development center failure. A Space Services Inc. Starfire rocket failed just after launch from New Mexico in 1989. [Banke, FLORIDA TODAY, p. 5A, June 19, 1991, "Launch Abort," USA TODAY, p.

3A, June 19, 1991, JOUST 1 UPDATE, June 19, 1991, Date, THE ORLANDO SENTINEL, p. A-5, June 19, 1991.]

[] **THOMAS: FREEDOM DODGED A BULLET**

Kennedy Space Center's Deputy Director **James "Gene" Thomas** said tonight that "Space Station Freedom dodged a bullet" in the recent Congressional vote which revived spending plans for the Space Station Project. Speaking to the opening session of a NASA-sponsored meeting on engineering for university students, Thomas went on to say, "The top management of NASA feels that if the Space Station had gone away that was the death knell for manned spaceflight." Even with the reprieve, NASA will have to find $1 billion for program expenses within its own budget, he said. "That's discouraging, but I think it's encouraging that NASA won another one. Based on what's happened, I think the Space Station is going to have a solid future. I don't think Space Station is going to go away." The conference in Cocoa Beach, FL, included about 500 students and professors from 45 schools which participate in the University Space Research Association's advanced design program. The program gets $1.6 million annually from NASA. [Brown, FLORIDA TODAY, p. 5A, June 19, 1991.]

June 19: **ATLANTIS MOVES TO VAB**

When the Orbiter Atlantis rolled over to the Vehicle Assembly Building (VAB) from the Orbiter Processing Facility (OPF) earlier this week, it bested the post-Challenger record for shortest time spent in the OPF by 10 days. Atlantis first entered OPF Bay 2 on April 19, 1991, after its STS 37 was completed; it spent 59 days in the bay for processing for its STS 43 mission now scheduled for July 22. The previous OPF record, also held by Atlantis, was for processing the STS 36 mission. "We have had an extremely good OPF flow," said **Conrad Nagel**, NASA's Flow Director for Atlantis. "The hardware was very good to us and we had very few problems during processing." Originally, managers had hoped for a 65 day flow, but the lack of problems shortened the schedule to a record-setting pace. The Task Team Leader concept was also a contributing factor. Under this program, specific individuals are responsible for coordinating activities, getting the necessary paper work ready prior to the scheduled job, and tracking the work until the job is complete. Nagel described the program as "a real asset. It made a definite impact to our processing flow. Every day we came out of the scheduling meeting we all knew what had to be done during the next 24 hours. We could go plan our work and be sure it was going to be accomplished," he said. "I feel we can clean up the flow even more. We can roll out with not only the shortest turn around possible, but also with all the work completed, all the paper closed, and with all the requirements met. I don't want to come out of the OPF on a wing and a prayer. I want the spaceship to come out of the OPF as it is supposed to come out - ready to fly."[Buckingham, NASA/KSC NEWS RELEASE NO. 76-91, June 21, 1991, Banke, FLORIDA TODAY, p. 5A, June 20, 1991, Brown, FLORIDA TODAY, p. 1A, June 21, 1991.]

PROSPECTOR PAYLOAD BITS FOUND

Parts of the failed Prospector rocket's payload have been recovered but any hope of reflying some of the payload have vanished. "We're disappointed," said spokesman **Rick Mould** of the University of Alabama at Huntsville. "We were hoping we might find the payload intact. The rocket, but the not the payload, were insured and the insurance money may fund another project scheduled tentatively for next year. [Banke, FLORIDA TODAY, p. 5A, June 20, 1991, Date, "Searchers Find Bits of Rocket's Payload Capsule," THE ORLANDO SENTINEL, June 20, 1991.]

AMBASSADOR TO STAY TILL 1992

Ambassador, a replica of the Space Shuttle built by Guard-Lee and Co. (Apopka, FL), will remain at Spaceport USA until 1992, according to **George Meguiar**, Director of Marketing for the KSC tourist attraction. "Initially, the company wanted a place to try it out and see how it would transport and how well people reacted to it. The Shuttle is actually built in sections, which are transported in individual carriers. It took 22 semi-trucks to bring it here." The exhibit is free and visitors are able to walk inside the Shuttle's crew quarters and go up a set of stairs to the flight deck. The replica will leave Spaceport USA early next year, but Meguiar explained, "There are currently no specific plans for another replica to replace this one. But we will definitely have another one someday. That's very much a part of our objectives." [Lethbridge, STAR-ADVOCATE, June 19, 1991.]

June 20:

KSC: PRIMARY LANDING SITE!

Atlantis will land at Kennedy Space Center following its July mission and, this time, KSC will be the primary landing site, NASA said today. "We're delighted," KSC Director **Forrest McCartney** said. "It will allow us to operate more effectively and efficiently." Space business booster **Bob Allen** remarked, "Landing Shuttles at KSC will help us sell the area as a true spaceport. A company can see the logic of setting up right outside KSC if their experiments will be coming back here." Weather in Florida remains a concern and may prompt landings at California's Edwards Air Force Base; heavy payloads and two-week or more missions may also end at Edwards. The decision to start regular landings at the space center was due, in part, to the development of better brakes, improved steering and the planned addition of parachutes to the fleet. Seven of the 41 Space Shuttle launches have landed at Kennedy Space Center. In other news, NASA announced that it had rescheduled Atlantis' STS 43 mission's launch to July 22; it had previously been set for July 25. [Brown, FLORIDA TODAY, p. 1A, June 21, 1991, "KSC Gets Landing Site Role," THE ORLANDO SENTINEL, p. A-1 +, June 21, 1991, "Shuttle Landings," USA TODAY, p. 3A, June 21, 1991.]

CHEMICAL SPILL AT LC 39B

Drops of a caustic cleaner splashed on four technicians at Launch Complex 39B today. "They were seen at the health facility and released to return to work," said

J. B. **Klump**, spokesman with Lockheed Space Operations Co. The drops came from a bubble of sodium hydroxide during a cleaning operation designed to vent toxic nitrogen tetroxide from Orbiters. Two of the workers were soaked by the chemical and took emergency showers at the launch pad, the other two were splattered. The accident caused the pad to be evacuated briefly while officials determined if any danger existed for the remainder of the work crew. Launch Complex 39B is undergoing major modifications to prepare it for Endeavour's first launch in May 1992; no other Space Shuttle will be launched there until Endeavour's mission. The 2-inch pipe involved in the accident was being replaced by a four-inch pipe as part of the modifications. The $3.3 million project will include some 50 modifications to enable safer Shuttle launches and more efficient launch operations. [Banke, FLORIDA TODAY, p. 5A, June 21, 1991.]

June 21: **COLUMBIA ARRIVES AT KSC**

Columbia and its Shuttle Carrier Aircraft arrived at Kennedy Space Center this morning at 8:59. It was demated from the SCA and towed to the Orbiter Processing Facility (OPF) early June 22. Preparations were made for removal of the Shuttle Tailcone and for setting up the work platform configuration and other post-flight operations. A special congressional delegation was on hand at the space center to greet the returning Columbia. The representatives are members of a NASA oversight committee and had come to the Space Coast to see how NASA is spending the money it is given. Rep. **Jim Bacchus** (D-Orlando, FL) said, "It bothers me that people still have to work in trailers and have to walk a good ways to go to the rest room. That's not what seems to me to be the cutting edge...of high technology." The group was interested in seeing what NASA was doing in the five years since the Challenger accident. "Some of us are anxious to see in this trip what changes we've made, what precautions we've taken to avoid a similar accident. I think we'll go back with a greater confidence in what we are doing in space." [Banke, FLORIDA TODAY, p. 1A, June 22, 1991, KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 22: **ELECTRICAL CHECKS ON ATLANTIS**

Atlantis must undergo important electrical and mechanical checks of connections between the Orbiter and its solid rocket boosters and external tank before rollout to Launch Complex 39A for its STS 43 mission. Rollout is scheduled for 3 a.m. June 25; launch is set for July 22. The Space Shuttle Columbia returned to Kennedy Space Center June 21 and was moved to the Orbiter Processing Facility for post-flight servicing and removal of the Spacelab payload. Later this summer Columbia will be returned to California in eight weeks for extensive modifications including the installation of new brakes and a parachute for safer landings. [Brown, FLORIDA TODAY, p. 6A, June 23, 1991, Brown, FLORIDA TODAY, p. 1A, June 24, 1991.]

[] **LC 39B CLOSES FOR REPAIRS**

Launch Complex 39B is closing down for repairs after having launched a dozen

Space Shuttles in the past three years. Workers begin shortly a $3.3 million modification designed to enhance safety and efficiency in the business of launching Orbiters. It will become more like LC 39A than it has been. Both pad originally were constructed for launching Saturn rockets thirty years ago. The manager in charge of LC 39B, **Buzz Brown** of Lockheed Space Operations Co., said, "In the history of aerospace, where we have had more than one launch complex, one has never been exactly like the second one. You're constantly incorporating new features." After the Challenger accidents and before flights were resumed in September 1988, modifications were begun on both pads. That work stopped at LC 39B when Discovery was ready for the Return to Flight mission (STS 26). Brown said, "We got back into the flying business faster at Pad B than Pad A did." With Columbia soon to be in California and Endeavour still not ready to fly for another year, it was thought that now is a good time to finish the modifications begun after Challenger. [Banke, FLORIDA TODAY, pp. 10E & 9E, June 23, 1991.]

June 23: **ATLANTIS READY FOR ROLLOUT**

Atlantis has been mated to its solid rocket boosters and to its external fuel tank. Tests of electrical and mechanical connections remain to be completed before rollout to Launch Complex 39A begins shortly after midnight tonight, according to Kennedy Space Center spokesman **Bruce Buckingham**. Call to stations for the rollout is set for 8:00 p.m. Atlantis' payload for its STS 43 mission, a Tracking and Data Relay System satellite (TDRS) is already at the pad. The new satellite will join three others already in orbit around the Earth. Atlantis' launch, expected to be July 22, will be the 42 Shuttle liftoff and fourth of this year. At LC 39A, preparations are underway to receive Atlantis; and the TDRS payload is getting its final fuel servicing.[Brown, FLORIDA TODAY, p. 1A, June 24, 1991, KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 24: **STS 48/STS 49 LAUNCH PREPARATIONS**

Ammonia boiler servicing and on board fuel cell system tests have been completed on Discovery in preparation for its STS 48 mission. Also completed are OMS system functional checks, flight control inspections and nose wheel steering checkouts. Payload bay door functional tests are scheduled. Underway presently are bulb seal repair work, payload bay reconfiguration, helium tank leak checks, radiator inspections, robot arm tests, and auxiliary power unit leak and functional tests. A number of operations are also in progress upon the newest Shuttle Endeavour. Checks are proceeding on the Orbiter's 17 inch disconnect, the aft compartment is being cleaned and thermal protection system work is continuing. Checks are being made of the ammonia boiler installation and the external tank door housing mechanisms. [KSC SHUTTLE STATUS REPORT, June 24, 1991.]

June 25: **ATLANTIS ROLLS OUT TO LC 39A**

The Space Shuttle Atlantis, on the first leg of its STS 43 mission, rolled 3 1/2 miles from the Vehicle Assembly Building to Launch Complex 39A; the journey began

at 12:55 a.m. and the Orbiter was hard down on the pad at 7:09 a.m., according to Kennedy Space Center spokesman **Bruce Buckingham**. Presently, connections between the vehicle and the launch pad are underway. Over the weekend concern had arisen over a TDRS antenna, but additional tests determined that an antenna hinge "was more flexible than we had assumed," explained TDRS Project Manager **Nicholas Chrissotimos**. Engineers had similar problems with a Galileo spacecraft antenna which has not been fully deployed. The TDRS will be installed in Atlantis tomorrow and a helium signature leak test will also be performed on the main propulsion system and the three main engines.[Brown, FLORIDA TODAY, p. 1A, June 25, 1991, KSC SHUTTLE STATUS REPORT, June 25, 1991, Brown, FLORIDA TODAY, p. 1A, June 26, 1991.]

STS 48 PROCESSING: DISCOVERY

In the Orbiter Processing Facility's Bay 1, the Space Shuttle Discovery is undergoing verification of its orbital maneuvering system electrical redundancy capability and servicing of its supply of potable water. In addition, repairs of the Orbiter's payload bay bulb seal have begun as have leak and functional tests of the auxiliary power units, thermal protection system operations and evaluation of the Tacan antennas. Discovery's three main engines will be installed over June 28 and June 29. [KSC SHUTTLE STATUS REPORT, June 25, 1991.]

POST-FLIGHT PROCESSING OF COLUMBIA

The tail cone has been removed from Columbia and preliminary inspections have been made inside the Spacelab module. Residual propellants are scheduled to be removed the auxiliary power units shortly. Post-flight processing which has already begun includes inspections of the payload bay door bulb seal, removal of ferry flight kit hardware and installation of platforms for access to various parts of the vehicle. [KSC SHUTTLE STATUS REPORT, June 25, 1991, Brown, FLORIDA TODAY, p. 1A, June 26, 1991.]

ENDEAVOUR PROCESSING OPERATIONS

Currently, ammonia boiler tubes are being installed on board Endeavour as are snaps and buttons for thermal control blankets. The right orbital maneuvering system pod has just arrived from its manufacturer and is being offloaded into the VAB's High Bay 2. [KSC SHUTTLE STATUS REPORT, June 25, 1991.]

June 26:

TDRS LOADED INTO ATLANTIS

The $100 million Tracking and Data Relay System satellite, a key part of NASA's communications system, was loaded into the Space Shuttle Atlantis today in preparation for the STS 43 mission. Atlantis is expected to be launched July 22. **John Blaha**, Mission Commander for STS 43, commented, "We're very excited about getting no with the mission. The crew's been together for about a year planning to do this mission. We're looking forward to it. It's going to be a challenging mission." Blaha's crewmates include: Pilot **Michael Baker**, and

Mission Specialists **Shannon Lucid, James Adamson** and **G. David Low.** Lucid will be making her third flight; Adamson and Low will each be making his second trip into space. [Brown, FLORIDA TODAY, p. 4A, June 27, 1991.]

June 27: **ATLAS FAILURE BLAMED ON DEBRIS**

A bit of debris may have been at fault in the Atlas rocket failure last April, according to accident investigators. "We'll never know for sure, but it probably was a bolt, a washer or some foreign object that caused the engine's turbomachinery to seize up. Then everything stopped and the rocket tumbled," said General Dynamics Corp. spokesman **Jack Isabel.** The rocket and its payload - a Japanese television satellite - were destroyed six minutes after launch on April 18 from Cape Canaveral Air Force Station. According to Isabel, an investigative team studied flight data for two months before concluding that debris must have jammed the engine turbopump. These findings clear the way for the remaining three Atlas flights scheduled for this year. [Halvorson, FLORIDA TODAY, p. 4A, June 28, 1991.]

LEAK CHECKS ON ATLANTIS

Electrical connections between Atlantis and its payload -a Tracking and Data Relay Satellite - are being completed today and other workers are preparing to check the Orbiter's propulsion system for leaks tomorrow. Preparations have also begun for loading propellants into Atlantis' onboard storage tanks and power system. The Orbiter is scheduled to launch July 23 for a nine-day mission which, besides deploying the TDRS, will be devoted to science and medical experiments. [Brown, FLORIDA TODAY, p. 4A, June 28, 1991.]

M.A.P. MECHANICAL CONTRACT

M.A.P. Mechanical Contractors, Inc. (Homestead, FL) has been awarded a $1,675,000 contract to increase the capacity of the Orbiter Processing Facility (OPF) high bay HVAC/chilled water systems. The current HVAC system (heating, ventilating and air conditioning) is old and showing signs of deterioration and corrosion. Some operations performed in the OPF, such as the bonding of the thermal tiles on the Orbiter, are very temperature sensitive. The modifications will ensure an environment in which the temperature and humidity levels can be controlled. [Stoaley, NASA/KSC News Release No. 79-91, June 27, 1991.]

June 29: **KSC TEAM LAUNCHES SCOUT AT VAFB**

A four-stage Scout rocket was successfully launched by a 25-member team from Kennedy Space Center today at Vandenberg Air Force Base in California. The Scout carried a 212-pound satellite into orbit. "It was beautiful. We saw it all the way through third stage ignition,? said **Jim Meyer**, Test Controller for the launch team. The Scout launch was the first directed by a KSC launch team, according to Meyer. At Kennedy Space Center, technicians continued to prepare Atlantis for its late July launch. Electrical and mechanical connections between the Orbiter

and its TDRS cargo were tested and the Shuttle's engine valves and sensors were calibrated. ["NASA to Launch Scout Rocket Friday," FLORIDA TODAY, June 23, 1991, Halvorson, FLORIDA TODAY, p. 1A, June 30, 1991.]

JULY

July 1: **STS 43 PROCESSING: ATLANTIS**

The crew of STS 43 arrives today at 3 p.m. to prepare for tomorrow's Terminal Countdown Demonstration Test; call to stations is set for 8 a.m and the test will run until 11 a.m. July 3. An end-to-end test of the Tracking and Data Relay Satellite is in progress at Launch Complex 39A. Work completed at the pad includes a helium signature leak test of the three main engines and the main propulsion system, a payload to Orbiter interface verification test , final connections between the launch pad and the vehicle and a main engine flight readiness test which calibrates engine valves and sensors. A Launch Readiness Review is scheduled for July 8 and a Flight Readiness Review is scheduled for July 11-12. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

STS 48 PREPARATIONS

Two of the three Shuttle Main Engines have been completely installed; the third is currently being installed. An external tank door functional test has been completed on Discovery in preparation for its STS 48 (UARS) mission. Discovery's potable water system is being serviced and the Orbiter's payload bay bulb seal is also being repaired. The auxiliary power units are undergoing leak and functional tests. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

COLUMBIA'S POST-FLIGHT PROCESSING

The Spacelab module and getaway special beam have been removed from Columbia as part of the post-STS 40 processing. Work is underway to remove the forward reaction control system on July 2 and inspect the payload bay door bulb seal. Ferry flight kit hardware is being removed and technicians are preparing to drain residual fuels from the auxiliary power units; there is also some work being done on the Orbiter's thermal protection system. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

ENDEAVOUR'S STS 49 PROCESSING

Work continues in preparation for Endeavour's first mission, STS 49. Leak checks of the main propulsion system are in progress as are the installation of covers on the main propulsion system lines, brazing water lines into the environmental control life support system, mounting the external tank umbilical door drive mechanism and brazing in lines for the ammonia boiler. [KSC SHUTTLE STATUS REPORT, July 1, 1991.]

ATLANTIS CREW ARRIVES FOR TEST

The STS 43 crew arrived at Kennedy Space Center today to take part in a Terminal Countdown Demonstration Test which begins at 8 a.m. tomorrow and runs until 11 a.m. July 3. **Bruce Buckingham**, spokesman for KSC, said, "It will

give the astronauts and the launch team an opportunity to go through real live launch-day activities without actually having to launch." Mission Specialist **James Adamson** arrived early in the day and was followed to the space center in T-38 training aircraft by Commander **John Blaha**, Pilot **Michael Baker** and fellow Mission Specialists **Shannon Lucid** and **G. David Low**. Tomorrow the crew will practice emergency egress procedures at Launch Complex 39A. On the morning of July 3, the entire crew will put on flight suits and board the Orbiter for the final hours of the practice countdown. [Halvorson, FLORIDA TODAY, p. 4A, July 2, 1991.]

July 2:

DELTA 2 LIFTOFF TONIGHT

A Delta 2 rocket is scheduled to liftoff tonight at 10:36 from Cape Canaveral Air Force Station's Launch Complex 17; the launch window extends until 11:07 p.m. The Air Force's Delta 2 will carry a $65 million Navstar Global Positioning System satellite which will join 15 other such spacecraft in orbit 12,000 miles above Earth. Eight more satellites must be launched to complete the planned 24-satellite system. There is a 60 percent chance of favorable weather for the launch, but forecasters are concerned about electrically charged clouds in the area. [Halvorson, FLORIDA TODAY, p. 4A, July 2, 1991.]

COUNTDOWN DEMONSTRATION TEST

"The vehicle really looks good. We're ready to go for our nine-day space mission," said Atlantis Commander **John Blaha**. The crew spent this afternoon at Launch Complex 39A, inspecting the Orbiter's Tracking and Data Relay Satellite payload and practicing emergency escapes from the launch pad. Blaha noted that the launch pad evacuation bunker is now equipped with oxygen hoses that can be connected directly to flight suits. Before, astronauts would have had to open their helmets to obtain oxygen. The TCDT is scheduled to end tomorrow at 11 a.m.; a firm launch date will be set next week following the mission's Flight Readiness Review. [Brown, FLORIDA TODAY, p. 13A, July 3, 1991.]

DELTA 2, ONE MORE TIME

A storm in Virginia prevented the launch of an Air Force Delta 2 at Cape Canaveral Air Force Station tonight; a second attempt will be made July 3. Bad weather shut down a ground station in Virginia which relays information about the rocket's flight path from a South Atlantic tracking station. The launch is scheduled to occur at 10:32 p.m. The last Air Force Delta flight took place seven months ago; between the two launches was used to begin needed repairs on two Delta launch pads. A March 1991 Air Force report warned of the deterioration of the two pads: "Catastrophic failure of both towers is possible should they experience winds which approach structural design limits. The confidence level that the service towers will remain safe for the next two or three launches is very low." Repairs have now been made, according to the Air Force. "It's absolutely safe, otherwise we wouldn't be launching," said Air Force Lt. Col. James Jannette. [Brown, FLORIDA TODAY, p. 1A, July 3, 1991, Date, THE ORLANDO SENTINEL, July 3, 1991.]

July 3: DELTA LAUNCHED SUCCESSFULLY

"Everything looks very good, very clean," said **Skip Mackey**, Chief of a team which tracks the flight of rockets as a Delta rocket carrying a Navstar Global Positioning System satellite was successfully launched tonight at 10:32 p.m. from Launch Complex 17A. The launch marked the delivery of the 11th GPS satellite into orbit; when completed the navigational system will include 24 satellites. The launch had been threatened by the prospect of rainy weather. [Brown, FLORIDA TODAY, p. 1A, July 4, 1991, Date, THE ORLANDO SENTINEL, July 4, 1991.]

[] BOTTOM FELL OFF PROSPECTOR ROCKET

Investigators know that the Prospector rocket went off course because the bottom of the rocket fell off; what they don't know yet is why. "We still are investigating the precise mode of failure," said **Laura Ayres**, spokeswoman for manufacturer Orbital Sciences Corp. She said that investigators found no indication that the rocket's motor, guidance or control system contributed to the rocket's failure. She added that investigators are still trying to determine whether an unanticipated recirculation of exhaust gases within the rocket played a role in the accident and that a rapid flapping of the rocket's fins as the vehicle reached speeds of about 700 mph might also have contributed to the failure. [Halvorson, FLORIDA TODAY, p. 13A, July 3, 1991.]

[] DRESS REHEARSAL GOES WELL

"Everything went smoothly," said Kennedy Space Center spokesman **Bruce Buckingham** of the just completed Terminal Countdown Demonstration Test. During the test, the STS 43 crew of Commander **John Blaha**, Pilot **Michael Baker** and Mission Specialists **G. David Low, Shannon Lucid** and **James Adamson** practiced an emergency escape from the launch tower at Launch Complex 39A. During the day, pad technicians prepared to load toxic propellants into Atlantis to power its orbital maneuvering units and steering thrusters; the loading begins May 8. Pad workers also tested the doors near the trailing edge of Atlantis' right wing. Tomorrow, only a skeleton crew of security and safety workers will be on hand at KSC as the space center closes down for the July 4 holiday. [Banke, FLORIDA TODAY, p. 12A, July 4.]

[] DELTA PADS GET REPAIRS IN 1992

"We'll build our launch schedule based on using one pad at a time. We will not have dual pad operations," said Delta Program Commander Lt. Col. **Randolph Moyer**. The two Delta launch pads run by the Air Force will be closed down one at a time next year to undergo repairs made necessary by corrosion of the 30 year-old towers. He said launch operations on the pads will be suspended from three to five months at a time. Moyer also said that repairs made on Launch Complex 17A just prior to tomorrow's Delta launch were sufficient to eliminate critical concerns and that a complete structural analysis of the pad is underway.

Work at LC 17B was not deemed as critical. [Brown, FLORIDA TODAY, p. 12A, July 4, 1991.]

July 5: **SAILORS ARRESTED AT KSC**

Security officers at Kennedy Space Center arrested two sailors from Massachusetts who made a navigational error and mistakenly anchored near a Space Shuttle launch pad. **Thomas Hamilton** and **Paul O'Leary** (Brookline, MA) said they became lost in the Intercoastal Waterway and anchored to a small island in the Banana River. The two were released on their own recognizance. An investigation is underway to discover how security was broken. [Banke, FLORIDA TODAY, p. 1A, July 6, 1991.]

July 6: **LOCKHEED AWARD WINNERS**

Lockheed Space Operations Co. announced that **Carla King** (Orlando, FL) has been named Shuttle Processing Contract Employee of the Month Award. Supervisor of the Month was awarded to **Tom Studstill** (Titusville, FL). King is a senior software engineer and is responsible for analyzing launch processing problems, meeting with engineers to clarify details and writing problem specifications and defining methods of solutions. Studstill supervises 11 people in the Finance-Logistics-Performance Measurement group in Lockheed's Business Systems Department. ["Employee, Supervisor Reap Space Awards," FLORIDA TODAY, p. 9E, July 7, 1991.]

HELLING WINS SAFETY AWARD

Kennedy Space Center Director **Forrest S. McCartney** presented the Director's Award for Outstanding Safety Performance to **Dean Helling**, General Manager of Boeing Aerospace Operations, Inc.'s Engineering Support Contract. The award is based on a point system involving lost-time accidents, damage to hardware, work place inspections, job surveillance and timely submittal of reports. ["Boeing Group Wins KSC Safety Award," FLORIDA TODAY, p. 9E, July 7, 1991.]

HOLIDAY BREAK ENDS AT KSC

A four-day holiday break ends for Kennedy Space Center workers tomorrow as preparations for a July 23 launch of Atlantis resumes. Thermal protection system work on each Orbiter continues July 7. The STS 43 Flight Readiness Review begins July 11 and a definite launch date for the mission will be set at the conclusion of that review. [Banke, FLORIDA TODAY, p. 4A, July 6, 1991, Banke, FLORIDA TODAY, p. 4A, July 7, 1991.]

July 8: **LAUNCH READINESS REVIEW**

Kennedy Space Center managers meet today to discuss whether the Space Shuttle Atlantis and its TDRS payload are ready to be launched on July 23. According to KSC spokeswoman **Lisa Malone**, managers will discuss how pre-

launch tasks are proceeding and determine when the space center will be ready to launch the Orbiter. Launch Complex 39A will be closed to all except essential workers as toxic propellants are loaded onboard Atlantis. Technicians will wear special safety garments for protection against leaks or toxic vapors while the loading operation is underway. The pad will reopen late on July 9. [Banke, FLORIDA TODAY, p. 1A, July 8, 1991.]

LRR CONTINUED

KSC managers completed the STS 43 Launch Readiness Review this afternoon without identifying any significant issues. KSC Launch Director **Bob Sieck** said, "KSC is proceeding toward the safe and successful launch and landing of Atlantis the end of this month." The managers are recommending a launch on July 23. While the managers met, the five members of the STS 43 crew were at Kennedy Space Center to inspect the Upper Atmosphere Research Satellite they will deploy. Commander **John Creighton** said, "This is very much an environmental mission." Mission Specialist **John Buchli** added, "It's the type of thing, in my mind, will give environmentally oriented scientists a lot of data to look at and really fine-tune their thinking." The FRR begins July 11. [Banke, FLORIDA TODAY, p. 1A, July 9, 1991, STS-43 LAUNCH READINESS REVIEW, July 8, 1991.]

NIGHTTIME LANDING PLANNED

Discovery Commander **John Creighton** is practicing for the first-ever landing at Kennedy Space Center after dark. "In my opinion a night landing is a little more difficult than a day landing," he said of the planned conclusion to the Orbiter's STS 48 mission. Launch of the mission is expected to be September 12 with landing coming five days later at 1:30 a.m. at KSC. [Date, THE ORLANDO SENTINEL, p. 2A, July 9, 1991.]

July 9:

LAUNCH PROCESSING: STS 43

The Launch Readiness Review for STS 43 has been completed at KSC; the Flight Readiness Review begins at the space center July 11 and is completed the following day with the announcement of a firm launch date for the mission. The target date is presently July 23. Currently underway at Launch Complex 39A is the loading of hypergolic propellants into Atlantis' reaction control system and orbital maneuvering system storage tanks. During the loading operation, the pad is closed to all non-essential personnel. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

LEAKY VALVES ON ATLANTIS

Technicians wearing special safety suits replaced two leaking oxidizer valves aboard Atlantis today at Launch Complex 39A. The valve problem has put a hazardous fuel loading operation behind schedule, but Kennedy Space Center officials remained confident that the July 23 launch date could be met. Loading is expected to be completed July 10, about 12 to 16 hours behind schedule,

according to spokeswoman **Lisa Malone**. Meanwhile, routine pad work continues as workers open the payload bay doors of Atlantis to conduct final pre-launch preparations on its STS 43 payload, a $100 million Tracking and Data Relay Satellite. [Banke, FLORIDA TODAY, p. 5A, July 10, 1991.]

FIRE AT CAPE CANAVERAL COMPLEX

A small electrical fire took place today at Launch Complex 40 at Cape Canaveral Air Force Station; it began about 4:45 p.m. and lasted about an hour. An investigation is underway and the pad is being inspected for damage. The next launch from the pad is scheduled for September - a mission to deploy NASA's Mars Observer spacecraft; officials were unsure whether today's fire would delay the mission, according to Air Force spokeswoman **Terri Brasher**. The pad had not been used since June 1990 for the launch of a commercial Titan 3 carrying a communications satellite. [Banke, FLORIDA TODAY, p. 5A, July 10, 1991.]

RUNWAY WORRIES NASA MANAGERS

NASA's managers are concerned that the rough surface of the Shuttle Landing Facility runway might shred the tires of Atlantis if it is allowed to land at Kennedy Space Center after its STS 43 mission. "Some people would prefer to wait until new tires are installed on the Shuttles," said NASA spokesman **Ed Campion**. On an unplanned landing of Discovery in May, the Orbiter's tires shredded; the space agency is developing more durable tires for the fleet of Shuttles. [Brown, FLORIDA TODAY, p. 1A, July 10, 1991.]

DISCOVERY WORK PROGRESS: STS 48

Connection of the main engine interfaces have been completed in processing operations conducted upon the Space Shuttle Discovery in preparation for its STS 48 mission. Work in progress includes: Crew Equipment Interface Test with STS 48 flight crew; installation of heat shields around the main engines; tests of the Ku-band antenna; closeouts of the aft compartment; installation of the Orbiter's tires; repair of the payload bay bulb seal; thermal protection system operations. Work scheduled to be completed includes: functional test of the galley; payload bay inspections and cleaning; and rollover to the Vehicle Assembly Building in about two weeks. In the VAB's High Bay 3, mating the right aft center segment of Discovery's solid rocket boosters is underway as are preparations for mating the right forward center segment. Stacking of the motor segments for the left booster is scheduled for next week. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

COLUMBIA: POST-FLIGHT PROCESSING

Technicians continue to prepare the Space Shuttle Columbia for its trip to California for extensive modifications; the removal of auxiliary power unit no. 3 has been accomplished. Work underway includes: venting the orbital maneuvering system helium tanks; removal of the power reactant storage and distribution

system tanks; removal of the heat shields from around the main engines; payload bay door bulb seal inspection and thermal protection system operations. Work scheduled to be done involves the removal of Columbia's brakes; offloading residual propellants this weekend; removal of the two orbital maneuvering system pods this weekend and early next week. Columbia will be ready for its ferry flight to Palmdale (CA) in early August. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

[] **ENDEAVOUR PROCESSING: STS 49**

Endeavour is scheduled to undertake its first flight (STS 49) next year to rescue an Intelsat satellite, but processing work has been underway since its arrival at KSC in May. That work includes installation of the Orbiter's ammonia boiler; leak checks and inspections of the main propulsion system; installation of covers on the main propulsion system lines; installation of insulation on the auxiliary power units and preparations to perform leak checks of the freon coolant loops. [KSC SHUTTLE STATUS REPORT, July 9, 1991.]

July 10: **FLIGHT READINESS REVIEW TODAY**

NASA managers will answer several questions when they meet at Kennedy Space Center today for the STS 43 Flight Readiness Review. They will review Atlantis' readiness for flight, set a definite launch date and decide whether KSC will be the primary landing site for the mission. Some officials have questioned whether Atlantis' tires are durable enough to withstand the stress of landing on the Shuttle Landing Facility's rough runway. Discovery had tire and brake damage when it made an unplanned landing at KSC in May. Yesterday technicians loaded propellants onboard the Orbiter; LC 39A will be reopened for other launch pad activities today. [Brown, FLORIDA TODAY, p. 6A, July 11, 1991, Date, THE ORLANDO SENTINEL, July 11, 1991.]

[] **ATLANTIS PAD WORK CONTINUES**

At Launch Complex 39A, technicians replaced two reaction control system oxidizer quick disconnects; the valves had been stuck in the open position which delayed the hypergolic loading operation. No impact is expected on the launch target date of July 23. In addition, pad workers loaded oxidizer into the Orbiter's storage tanks. During these operations the pad was closed to all non-essential personnel. [KSC SHUTTLE STATUS REPORT, July 10, 1991.]

July 11: **CRIPPEN STATEMENT: KSC LANDINGS**

Shuttle Director **Robert L. Crippen** announced today that KSC will be the primary landing site for STS-43. "This decision has been briefed to, and concurred with, by management officials at all levels within NASA. The KSC landing is going to be approached in a conservative manner using very restrictive flight rules to ensure the safety of the vehicle and crew. Consequently, there is a high probability that the landing could be at Edwards Air Force Base and the program

is prepared to handle a landing at either site." Bad weather - rain, high winds or cross winds - at Kennedy Space Center would send the Orbiter to a landing at Edwards Air Force Base, CA. There are 22 runways at Edwards located on a huge dry lake bed. KSC has two runways, both surrounded by water. [STATEMENT FROM SHUTTLE DIRECTOR Robert L. Crippen REGARDING KSC LANDING, July 11, 1991, Brown, FLORIDA TODAY, p. 1A, July 12, 1991, Date, THE ORLANDO SENTINEL, July 12, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-14, July 14, 1991.]

SOVIET VISITORS AT KSC

Kennedy Space Center hosted a group of high-level Soviet space officials at the beginning of an eight-day cross-country tour of NASA facilities. The Soviets began their overview of NASA with a tour of the Shuttle launch site. KSC **Forrest S. McCartney** greeted the 15-member delegation and hosted a luncheon in their honor. The group also saw the Launch Control Center, the Orbiter Processing Facility, Vehicle Assembly Building and several launch pads. Among the delegates were **Oleg Nikolaevich Shishkin**, Minister of General Machine Building and **Yuriy Semyenov**, General Director, Chief Designer of the Soviet's heavy-lift booster Energia. The group heads for Marshall Space Flight Center (Huntsville, AL) July 12 and will subsequently visit Stennis Space Center (MS), Johnson Space Center (Houston, TX) and Goddard Space Flight Center (Greenbelt, MD). [Brown, FLORIDA TODAY, p. 1A, July 12, 1991.]

STS-43 LAUNCH PREPARATIONS

The Flight Readiness Review for STS 43 began today at Kennedy Space Center and will conclude July 12. During the day, pad technicians concluded hypergolic propellants loading; they opened the pad for routine work and opened the payload bay doors to complete pre-launch preparations on the TDRS-E payload. Technicians continue work to closeout the Orbiter's Flipper Door and to check for leaks in the auxiliary power units and to check hydraulic circulation. Hydraulic operations, disconnects, and retests remain to be completed; also scheduled for completion are elevon retests, TDRS battery charge operations, aft compartment closeouts and installation of the Extravehicular Mobility Unit. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]

STS 48 DISCOVERY PROCESSING

Main landing gear wheel and tire installation have been completed upon Discovery in preparation for the Orbiter's STS 48 mission; also completed are the heat shield's installation and preparation for hypergolic operation. Hydraulic operations are scheduled. Work is in progress for other integrated hydraulic operations, main engine and aft compartment closeouts, bulb seal repair work, nose landing gear wheel and tire installation and service freon coolant lines. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]

COLUMBIA/ENDEAVOUR PROCESSING WORK

Columbia's SLS Tunnel Adapter and support equipment have been removed and post-mission propellant deservicing has been scheduled. Still in progress is work to remove the Power Reactant Storage and Distribution System tanks, auxiliary power unit system preparations for sending the Orbiter to Palmdale, CA, thermal protection system operations and removal of the main landing gear brakes. The processing of the Space Shuttle Endeavour continues as well. The work in progress includes: ammonia boiler installation, installations of auxiliary power unit insulation, nose landing gear hydraulic operations and water spray boiler line checks. [KSC SHUTTLE STATUS REPORT, July 11, 1991.]

July 12:

STS 43 LAUNCH DATE

NASA managers today set July 23, 1991, as the launch date for the next flight of the Space Shuttle system. The STS-43 mission will see the Atlantis and its crew of five astronauts conduct a mission highlighted by the deployment of the fifth Tracking and Data Relay Satellite (TDRS-E). The launch window on July 23rd opens at 10:54 a.m. EDT. The flight, which is a little less than 9 days in duration, is scheduled to land on August 1 at either Kennedy Space Center or Dryden Flight Research Facility, (Edwards, CA), depending on weather conditions at those sites. Shuttle Director **Robert L. Crippen** commented [see article following], "The launch team did a superb job getting Atlantis and its payloads ready for flight. The experience we gain with the processing of each mission allows us to have smoother flows and that showed in the Atlantis being processed in record time." Taking note of concerns about landings at KSC, Crippen also said that extremely restrictive weather requirements for landings here will preclude situations that could damage Atlantis' tires. Landings at KSC save the space agency about $1 million - the cost of ferrying the Orbiter back to the space center. [Halvorson, FLORIDA TODAY, p. 6A, July 13, 1991, NASA NOTE TO EDITORS: SHUTTLE MISSION STS-43 LAUNCH DATE ANNOUNCED, July 12, 1991.]

CONTINGENCY SPACE SUITS STORED

Two contingency space suits have been installed aboard the Space Shuttle Atlantis and tests of the suits are underway in preparation for its July 23 STS 43 mission. Payload closeouts were continuing as was battery charging on the Tracking and Data Relay Satellite which is the primary cargo on next week's flight. The elevon flipper doors are being closed out as is the aft compartment. The hydraulic system is being prepared for flight. A number of tasks have been scheduled: continued charging of TDRS batteries and its Inertial Upper Stage. Launch countdown preparations will be started and vehicle ordnance devices must be installed and tests of the firing circuits must be conducted next week as well. The Orbiter's hypergolic propellant system tanks must be pressurized; the launch countdown begins at 4 p.m. EDT July 20 with launch coming at 10:54 a.m. EDT on July 23. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]

DISCOVERY PRE-LAUNCH PREPARATIONS

Discovery's new tires have been installed and tests of its Ku-band antennas have been completed prior to the Orbiter's STS 48 mission. Work in progress includes: integrated testing between the main engines and main propulsion system; tests of the closed circuit television communications system; installation of heat shields around the main engines; closeouts of the aft compartment and avionics bays; thermal protection system operations. Scheduled work includes: cycling payload bay doors; inspecting and cleaning the payload bay and rolling over Discovery to the Vehicle Assembly Building on July 22. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]

COLUMBIA: POST-LAUNCH WORK

Reaction control system and orbital maneuvering system helium tanks have been vented aboard Columbia and a simulated forward reaction control system has been installed in the Orbiter. Preparations are being made to offload the residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Removal of the power reactant storage and distribution system tanks has begun; the heat shields from around the main engines are being removed. Thermal protection system operations are underway and the payload bay door bulb seal is being inspected. Brake removal has been scheduled; residual propellants will be offloaded this weekend to ready Columbia for its ferry flight to Palmdale, CA, in early August. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]

ENDEAVOUR'S PROCESSING PROGRESS

Though leak checks of freon coolant loop number one has been completed, Endeavour is scheduled to undergo a number of other processing activities: installation of panels in the crew cabin; installation of lines for the main propulsion system; leak checks of freon coolant loop number 2; installation of covers on the main propulsion system lines; thermal protection system operations; installation of insulation on the auxiliary power units. [KSC SHUTTLE STATUS REPORT, July 12, 1991.]

July 14:

GUPPY TO RETIRE

NASA's "Super Guppy" which has carried two million pounds of cargo - including the Hubble Space Telescope and jet fighters - to Kennedy Space Center is retiring after twenty-five years of service to the space agency. Its pilot, speaking of the plane, said, "It's like a flying dinosaur." Cargo is loaded through the front of the plane which is swung open; on takeoffs the Guppy's nose gear leaves the ground after the main gear and reverses the process for landings. The plane is being retired because it needs four new engines and re-enforced wings and NASA cannot afford the $6 to $10 million needed to repair the airplane. [Banke, FLORIDA TODAY, July 14, 1991.]

July 16: ATLANTIS: FAILED POWER SUPPLY

During power up this morning, there was an indication of a failed power supply with MDM FA3. This electronic component, part of the Orbiter's data processing system, is located in the aft compartment in avionics bay 6. The function of the MDM is to interpret data between the Orbiter's major components and the general purpose computers. Engineers are troubleshooting the box to determine the exact problem. At Launch Complex 39A, the external tank has been purged and ordnance devices have been installed on Atlantis in preparation for its July 23d mission to deploy the TDRS-E. In progress work includes: connections of the Inertial Upper Stage batteries; payload closeouts; trickle charging of the Tracking and Data Relay Satellite (TDRS) batteries; closeouts of the Orbiter's aft compartment and launch countdown preparations. The tasks remaining to be completed include: a simulated payload countdown tonight; purges of the power reactant storage and distribution system tomorrow; pressurization of the Orbiter's hypergolic propellant system tanks July 17; tests and final connections of the ordnance firing circuits July 18. The flight crew of Commander **John Blaha**, Pilot **Michael Baker** and Mission Specialists **G. David Low, Shannon Lucid** and **James Adamson** arrives at Kennedy Space Center at 1:00 p.m. July 20; the launch countdown begins at 4:00 p.m. heading for a launch July 23 at 10:54 a.m. EDT. [KSC SHUTTLE STATUS REPORT, July 16, 1991, Date, THE ORLANDO SENTINEL, July 17, 1991.]

SPACEPORT USA CELEBRATES 25 YEARS

"This is where America can come and see the launch site - not only to look at what we have done over the past 30 years but to dream of the future," said Kennedy Space Center Director **Forrest S. McCartney** at the 25th anniversary celebration of the space center's visitors center held today at Spaceport USA. During the past 25 years, 43.5 million persons have visited Kennedy Space Center "to see our space program firsthand," as McCartney put it. The occasion also honored four employees who have been with the visitors center since it opened: tour bus drivers **Joseph Wallace, Jr.** and **Dorris Williams**, cash control agent **Sallye Foster** and marketing representative **Burton Prince**. The 22nd anniversary of the Apollo 11 launch was also noted with Center Director McCartney saying, "There are no footprints [on the moon] that aren't an American's. And it's not just one footprint; there are 24 footprints up there." Spaceport USA General Manager **Donn Hennessy**, referring to the planned $30 to $40 million expansion of the attraction, said, "It depends on current cash flow. But I'd like to break ground on it in 1994." The expansion would focus on the Apollo-Saturn V space program. Despite the recession in 1990, a record 3.1 million persons toured the attraction which competes for tourists with Walt Disney World, Epcot Center, Disney-MGM Studios, Sea World and Busch Gardens. ["Spaceport USA Celebrates Anniversary," FLORIDA TODAY, p. 2B, July 17, 1991, Harris, FLORIDA TODAY, pp. 1A-2A, July 16, 1991.]

STS-43: SRB PROBLEM

A circuit which sends signals from an electronics unit to a separation motor on the right booster of Atlantis gave no reading during a test at Launch Complex 39A today. Further testing will take place tomorrow in an attempt to locate the site of the problem. If the electronics box must be replaced launch will be delayed one day. Another problem threatened to delay the launch, when circuitry within an electronics box in Atlantis' rear engine compartment failed during a test; examinations which took all day showed that the problem was within circuitry used only for tests and not for flight, according to NASA spokeswoman Lisa Malone. [Halvorson, FLORIDA TODAY, p. 1A, July 17, 1991, KSC SHUTTLE STATUS REPORT, 6:30 p.m., July 16, 1991]

STS 48 PROCESSING WORK

The Space Shuttle Discovery has a number of processing operations underway at present: troubleshooting of a cabin pressure transducer; inspections of main propulsion system screams; cleaning the payload bay; installation of ordnance devices; leak checks of auxiliary power unit no. 3; closeouts of the aft compartment and avionics bays; thermal protection system operations. Work scheduled to be completed includes: Orbiter positive pressure leak checks; cycling payload bay doors; payload bay inspections and cleaning; determining Orbiter weight and its center of gravity and rollover of Discovery to the Vehicle Assembly Building on July 22. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]

COLUMBIA: FERRY-FLIGHT PREPARATIONS

Technicians in Orbiter Processing Facility's Bay 2 have disconnected ground support equipment used in offloading residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Work remaining to be completed includes: preparations to remove the ammonia boiler aboard Columbia; removal of the power reactant storage and distribution system tanks; removal of heat shields from around the main engines; payload bay door bulb seal inspections; thermal protection system operations. The Orbiter is now ready for ferrying to Palmdale, CA, for extensive modifications. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]

ENDEAVOUR'S PROCESSING FOR STS 49

Work underway on Endeavour in behalf of its maiden mission, STS 49, includes: installation of panels in the crew cabin; installation of lines for the main propulsion system; leak checks of freon coolant loop no. 2; installation of covers on the main propulsion system lines; thermal protection system operations; installation of insulation on the auxiliary power units. The newest Orbiter will be transferred to OPF Bay 1 on July 22. [KSC SHUTTLE STATUS REPORT, July 16, 1991.]

July 17: ATLANTIS: ELECTRONICS UNIT REPLACEMENT

Kennedy Space Center managers decided today to replace a suspect electronics unit on Atlantis; the unit - an Integrated Electronics Assembly - controls ignition and separation of the Orbiter's right solid-rocket booster. KSC spokeswoman **Lisa Malone** said, "It does make the schedule tighter, but we can still make it [the launch target of July 23]." The malfunctioning unit also controls deployment of the SRB's parachutes after dropping away from the Shuttle and its external tank. The difficulty with the unit was evidenced by testing at Launch Complex 39A July 16; circuits failed to give readings indicating separation. The decision to replace the electronics unit came after further tests showed the circuits were functioning properly, Malone said. The replacement will be installed and tested tomorrow. No launch delay is expected. In other prelaunch pad activities, workers completed connections of the Inertial Upper Stage batteries. Troubleshooting of multiplexer demultiplexer (MDM) FA3 was finished. After a series of tests and conferences with the vendor, officials determined that the MDM is flight worthy and there is no concern with the power supply. The function of the MDM is to interpret data between the Orbiter's major components and the general purpose computers. Other work in progress prior to the flight includes: a simulated payload countdown; closeouts of the aft compartment; disconnection, replacement and retest of the forward integrated electronic assembly (IEA) on the right solid rocket booster; payload closeouts; trickle charging of the Tracking and Data Relay Satellite (TDRS) batteries. The schedule for further work at LC 39A includes: purges of the power reactant storage and distribution system (July 19); pressurization of the Orbiter's hypergolic propellant system tanks for flight (July 19); final ordnance preparations (July 19); arrival of the five-member crew at 1:00 p.m. July 20. [Halvorson, FLORIDA TODAY, p. 7A, July 18, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991, "Despite Repair, Shuttle Is to Fly on Tuesday," THE NEW YORK TIMES, p. A11, July 18, 1991.]

STS 48 PROCESSING: DISCOVERY

Aboard Discovery in OPF Bay 1, a panel in the Orbiter's middeck associated with a failed cabin pressure transducer (sensor) has been removed. Inspections of Discovery's main propulsion system screens are underway as is cleaning of the payload bay. Other work currently being performed on the Orbiter include: leak checks of auxiliary power unit no. 3, closeouts of the aft compartment and avionics bays, thermal protection system operations and positioning of the main landing gear strut. Work scheduled: Orbiter positive pressure leak checks, cycling of payload bay doors, payload bay inspections and cleaning, determining Orbiter weight and center of gravity and a July 24 rollover to the Vehicle Assembly Building. Work continues in preparing the solid rocket boosters for mating with Discovery. Columbia is undergoing final preparations for its ferry-flight to Palmdale, CA, where it will undergo major modifications. Technicians have completed disconnecting ground support equipment used in offloading residual propellants from the auxiliary power units, orbital maneuvering system and reaction control system tanks. Work has been done to remove the Shuttle's Ku-band antenna, dry the Orbiter's main engines, prepare for removal of the vehicle's

ammonia boiler and its power reactant storage and distribution system tanks and heat shields from around the main engines. Payload bay door bulb seal inspections remain to be done and there are further thermal protection system operations to be undertaken. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991.]

STS 49: INTELSAT RESCUE MISSION

The newest Space Shuttle - Endeavour - is undergoing preparations for its STS 49 Intelsat Rescue mission and for the vehicle's rollover to OPF Bay 1 on July 24. Freon coolant loop no. 1 and 2 pressure testing is complete. Work in progress: installation of panels in the crew cabin; installation of the payload bay door drive shaft; installation of lines for the main propulsion system; installation of covers on the main propulsion system lines; thermal protection system operations and installation of insulation on the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 17, 1991.]

July 18: IEA REPLACED IN ATLANTIS

A new integrated electronics assembly has been installed on Atlantis' right solid rocket booster in the place of a suspect assembly discovered in pre-launch testing activities at Launch Complex 39A. Engineers still don't understand why the original assembly's circuitry failed. The new assembly is now undergoing testing A simulated payload countdown has also been completed. Also underway are purges of the power reactant storage and distribution system as well as trickle charging of the Tracking and Data Relay Satellite batteries. Tomorrow, pad technicians at LC 39A will pressurize Atlantis' onboard propellant tanks. The countdown to launch begins at 4 p.m. July 20. Launch of STS 43 continues to be on schedule for 10:54 a.m. July 23. [KSC SHUTTLE STATUS REPORT, 10 a.m. July 18, 1991, Banke, FLORIDA TODAY, p. 4A, July 19, 1991.]

STS 48: DISCOVERY'S PROCESSING FLOW

Technicians in the Orbiter Processing Facility's High Bay 1 have completed a positive pressure test of the Orbiter's wing. They are also engaged in replacement of the liquid hydrogen recirculation pump package aboard the Orbiter and inspections of the main propulsion system. The flight control system is being tested as is a newly installed Tacan no. 2. Reconnection of a control panel in Discovery's middeck is underway as are thermal protection system operations, cleaning of the payload bay and closeouts of the midbody and aft compartment. Scheduled work includes: Orbiter positive pressure leak checks, cycling of payload bay doors, payload bay inspections, determination of the Orbiter's weight and center of gravity and rolling the vehicle over to the Vehicle Assembly Building on July 24. Meanwhile, work continues on readying the Space Shuttle Columbia for its ferry-flight to Palmdale, CA, for extensive modifications. The Orbiter's heat shields have been removed from around the main engines, the left OMS pod has been electrically disconnected from the vehicle and the Ku-band antenna has been removed. The latest addition to the Space Shuttle fleet - Endeavour - has

also been undergoing processing operations prior to its 1992 maiden voyage on STS 49. The freon coolant loops are being dried; various sensors are being installed in the vehicle as well as linkages for the external tank door and the payload bay door drive shaft. Endeavour is also undergoing thermal protection system operations or tile work. The Orbiter is scheduled to be transferred from VAB High Bay 2 to OPF Bay 1 on July 24. [KSC SHUTTLE STATUS REPORT, July 18, 1991.]

July 19: **ATLANTIS DELAYED A DAY**

A faulty electrical circuit used to separate Atlantis from its fuel tank during flight has delayed the launch of STS 43 for one day; liftoff is now scheduled for July 24 during a launch window running from 10:55 a.m. through 3:12 p.m. The circuit was tested unsuccessfully today. When technicians entered the aft compartment to analyze the failure they found a frayed wire which is due to be repaired and retested. The circuit involves the left-hand Orbiter/external tank attach point separation function. To prevent further delay, the repairs must be completed by noon July 20 to allow for the pressurization of on-board tanks filled with propellant. Failure to achieve full separation of the tank from the Orbiter could result in the destruction of the crew and the vehicle. The arrival of the STS 43 crew of Commander **John Blaha**, Pilot **Michael Baker** and Mission Specialists **Shannon Lucid, James Adamson** and **G. David Low** - was delayed until July 20 at 1 p.m. [Banke, FLORIDA TODAY, p. 1A, July 19, 1991, KSC PRESS DOME, "Launch Delay Announcement," 5 p.m., July 19, 1991.]

July 20: **CIRCUIT FIXED; COUNTDOWN BEGINS**

With its faulty electrical circuit repaired and tested, Atlantis is cleared for the countdown to begin today. Kennedy Space Center spokesman **Bruce Buckingham** said, "Barring any unforeseen problems, we're in a good position for launch Wednesday morning [July 24]. Everything tested out just fine." The nine-day STS 43 mission is scheduled to land August 2 at KSC, the first time since 1985 that the space center has been the primary landing site. Tomorrow, technicians will complete work in the Orbiter's rear engine compartment and seal it for liftoff; final payload preparations should be finished July 22, according to Buckingham. [Brown, FLORIDA TODAY, p. 1A, July 21, 1991.]

ATLANTIS CARRIES NEW SOFTWARE

The five general purpose computers aboard the Space Shuttle Atlantis for the STS 43 mission will run some new software for the first time. **Rob Kelso**, NASA Flight Director for STS 43, said, "Periodically we bring in new software that gives us new capabilities. This will give us a lot more flexibility." The Orbiter will be able to perform certain maneuvers with six small steering thrusters rather than 38; that will save fuel and make the ride a little easier for sensitive cargo. ["Atlantis Will Carry New Software," FLORIDA TODAY, July 21, 1991.]

ATLANTIS' MANIFEST: MORE THAN TDRS

The Space Shuttle Atlantis will carry more cargo into space than the Tracking and Data Relay Satellite (TDRS-E) which is its prime payload. One of these is SHARE-II, an acronym for the Space Station Heat Pipe Advanced Radiator Experiment which is designed to test how well a pumpless cooling system can dissipate heat; the system, when fully developed, is intended for use on Space Station Freedom. Also on the manifest is the Shuttle Solar Backscatter Ultra-Violet Instrument (SSBUV) which will calibrate ultraviolet instruments on orbiting satellites from two canisters located in the cargo bay. The information from this experiment will ultimately be used to calibrate ozone-measuring instruments aboard satellites.

The Optical Communications Through Window Experiment (OCTW) contains two transmitter/receiver modules. One is mounted in the payload bay; the other is in the aft flight deck for operation by the crew. The experiment should demonstrate video and audio transmission via fiber optic cable, versus conventional radio frequency transmission.

Flying for the first time is the Tank Pressure Control Experiment (TPCE) which is aimed at determining the effectiveness of jet mixing as a means of controlling tank pressures and equilibrating fluid temperatures. The experiment features a Get Away Special canister mounted on an adapter beam.

The Auroral Photography Experiment (APE-B) is also located in the aft flight deck and features a camera and associated equipment. It will involve extensive photography of auroras, aurora optical effects, Shuttle glow phenomena, and thruster emissions.

The Protein Crystal Growth (PCG-III) experiment will fly in the Orbiter's middeck and will supply data on the scientific methods and commercial potential for growing large high-quality protein crystals in microgravity.

In the same field, current processes for growing large protein crystals in microgravity will be studied in the Bioserve-Instrumentation Technology Associates Materials Dispersion Apparatus (BIMDA). Investigations into Polymer Membrane Processing (IPMP) is designed to flash evaporate mixed solvent systems in the presence of convection to control the porosity of a polymer membrane.

The Space Acceleration Measurement System (SAMS) is designed to provide data to other payloads on the acceleration environment of the middeck. The Solid Surface Combustion Experiment (SSCE) will make the second of eight planned flights on STS 43. It is designed to measure flame spread rate, solid-phase temperature, and gas-phase temperature for flames spread in the reduced gravity environment of space. Also making a return aboard a Space Shuttle is the Air Force Maui Optical Site (AMOS) experiment in which the Orbiter serves as a calibration target for this electro-optical facility on the Hawaiian island of Maui. [Date, THE ORLANDO SENTINEL, July 21, 1991, NASA FACTS, KSC RELEASE NO. 72-91, June 1991.]

July 21: **CRACK FOUND: NO DELAY EXPECTED**

A small crack was found in Atlantis' engine compartment today, but the problem is not thought likely to delay the July 24 launch of STS 43. The countdown began at 4 p.m. today; the crew of five astronauts arrived at the Shuttle Landing Facility in their T-38 training jets some twenty minutes after countdown began. Commander **John Blaha** spoke on arrival, "We're happy to be here. We hope the weather is good Wednesday morning for the launch so we can be out of here for a nine-day spaceflight." The Commander and Pilot will fly in the Shuttle Training Aircraft tomorrow and the entire crew will receive medical examinations, review flight data files and perform fit checks of their flight equipment. Forecasters presently call for a 70 percent chance of favorable weather at launch time. Technicians found a 4 1/2 inch crack in a structural beam on the floor of Atlantis' rear engine compartment in a review of photographs taken just before the compartment was to be closed for flight. Managers said the flaw was not a concern for flight; the crack measures from about one-eight to one-sixteenth of an inch. Referring to a series of technical problems which have cropped up late in the Orbiter's processing, Shuttle Test Director **Al Sofge** said, "I guess we're a little snakebit." [Brown, FLORIDA TODAY, p. 1A, July 22, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

July 22: **LAUNCH MINUS TWO DAYS**

This afternoon liquid oxygen and liquid hydrogen reactants will be loaded into Atlantis' onboard storage tanks as the countdown to launch of the STS 43 mission continues. The Shuttle main engines and main propulsion system are being prepared for flight. The 4.4 inch crack found yesterday on one of the structural beams in the aft compartment has been repaired and the compartment was closed out this morning at 5 a.m. The payload bay doors were closed and ready for flight ten minutes later, at 5:10 a.m. Trickle charging of the Tracking and Data Relay Satellite batteries have been charged and a faulty firing circuit has been replaced. Final ordnance connections and firing circuit tests have also been completed as has pressurization of the Orbiter's hypergolic propellant system tanks for flight. The Orbiter's communications system will be activated tonight. At 2:35 a.m., pad technicians will begin loading the external tank with half a million gallons of liquid oxygen and liquid hydrogen propellants. Launch is expected to come at 10:55 a.m. July 24. Weather is expected to allow for a 50% probability for launch and the chance of violating constraints for the entire launch period is rated at 40%. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991, "Shuttle Mission," USA TODAY, p. 3A, July 23, 1991, Date, THE ORLANDO SENTINEL, July 23, 1991, Date, THE ORLANDO SENTINEL, July 22, 1991.]

STS 48 PROCESSING CONTINUES

The liquid hydrogen recirculation pump package has been installed upon Discovery in preparation for its STS 48 mission. A retest of a control panel in the middeck has also been completed. Tests of the newly installed Tacan no. 2 are underway. Other tasks in process include: cleaning the payload bay, closeouts

of the midbody and aft compartment, thermal protection system operations, positive pressure leak test of the aft compartment and inspections of the radiators. Work scheduled includes: Orbiter positive pressure leak checks, cycling of the payload bay doors, payload bay inspections and cleaning, determination of the Orbiter's weight and center of gravity and its rollover to the Vehicle Assembly Building now targeted for early morning on July 25, delayed a day by the change in the STS 43 launch day to July 24. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

COLUMBIA'S LEFT OMS POD REMOVED

The left OMS pod has been removed from the Space Shuttle Columbia in preparation for its ferry flight to California. Preparations are under way to remove the right orbital maneuvering system pod and the power reactant storage and distribution system tanks. Thermal protection system (tile) operations are also proceeding. Technicians will begin the removal of Columbia's three main engines tomorrow (July 23) as well as the installation of the mock OMS pods. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 22, 1991.]

July 23: WEATHER CONCERNS STS 43 MANAGERS

There is only a 50 percent chance that weather will allow Atlantis to meet its 10:55 a.m. launch time tomorrow; however, the Orbiter will be ready, NASA managers said today. Overall, there is a 60 percent chance that weather will be favorable for launch during the window which extends until 3:12 p.m. The repair work in the Shuttle's aft compartment has been completed and the payload doors have been closed for flight. The astronauts who will fly on the STS 43 mission have had medical examinations and have checked out their flight equipment. Today the crew will receive a briefing on the status of Atlantis, its payload and the weather. Commander **John Blaha** and Pilot **Michael Baker** spent a portion of the day practicing approaches and landings on the Kennedy Space Center Shuttle Landing Facility where Atlantis is due to touch down on August 2. Prelaunch pad work continues as technicians have bonded two carrier panels on the payload bay doors, one each on the left and right doors. The external tank will be loaded with 500,000 gallons of liquid oxygen and liquid hydrogen propellants beginning at 2:35 a.m. tomorrow. Liquid oxygen and liquid hydrogen reactants have loaded into the Orbiter's onboard storage tanks. The Shuttle main engines and main propulsion system have been prepped for flight and the Orbiter's communications system has been activated. The tail service masts have been prepared for launch and crew seats have been installed in the crew cabin. The crew will be awakened at 6 a.m.and departs for Launch Complex 39A at 7:40 a.m. [Brown, FLORIDA TODAY, p. 1A, July 23, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., July 23, 1991.]

July 24: STS 43 SCRUBBED: COMPUTER PROBLEM

With the Space Shuttle Atlantis cleared for flight yesterday and the five-member crew "gung ho and ready to go," the STS 43 mission was scrubbed this morning

because channel A on the main engine controller for engine no. 2 had shut itself down and mission managers were unable to restart it. The problem occurred about 4:30 a.m. and tests were performed to determine the cause of the failure; then the launch was called off at 5:38 a.m. The delay may be as much as a week to ten days. A minor problem arose yesterday when technicians found that two of 64 fasteners that attach eight protective plates on the outside of the Orbiter's payload bay doors were broken; the two bolt holes were apparently stripped of their threads, a problem which has occurred before. Managers resolved the problem by deciding to fill the two holes with an adhesive and make a permanent repair after the mission was completed. "If it's not a concern structurally, you don't want to take a chance of mucking up something," said Shuttle Test Director **Al Sofge**. The postponement of the STS 43 mission came just when weather forecasters were predicting more favorable conditions for launch. [Brown, FLORIDA TODAY, p. 1A-2A, July 24, 1991, Date, THE ORLANDO SENTINEL, p. A-6, July 24, 1991, Hoversten, USA TODAY, p. 6A, July 24, 1991, Brown, FLORIDA TODAY, pp. 1A-2A, July 25, 1991, STS 43 STATUS REPORT, 4:15 p.m., July 25, 1991.]

STS 43 GROUNDED TILL AUGUST 1

Replacement and testing of a faulty computer that caused NASA to scrub today's launch of STS 43 will postpone the liftoff until at least August 1, officials said. Atlantis' five-member crew returned to Johnson Space Center (Houston, TX) after the scrub was announced. The failure of an engine controller in flight could have forced the crew to attempt a risky emergency landing overseas. Launch Director **Robert B. Sieck** said, "It was pretty obvious it was going to be a hardware changeout. You get over the disappointment pretty quickly and get on with the job." Commander **John Blaha** speaking for his crew said, "We wished we had launched and were up there right now, but we're totally behind NASA's decision to fix the problem. That's the right thing to do." The crew departed for Houston, TX, at 1:30 p.m.; the five-member crew will return to Kennedy Space Center three days before launch.

Launch pad technicians were immediately occupied with extending the rotating service structure around the vehicle, connecting the Orbiter's midbody umbilical unit for draining propellants from both the external tank and the onboard storage tanks. When that hazardous operation is completed, the technicians will climb into the rear engine compartment to remove the faulty controller and replace it with one on hand. This procedure has been done before on Atlantis prior to its October 1989 (STS 34, the Galileo mission) flight; that delay was just five days due to there having been no propellants onboard. A special work stand will have to be constructed to help lift the 213-pound controller; it measures 14-by-18-by 23 inches. NASA spokesman **Bruce Buckingham** rejected the idea that there was a generic problem with the controller saying, "The more you fly, the more likely we are to duplicate a failure." **Jerry Smelser**, Main Engine Program Manager at Marshall Space Flight Center (Huntsville, AL) said, "We can't anticipate the kind of problem we had (Wednesday) morning. You can't guess why it happened or when it happened." The delay is not expected to impact negatively the planned

September flight of Discovery (STS 48) or Atlantis' next mission (STS 42) now scheduled for December. [Brown, FLORIDA TODAY, pp. 1A-2A, July 25, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., July 25, 1991, Leary, THE NEW YORK TIMES, p. A10, July 25, 1991.]

[] **BUSH ADMINISTRATION: NO NEW SHUTTLES**

"In all probability, we have purchased the last Space Shuttle. It is time for a new phase in space launch," said Vice President **Dan Quayle** in a speech at Vandenberg Air Force Base (CA). Quayle, who chairs the National Space Council, said the new policy proposes to extend the life span of the Shuttle fleet and maintain the capacity to produce needed spare parts, "but the policy does not envision acquiring new Orbiters." Quayle went on to say, "It is time for a new phase in space launch. I am here to announce that as of today, we have entered that new phase." NASA Administrator **Richard H. Truly** said today that he supports the Bush Administration's new "National Space Launch Strategy." He said, "It is a thoughtful plan that lays out important priorities for a new launch system while still maintaining the inherent capability for Shuttle support or production in the event of an Orbiter loss or other demonstrable need."At Kennedy Space Center, Public Affairs Director **Chuck Hollinshead** said, "It doesn't seem to indicate a shift in policy. This is generally what we've been working toward. We will continue to see Shuttles flying out of here on a regular basis." U. S. Representative **Jim Bacchus** (D-Orlando, FL) said, "Ideally, I'd like to see another Shuttle, but realistically I think the administration's policy is correct."

The policy calls for joint development of a new family of launch vehicle by NASA and the Department of Defense. They would be based on new technology and replace the current launch vehicles. The policy also envisions making use of long-range missiles retired from military use as the need for nuclear missiles declines. The new policy states "due regard to economic impact on the commercial space sector" will be a concern. A new long-range plan to implement the new launch strategy is due in December and will be designed by joint effort of NASA, the Department of Defense and the Department of Energy. THE NEW YORK TIMES reported that the cost of developing a new family of launch vehicles might run as high as $11.5 billion; the goal is to reduce the cost of launching from $3,600 a pound to about $300. The directive said that NASA and DOD "should actively explore having private industry take part in the new rocket plans." [Banke, FLORIDA TODAY, p. 6A, July 25, 1991, "Delay," USA TODAY, p. 3A, July 25, 1991, "U.S. Plans to Build No New Shuttles," THE NEW YORK TIMES,p. A10, July 25, 1991.]

July 25: **TEST FAILURE MAY DELAY STS 43 LAUNCH**

A developmental Space Shuttle main engine sustained extensive internal damage while it was undergoing ground testing yesterday at NASA's Stennis Space Center (Bay St. Louis, MS). The test failure occurred at approximately four seconds after engine start when engine sensors detected abnormal operating conditions. Ground-control systems terminated the test immediately and there was no

apparent damage to the test stand on which the engine was mounted. The exact nature and extent of damage to the engine, as well as the cause of the incident, are being investigated. However, from initial external observations, the damage appears to be largely internal to the engine. A team of engineers with NASA and the prime contractor for the main engine, Rocketdyne Division of Rockwell International, have begun gathering all pertinent test data for analysis.
The engine which was being tested is a development engine and its configuration is different from engines used in the Shuttle flight program.

"Failures such as this do occur from time to time in the aggressive ground-test program that we've always maintained, and especially when we're testing advanced design components. However, it has been over two years since we've had such an incident and during that time, we've accumulated over 100,000 seconds of engine operation, with 257 engine starts," said **Jerry Smelser**, (Main Engine Project Office Manager, MSFC). "The engine, unit number 0215, had been tested extensively in the past. It had been run 15 times prior to the aborted test, with an accumulated run time of 5,255 seconds, or approximately 87.6 minutes." Referring to the incident itself, Smelser said, "It was not spectacular at all. You just saw the steam come out and then it suddenly stopped. I didn't even know there had been any damage to the engine until much later," said Stennis spokesman **Myron Webb**. If investigators determine that the problem which caused the destruction of the engine at Stennis could occur with one of Atlantis' main engines, the launch of the Orbiter could be further delayed. Tentative plans are to launch August 2, but, if the replacement and retesting goes well, August 1 is a possibility. [Banke, FLORIDA TODAY, p. 1A, July 26, 1991, NASA NEWS RELEASE NO. 91-118, July 25, 1991.]

DISCOVERY READIED FOR TRANSFER

The landing gears have been retracted on the Space Shuttle Discovery in preparation for its transfer to the Vehicle Assembly Building's High Bay 2 this afternoon. The Orbiter has been bolted to the crawler transporter and its weight and center of gravity have been determined. Meanwhile, all three main engines have been removed from Columbia; freon coolant loop no. 1 has been deserviced and the power reactant storage and distribution system tanks have been removed. Purges of the potable water system continue as do thermal protection system operations and the installation of closeout panels and the ferry flight cover for the forward reaction control system. The mock OMS pods must still be installed prior to the Orbiter's ferry flight to Palmdale, CA. [KSC SHUTTLE STATUS REPORT, July 25, 1991.]

DISCOVERY, ENDEAVOUR SWITCH PLACES

The Space Shuttles Discovery and Endeavour switched places late tonight. Discovery was rolled from the Orbiter Processing Facility into the Vehicle Assembly Building at 11:55 p.m. to be readied for its September launch. The Endeavour was rolled from the VAB into the OPF at 11:40 p.m., for further

preparations for its May 1992 flight. [Banke, FLORIDA TODAY, p. 4A, July 27, 1991.]

July 26: **PLATFORMS READIED FOR REPLACEMENT**

Pad technicians have completed setting up platforms on the top deck of the mobile launcher under Atlantis' main engine number 3 and access to the Orbiter's aft compartment has been gained. Propellants have been drained from the Orbiter's onboard storage tanks. The main engines must be positioned and locked into place and the faulty controller must be electrically disconnected. The Tracking and Data Relay Satellite must be recharged. Still scheduled are the removal of heat shields around the main engine, the removal and replacement of the controller - now scheduled for July 27 - and testing of the new controller July 28. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 26, 1991.]

July 27: **COMPUTER REPLACEMENT PREPARATIONS**

The main engine controller which caused the STS 43 mission to be scrubbed July 24, will be replaced today and retested, according to Kennedy Space Center spokeswoman **Lisa Malone**. Launch may come as early as August 1. Still under discussion is the impact, if any, of the failure of a Shuttle main engine in a test at Stennis Space Center (Bay St. Louis, MS). **Russell Bardos**, Deputy Director of Systems Analysis at NASA Headquarters, said, "Prior to launch, we have to have a pretty good understanding of what the failure was." If engineers believe that whatever caused the test failure could pose a similar problem for Atlantis, the launch could be delayed beyond August 1. The test engine, however, was not identical to those on Atlantis. NASA managers meet July 29 to discuss the situation. [Banke, FLORIDA TODAY, p. 4A, July 27, 1991.]

SOFGE, LEINBACH PROMOTED AT KSC

Al Sofge and **Mike Leinbach**, who have both served as NASA Test Directors, have been promoted to the newly created post of Shuttle Test Director at Kennedy Space Center. They are responsible for all Shuttle testing and launch preparations from a console in the Launch Control Center adjacent to the Vehicle Assembly Building. The console is managed 24 hours a day, seven days a week. Shuttle Test Directors will assume the role of Chief NASA Test Director during the final nine hours of Shuttle countdowns; they will oversee the team of NASA Test Directors at KSC and will be available for special projects to Shuttle Launch Director **Robert B. Sieck**. [Banke, FLORIDA TODAY, p. 9E, July 28, 1991.]

ATLANTIS: CONTROLLER INSTALLED

Technicians installed a new main engine controller today and tests of the new unit begin tomorrow; The computer will control main engine no. 3. If the testing is successful, launch could come as early as August 1, otherwise a second attempt would occur the next day. [Banke, FLORIDA TODAY, p. 1A, July 28, 1991.]

July 29: **MANAGERS TO SET DATE FOR STS 43**

The countdown for STS 43 may begin today because the installation and testing of a replacement controller for Atlantis' main engine no. 3 went very well. "At this point it looks achievable. We are leaning toward picking up the countdown on Monday [July 29], but we haven't committed to it yet." This morning, Shuttle managers meet at Kennedy Space Center to discuss the Orbiter's readiness for flight and set an official date. If the countdown is not begun today, it will most likely begin tomorrow aiming for an August 2 launch. **Barbara Schwarz**, a spokeswoman for Johnson Space Center (Houston, TX) said, the five-member astronaut crew will return to Kennedy Space Center no earlier than tomorrow. The crew is practicing flight maneuvers on a simulator at JSC today. [Banke, FLORIDA TODAY, p. 1A, July 29, 1991.]

LAUNCH DATE UPDATE: STS 43

Launch is targeted for 11:01 a.m. EDT August 1. Senior Shuttle Managers will not give a final go for liftoff until tomorrow (July 30) after they have reviewed the data from the failed engine test at Stennis Space Center last week. "We really don't feel that's going to be a concern with Thursday's launch attempt," said **Eric Redding**, NASA Test Director. Redding emphasized that the test engine was not only not identical to the Shuttle main engines now in use on Atlantis, but it had also been fired many more times than any Shuttle engine that had flown. The probability for being within launch weather criteria at the opening of the window is 60 percent. There is a 70 percent chance for good weather for the entire window which ends at 3:06 p.m., according to KSC spokesman **Bruce Buckingham**. Work in progress: preparations to start the launch countdown at 4 p.m. EDT, closeouts of the aft compartment and installation of the aft compartment. Scheduled work includes loading of liquid oxygen and liquid hydrogen reactants into the Orbiter's onboard storage tanks; closing of the aft compartment July 30; flight crew arrival; retraction of the rotating service structure away from the vehicle July 31 at 11 a.m.; loading of the external tank for flight begins at 2:41 a.m. August 1 at the T minus 6 hour mark. [KSC SHUTTLE STATUS REPORT, 11 a.m., July 29, 1991, Brown, FLORIDA TODAY, p. 1A, July 30, 1991, "Shuttle Countdown," USA TODAY, p. 3A, July 30, 1991.]

DIGITAL EQUIPMENT CONTRACT - KSC

Kennedy Space Center has awarded an $8.5 million contract to Digital Equipment Corp. (Orlando, FL) for the design, installation and on-site support of a Payload Data Management System (PDMS) to handle Space Shuttle and Space Station payload processing requirements. DEC will be responsible for assisting NASA and its payload ground operations contractor, McDonnell Douglas Space Systems, Co., with the implementation and successful operation of the PDMS, a highly sophisticated multiple computer system that will lead to more efficient and streamlined payload operations. Primary capabilities of the PDMS include storage of a data base and all documents relevant to NASA payload operations. The system will also produce and track the schedules of all KSC payloads as well as

the equipment and manpower needed to process space flight hardware. The PDMS will be fully accessible and communicable with similar systems at other NASA facilities. "We believe the PDMS will provide a more cost effective and productive working environment," said KSC Payload Management and Operations Director **John Conway**. "PDMS is a sound investment in efficiency and savings for payloads being processed now and in the coming years." The contract is for five years and runs from July 29, 1991, and runs through July 28, 1996. [NASA/KSC RELEASE NO. 89-91, July 29, 1991.]

July 30: **STS 43: MANAGERS SAY GO!**

Senior NASA officials today gave the go-ahead to proceed toward the launch of STS 43 on August 1. The managers cleared Atlantis to fly following a review of the analysis conducted on a non-flight configuration Shuttle main engine that was damaged during ground testing at Stennis Space Center last week. To date, analysis points to a failure in the high pressure fuel turbine on the development test engine. "All three of Atlantis' main engines have significantly less run time than components on the development engine that experienced the failure," said Shuttle Director **Robert L. Crippen**, "and the fabrication, inspection and repair histories of these units are well within our experience base for Shuttle engines." [NASA/KSC STS-43 LAUNCH ADVISORY, July 30, 1991.]

STS 43: LAUNCH MINUS 2 DAYS

The countdown for STS 43 was started at 4 p.m. July 29 and held at the T-27 mark for a built-in hold. The countdown resumed at noon today. **Mike Leinbach**, Shuttle Test Director, said, "Everything's going well. We're not tracking any problems that would prevent us from getting to a launch attempt Thursday morning." All non-flight items have been removed from the aft compartment of Atlantis and the batteries of the Tracking and Data Relay Satellite have been charged. Currently, pad technicians are inspecting and closeout the aft compartment and are loading liquid oxygen and liquid hydrogen reactants into the onboard storage tanks. Some pre-flight preparations had to be handled gingerly when stormy weather, including a funnel cloud, moved over Kennedy Space Center. The change in work plans did not cause any unexpected delays in launch plans. The STS 43 flight crew arrived at 12:15 a.m. today after a week of training at Johnson Space Center (Houston, TX). "We're glad to be back. We're looking forward to a launch on Thursday," said Mission Commander **John Blaha**. The crew, which also includes Pilot **Michael Baker** and Mission Specialists **G. David Low**, **Shannon Lucid** and **James Adamson**, arrived in their T-38 training jets.

Among the tasks remaining to be done are: activation of the Orbiter's communication system, scheduled for midnight; preparing the main engines and main propulsion system for tanking and launch; retracting of the rotating service structure away from the vehicle about 11 a.m. tomorrow; loading of the external fuel tank for flight which begins at 2:41 a.m. August 1 at the T minus 6 hour mark. The probability for being within launch weather criteria at the opening of the window is 70 percent. There is an 80 percent chance of having acceptable

weather for the duration of the launch window. Atlantis is expected to conclude its STS 43 mission with a landing at Kennedy Space Center on August 10; Edwards Air Force Base [CA] will serve as the backup site. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991, Banke, FLORIDA TODAY, p. 1A, July 31, 1991.]

STS 48 PROCESSING CONTINUES

The Space Shuttle Discovery continues to undergo processing for its STS 48 mission expected to come in September. The Orbiter will be mated to its external tank and solid rocket boosters no earlier than August 1. Rollout to Launch Pad 39A is targeted for August 12. Currently technicians are monitoring the vehicle's systems. Endeavour, being readied for its STS 49 mission next year, has had its right mock orbital maneuvering system pod removed. Currently technicians are installing panels and electronic panels which are necessary for powering up the vehicle and they are establishing access to all areas of the vehicle; preparations are also underway to service the vehicle with freon. Work scheduled includes opening of the payload bay doors, power-up testing of all vehicle systems August 5. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991.]

COLUMBIA READIED FOR FERRY FLIGHT

The oldest Space Shuttle, Columbia, is being readied in OPF Bay 2 for its cross-country flight to Palmdale, CA, for extensive modifications. The ferry cover for the forward reaction control system has been installed and the auxiliary power unit catch bottles have been removed. Technicians are inspecting Columbia's payload bay door seal and preparing to install the simulated left orbital maneuvering system pod. Thermal protection system (tile) operations are underway. The payload bay doors will be closed for the last time before flight shortly and the tail cone still must be installed. On August 7, Columbia will be transferred to OPF Bay 3 for a one-day facility fit check and the Orbiter's ferry flight to California is targeted for August 9. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 30, 1991.]

NEW CENTER SUPPORT DIRECTOR: JONES

Marvin L. Jones was named Director of Center Support Operations by Kennedy Space Center Director **Forrest S. McCartney**; Jones' promotion is effective August 4. Jones succeeds the late **Jim Rice** who died June 12 following a long illness; Jones had been serving as Acting Director since Rice's death. Jones joined NASA in October 1985 and has served as Director, Safety, Reliability and Quality Assurance, and Protective Services as well as Director of the Protective Services Office. Jones has been Deputy Director of Center Support Operations since January. Before joining the space agency, Jones commanded the Eastern Space and Missile Center (Patrick Air Force Base, FL); he served 20 years in the U.S. Air Force. Center Support Operations Directorate provides assigned base operations, maintenance and center support services for all KSC and tenant organizations on the center, certain joint services for the Eastern Space and Missile Center, and

manages space vehicle propellants for NASA and other government agencies and their contractors. [NASA/KSC RELEASE NO. 90-91, July 30, 1991.]

LIGHTNING RESEARCH IMPACTS PLAYALINDA BEACH

The northern portion of NASA-owned Playalinda Beach on Canaveral National Seashore will be closed on weekdays from August 5 through August 30 to permit the safe conduct of a research program designed to enhance the accuracy of lightning forecast systems. The research program is being conducted through the launch of three-foot-long folding fin rockets trailing hair-thin strands of copper wire into thunderstorms to trigger lightning strokes. Launches will be conducted from a pad on the western shore of Mosquito Lagoon on the northern portion of the Merritt Island National Wildlife Refuge. [NASA/KSC RELEASE NO. 87-91, July 30, 1991.]

July 31:

STS 43: LAUNCH MINUS ONE DAY

AT 10 a.m. this morning, the countdown for STS 43 was in a built-in hold of 12 hours, 41 minutes at the T-11 hour mark. The clock will resume at 8:41 p.m. tonight. The rotating service structure was retracted at 10 this morning; pad technicians were preparing the main propulsion system and Shuttle main engines for flight, preparing the pad area for launch and installing flight crew time critical equipment. The Orbiter's communication system has been activated and crew seats have been installed in the flight and mid decks. The crew has been receiving vehicle, weather and payload briefings today. Still remaining to be done: preparing the fuel cells for launch later tonight; loading of the external tank for flight beginning at 2:41 a.m. at the T-6 hour mark; the flight crew is awakened at 6:06 a.m. and departs for the launch pad an hour and forty minutes later. Launch is targeted for 11:01 a.m. and the window runs till 3:06 p.m. The probability for being within launch weather criteria at the opening of the launch window is 70 percent; the probability for favorable weather improves to 80 percent over the course of the window. [KSC SHUTTLE STATUS REPORT, 10 a.m., July 31, 1991.]

U.S./U.S.S.R SPACE COOPERATION

The United States and the Soviet Union have agreed to expand civil space cooperation by flying a U.S. astronaut on a long-duration Soviet space station Mir mission and a Soviet cosmonaut on a U.S. Space Shuttle mission, increase cooperation in monitoring the global environment from space and initiate annual consultations activities. The agreement was reached by Presidents **George Bush** and **Mikhail Gorbachev** during the July 30-31 Summit in Moscow. These initiatives were developed for the U.S. side under the guidance of the National Space Council, chaired by Vice President **Dan Quayle**. The purpose of the exchange of flights is to conduct Life Sciences research of mutual interest. It would advance current efforts to standardize in-flight medical procedures which would improve comparability of data taken by each side. The exchange would involve training of the crew members at appropriate U.S. and Soviet facilities, exchange of medical equipment for flight on the space missions and establishment of a

telecommunications link between appropriate facilities of the two sides for use during missions. A new joint working group (JWG) on manned space flight will be established as an annex to the 1987 U.S./U.S.S.R. space science agreement to implement the flight project. The manned space flight JWG will work with the existing JWG on Space Biology and Medicine, which will be responsible for implementing the life sciences research. The agreement also calls for expanded cooperation in the monitoring of the global environment. Both sides will exchange information on their respective plans for Earth observation programs and develop cooperation where joint action could improve Earth science research and environmental monitoring on a global scale and facilitate the free and open international exchange of data from those programs. This cooperation will be carried out by the U.S./U.S.S.R. Earth Sciences JWG. It was also agreed to hold annual meetings between the two governments on civil space issues and cooperative activities. The JWGs are coordinated on the U.S. side by NASA and the Department of State-led "Interagency Working Group on U.S./Soviet Space Cooperation," under the guidance of the National Space Council. [NASA/KSC RELEASE NO. 91-122, July 31, 1991, Halvorson, FLORIDA TODAY, p. 1A, August 1, 1991.]

AUGUST

August 1: **LAUNCH DAY: STS 43**

Liftoff for STS 43 is scheduled for 11:01 a.m. today; the five-member crew left their quarters in the Operations & Checkout Building at Kennedy Space Center and headed for Atlantis aboard Launch Complex 39A. Mission managers are watching rain showers which are expected to move into the launch area during the day. The launch window extends until 3:06 p.m. NASA's failed effort to launch Atlantis on July 24 was due to a faulty main engine controller. The controller failed due to a defected soldered joint on a circuit board within the engine computer, according to **Jerry Smelser**, Main Engine Project Office at Marshall Space Flight Center (Huntsville, AL). Smelser said, "This particular joint had a deficiency in the manufacturing process. However, it was sufficiently attached that it did perform its function for a period of time. This clearly is an isolated case." Technicians for Honeywell Inc. (controller manufacturer) found the improperly soldered joint in a search of about 9,000 such joints in the computer; it had been undetected in five previous Shuttle missions. [Brown, FLORIDA TODAY, p. 5A, Aug. 1, 1991, Leary, THE NEW YORK TIMES, p. A12, Aug. 1, 1991.]

WEATHER, HARDWARE CAUSE SCRUB: STS 43

Atlantis' STS 43 mission was scrubbed because of a problem with a switch which raised doubts about whether the crew cabin was properly pressurized; when that problem was solved, bad weather moved into the launch area and forced the postponement of the liftoff until August 2. The launch was scrubbed at 12:28 p.m. by Shuttle Launch Director **Robert B. Sieck**. Crosswinds at the Shuttle Landing Facility rose above the 17 mph mark; that is a violation of launch rules. "We were looking very good at the beginning of the window, but after the first half hour, it deteriorated rapidly," said Staff Sgt. **Salinda Larabee**, an Air Force meteorologist. "The problem was the threat of rain showers and, to some extent, high winds." [Halvorson and Brown, FLORIDA TODAY, p. 1A, Aug. 2, 1991, Date, THE ORLANDO SENTINEL, p. A-3, Aug. 2, 1991, Leary, THE NEW YORK TIMES, p. A 11, Aug. 2, 1991.]

SPACEPORT USA RESTAURANT IMPROVED

Dining facilities are being improved through a $1.3 million expansion of the Lunch Pad restaurant at Spaceport USA. The eatery will more than triple its floor space, from 2500 square feet to 7800. The 11,500 square feet of adjacent outdoor patio area will be placed under a protective cover. The exterior of the restaurant will be remodeled to match that of the recently upgraded Spaceport Central building. By the end of the year, the Spaceport's souvenir store - The Gift Gantry - will undergo a major interior renovation; the Flight Crew Training Building, the first tour stop, will be modified to ease access and egress of visitors. The expansion projects are financed through a Services Improvement Account generated by sales to visitors; there are no taxpayer funds involved. In July, there were 298,662 visitors at Spaceport USA. Year-to-date attendance stands at 1,621, 235.

[SPACEPORT USA RELEASE NO. NT0589, Aug. 1, 1991, "Spaceport Expands Restaurant," FLORIDA TODAY, p. 12C, Aug. 3, 1991.]

August 2: **STS 43 LAUNCHES SUCCESSFULLY**

"We had a great countdown. We had no problems to deal with. We did what we like to do best, launch on time with no anomalies. It's good to be flying again," said Shuttle Launch Director **Robert B. Sieck**, at a news conference after Atlantis lifted off at 11:02 this morning. Mission Commander **John Blaha** said, "It was the best ride in the world." Six hours after launch the crew of five launched its primary cargo, the Tracking and Data Relay Satellite. The STS 43 mission was the ninth for Atlantis; it had been delayed twice for technical problems and once for bad weather. There had been a further technical problem before launch; engineers decided that the problem with a signal relayer was not critical to the mission since the relayer would not be used in the mission. Early in the flight there was a malfunction in a system which was used to cool lubricants for the auxiliary power units; engineers decided that this too was not serious enough to affect the mission. [Leary, THE NEW YORK TIMES, p. 6, Aug. 3, 1991, Brown and Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 3, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-10, Aug. 3, 1991.]

[] **BUCKINGHAM: FIRST LAUNCH COMMENTARY**

Kennedy Space Center spokesman **Bruce Buckingham** had a career first today when he became the seventh person to handle the job of "Voice of Shuttle Launch Control," since the beginning of Space Shuttle launches on April 12, 1981. [The other commentators have been **Hugh Harris, Lisa Malone, Jim Ball, Mark Hess, George Diller** and Jack King.] Buckingham was greeted with cheers when, a half hour after launch, he returned to the KSC Press Site. He said, "It was one of the most intense periods of my life." Buckingham's father, **Jamie Buckingham**, is pastor of the Tabernacle Church (Melbourne, FL) said of his son, "When you grow up in the home of a writer and a speaker, part of it just rubs off, I think. We're real proud. This is the kind of thing every dad hopes for his son some day." Buckingham, 35, joined NASA in September 1985, after working for former U. S. Rep. **Bill Nelson**. [Banke, FLORIDA TODAY, p. 6A, Aug. 3, 1991.]

August 5: **STS-43: POST-LAUNCH**

Launch Complex 39A sustained minimal damage from Atlantis' STS 43 launch August 2 at 11:02:00.0432 a.m. EDT. The solid rocket boosters arrived at Hangar AF at 12:30 p.m. EDT on August 3. No unusual anomalies have been reported; the exit cone has been removed from the right booster. High pressure water will be used to strip the boosters of their thermal protective foam. STS 43 is expected to conclude with a landing at Kennedy Space Center's Shuttle Landing Facility August 11, at 8:19 a.m. EDT on orbit 142. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 5, 1991.]

DELTA ROCKET GROUNDED

A technical problem with its navigation satellite cargo will keep an Air Force Delta rocket from launching for at least two weeks. The McDonnell Douglas Systems Co. rocket had been scheduled to liftoff August 8 from Launch Complex 17 at Cape Canaveral Air Force Station. The earliest opportunity for launch will come August 22. The cargo is a Navstar Global Positioning System satellite and would be the 12th in the system. [Banke, FLORIDA TODAY, p. 1A, Aug. 6, 1991.]

ASTRONAUTS MEMORIAL SHUTS DOWN: SAFETY

Safety concerns at Spaceport USA caused the Astronauts Memorial to be closed to the public today, officials at the attraction said. **Randy Barridge**, of the Astronauts Memorial Foundation, said, "The memorial itself, as far as its ability to rotate and pitch, has been shut down for safety reasons." Engineers from VSL Corp. which designed the memorial are flying to Florida to inspect the memorial which worked improperly today. Barridge said the moving memorial was making an unexplained popping sound. He said, "NASA engineers and our own consultants have determined that the mechanism that controls the pitch of the mirror got out of synch by an inch and a half." Barridge said that engineer had not yet found any structural damage. He said the popping sound that had been heard might have come from several screws that were found broken loose. No estimates of the repair's cost or the time needed to effect the repair were available. Barridge said that determining such details was low on the Astronaut Memorial Foundation's priority list. "We just want to get it back in operation," he said. Scaffolding will be erected August 8 to allow repairmen to make inspections of the $6.2 million "Space Mirror." [Banke, FLORIDA TODAY, p. 1A, Aug. 6, 1991, "Memorial Closed," USA TODAY, p. 3A, Aug. 7, 1991, "Memorial Closed," FLORIDA TODAY, p. 1B, Aug. 8, 1991, "Engineers Inspect Astronauts Memorial," FLORIDA TODAY, p. 1B, Aug. 9, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-7, Aug. 6, 1991.]

PROCESSING: DISCOVERY & COLUMBIA

In the Vehicle Assembly Building at Kennedy Space Center, workers attached the Space Shuttle Discovery to its external tank and solid rocket boosters today and will check electrical connections tomorrow, according to **Lisa Malone**, KSC spokeswoman. Discovery will continue pre-rollout processing in the VAB for another week and should be rolled to Launch Complex 39A beginning 12:01 a.m. August 12. Discovery's STS 48 mission will deploy NASA's Upper Atmosphere Research Satellite (UARS). In the Orbiter Processing Facility, the Space Shuttle Columbia is undergoing the final preparations for its ferry flight to Palmdale, CA, where it will spend half a year receiving modifications and an overhaul. Before its flight, Columbia will spend one day at KSC in a newly refurbished processing hangar, according to Malone, so that workers can see how a Shuttle fits in the new work area. At a KSC hangar at Cape Canaveral Air Force Station, workers have begun disassembling Atlantis' two solid rocket boosters which were recovered over the weekend and towed through Port Canaveral to CCAFS.

[Banke, FLORIDA TODAY, p. 2A, Aug. 6, 1991.]

August 6: **STS-43: FLIGHT DAY 5**

The STS-43 solid rocket boosters are being stripped of thermal protective foam with a hydrolasing technique using high pressure water. The motor segments will be disassembled and shipped back to Thiokol in Utah for refurbishment. The aft and forward sections will be refurbished here at KSC by USBI. The mobile launcher platform used to launch STS-43 is being transferred today from Launch Complex 39A to the park site located just outside of the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 6, 1991.]

[] **STS 48 PREPARATIONS**

Electrical connections between Discovery and its external tank have been completed and the vehicle was powered up at 1:23 this morning. In progress is a Shuttle Interface Test which validates connections between the vehicle elements and the launch platform. Late on August 9, platforms will be retracted from the vehicle. Rollout to Launch Complex 39A is targeted for 12:01 a.m. August 12. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 6, 1991.]

August 7: **ATLANTIS BOOSTER REFURBISHMENT**

Technicians are continuing to strip thermal protective foam from the STS 43 solid rocket boosters with a hydrolasing technique using high pressure water. Both the robot hydrolaser and manual method are being used to strip the foam away. The aft skirts are scheduled to be removed from both boosters today. The motor segments will be disassembled and shipped back to Thiokol (Brigham City, UT) for refurbishment. The aft and forward skirts will be refurbished here at KSC by USBI. The mobile launcher platform used to launch STS 43 was transferred yesterday from Launch Complex 39A to the park site located just outside the Vehicle Assembly Building. KSC's Landing Team will assemble today for a briefing to review landing procedures and plans. That landing is expected to occur at Kennedy Space Center August 11 (Sunday) at 8:23 a.m. EDT, on orbit 142. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 7, 1991.]

[] **COLUMBIA'S FERRY FLIGHT**

Columbia's aft compartment has been closed out in preparation for its ferry flight to Palmdale, CA; the crew cabin has also been closed out and the tail cone has been installed for the journey. Work in progress includes closing out the flipper doors which protect the wing hinges and the transfer of the Orbiter itself to OPF Bay 3 for a fit check this morning at 10 a.m. Technicians are also awaiting the arrival today of the Shuttle Carrier Aircraft and the C141 Pathfinder aircraft. Tomorrow (August 8) at 4 a.m., Columbia and the SCA will be towed to the Mate Demate Device at the Shuttle Landing Facility (SLF) for mating. Departure for California is planned for 7 a.m. August 9. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 7, 1991.]

STS 48 LAUNCH PREPARATIONS

The Space Shuttle Discovery is presently undergoing a Shuttle Interface Test to validate connections between the Orbiter and the launch platform. Leak checks are being performed of the cavities between the external tank to Orbiter disconnects; tests of the solid rocket boosters ' hydraulic system are being conducted. The platforms around the vehicle must be retracted August 9; rollout to Launch Complex 39A is projected to take place August 12 beginning at 12:01 a.m. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 7, 1991.]

ENDEAVOUR'S FIRST POWER UP TESTS

Endeavour will be powered up this week at Kennedy Space Center; this significant event marks the beginning of major testing of the newest Space Shuttle prior to its April 1992 launch. "We're happy to get started on processing Endeavour for its first flight. We've worked hard to schedule all the required tests and the team is ready," said **Tip Talone**, Endeavour's Flow Director. Endeavour arrived at Kennedy Space Center's Shuttle Landing Facility atop the new 747 Shuttle Carrier Aircraft on May 7 of this year and it was temporarily housed in High Bay 2 of the Vehicle Assembly Building (VAB) until July 25 when it was transferred to the Orbiter Processing Facility Bay 1. In the VAB, several major components were installed in the newest Orbiter, including the liquid hydrogen 17-inch disconnect, the ammonia boiler, the flash evaporator and the external tank door drive mechanisms. The forward reaction control simulator was removed in the VAB, but work in the VAB centered on preparing the Orbiter for power up testing in the OPF.

Last week, the mock left and right orbital maneuvering system pods were removed from Endeavour and installed on Columbia for its ferry flight to California. "First Flow" tests of a vehicle, to be performed during Endeavour's planned seven-month stay in the OPF, are the most rigorous an Orbiter ever undergoes. Extensive integrated tests and checks of each system will validate the operation of the vehicle. Also in the OPF, several major vehicle components will be installed: the three new main engines featuring upgrades that include new controllers, the forward reaction control system, and two orbital maneuvering system (OMS) pods. For the first time, KSC's processing team will install the new drag-chute on an Orbiter. Endeavour is the first Orbiter outfitted with the drag chute pod. Stacking of the solid rocket boosters for Endeavour's flight is tentatively scheduled for the November/December period. Mating with the external tank is set to occur early next year. Once the Orbiter is completely outfitted and its systems fully tested, it will be towed to the VAB for mating with the ET and SRBs; this is scheduled to occur in mid-February 1992; rollout to the launch pad is planned for the following week. A Flight Readiness Firing, which is a standard requirement for all new vehicles, is targeted to occur in early March 1992. While bolted to the launch pad, the Orbiter's three main engines are fired for approximately 20 seconds. No astronauts will be aboard for this test. Objectives of the test include validating the integrity of the new Orbiter's systems and evaluation of the main propulsion system performance and propellant delivery

systems. Other routine tests and operations will also be performed while Endeavour is at the launch pad, including a Terminal Countdown Demonstration Test scheduled for March 1992. Endeavour's first mission, STS 49, will carry seven astronauts into space in April 1992. The mission will be highlighted by a space walk to attach an upper stage to reboost an Intelsat satellite which was stranded in an inoperable orbit following launch aboard a commercial Titan 3 rocket last March. [NASA/KSC RELEASE NO. 94-91, Aug. 7, 1991.]

August 8: **YOUNG: KSC LANDINGS ARE RISKY**

John Young, former STS 1 commander and presently a safety official at Johnson Space Center, said today that NASA is taking unnecessary risks with its expensive Space Shuttles by making Kennedy Space Center the prime landing site. Atlantis is due to land here on the morning of August 11. Young, who is a Special Assistant for Engineering, Operations and Safety at JSC, said, "It's an increased risk, and I told them that." He referred to the potential for saving up to $3 million per flight by landing at KSC and said that the cost of a lost $2 billion Orbiter vastly overshadows the savings. "If there's an accident, it's certainly going to look penny-wise and pound-foolish," said **John Pike**, Space Policy Analyst for the Federation of American Scientists. He advocated foregoing landings at KSC until all the Orbiters had been outfitted with drag chutes; only Endeavour has this safety feature. KSC has not been a primary landing site since April 19, 1985, when Discovery blew out a tire landing on the Shuttle Landing Facility runway at the space center. "We're making it very tough on ourselves. We'll land wherever it's safest," said **Jim Cast**, NASA spokesman. Space agency officials said that NASA had not taken the risks lightly but felt that modifications to the Orbiter brakes, tires and steering led them to believe that KSC landings can be made safely. ["Young: Landing Shuttle At KSC Increases Risk," FLORIDA TODAY, p. 1A, Aug. 9, 1991.]

ENDEAVOUR POWERED UP

The Space Shuttle Endeavour, newest member of the four-vehicle fleet, was powered up today in the Vehicle Assembly Building. "We're happy to get starting on processing Endeavour," said **John "Tip" Talone**, Processing Manager for the Orbiter. When Columbia has left for California, the new Orbiter will be moved to the OPF. During its seven-month stay in the Orbiter Processing Facility, Endeavour will undergo a series of initial tests and have its main engines installed along with other important flight gear. KSC technicians will also install a drag chute designed to help slow the Orbiter down on landing. [Brown, FLORIDA TODAY, p. 12A, Aug. 9, 1991.]

COLUMBIA MODIFICATIONS

Once Columbia arrives at Palmdale, CA, for a six-month stay for modifications, technicians will demate the Orbiter from the SCA using a device called the Orbiter Lifting Frame; then the vehicle will be transferred into Rockwell's Orbiter Assembly and Modification Facility. Some fifty (50) modifications are planned, including

improved nose wheel steering capability, carbon brakes, improved auxiliary power units and the five new general purpose computers. Additionally, Columbia will be outfitted with the drag chute pod and its thermal protection system will be enhanced. Changes to equip the Orbiter for an extended flight include increasing the capacity of vehicle systems such as power and waste collection, adding a regenerating system for removing carbon dioxide from the crew cabin atmosphere. installing two additional nitrogen tanks for the crew cabin atmosphere, and adding extra middeck lockers for stowage. With these changes, Columbia can support a mission up to 16 days in duration. As part of periodic maintenance, Columbia will undergo the most extensive structural inspections performed on an Orbiter to date. Visual and borescope inspections will be performed to identify any fatigue, stress or cracks in the Orbiter's structure. Columbia's last structural inspections, in 1984-85, were not as extensive. When it returns to KSC, Columbia will have a new identifying mark - its name painted on the right wing. The omission of its name painted on the outside of the ship has been a visible difference between Columbia and its sister ships. Its first mission on returning to KSC will be the STS 50 mission, targeted for June 1992; it will be of extended duration - 13 days - and carry a crew of seven and the United States Microgravity Lab-1 payload. Columbia is the oldest Shuttle; it has flown eleven times, including the first five missions of the program. It flew for the first manned Spacelab flight, the ASTRO-1 payload and retrieval of the Long Duration Exposure Facility. [NASA/KSC RELEASE NO. 96-91, Aug. 8, 1991, Date, THE ORLANDO SENTINEL, Aug. 9, 1991.]

ATLANTIS KSC LANDING: AUG. 11

The first planned end of mission at Kennedy Space Center since 1986 is set to occur at 8:24 EDT, August 11, on the Shuttle Landing Facility; it will be the eighth landing at KSC. This mission marks the first time since STS 61-C (January 1986) that NASA managers determined end-of-missions could again be scheduled at KSC. In January 1986, Columbia was unable to make a KSC landing as planned; after being waved off three days running due to bad weather, the Orbiter was instructed to land at Edwards Air Force Base (CA) and Edwards has been the primary site since that time. The Presidential Commission on the Challenger Accident indicated that modifications were needed on the Orbiters before KSC landing could resume.

Modifications made to the Space Shuttle fleet include upgrades to the main landing gear, an improved carbon braking system, and an upgrade to the nose wheel steering capability. These and other enhancements have been made and successfully tested both at Edwards and KSC. Enhancements have also been made and successfully tested both at Edwards and KSC. Enhancements have also been made at the SLF, including work to grind smooth half mile sections on each end of the runway to remove cross grooves. These were replaced with smaller "corduroy" ridges that run the length of the runway. The primary purpose of this change was to enhance safety by reducing tire wear. Two landings have been made since the return to flight in 1988; both of these had been scheduled

for landings at Edwards, but were diverted to KSC due to poor weather in California.

Previous landings at KSC were:

41-B - Challenger, Feb. 11, 1984

41-G - Challenger, Oct. 13, 1984

51-A - Discovery, Nov. 16, 1984

51-C - Discovery, Jan. 27, 1985

51-D - Discovery, April 19, 1985

STS-38 - Atlantis, Nov. 20, 1990

STS-39 - Discovery, May 6, 1991

General weather restrictions for a landing at KSC are specified in part as:

*Surface winds must be less than 20 knots in any direction, and less than 12 knots for crosswinds;

*The ceiling must be greater than 10,000 feet. For scattered clouds below 10,000 feet, cloud cover must be observed to be less than 20 percent at the deorbit burn go/no go decision time;

*Visibility must be seven miles or greater;

*There can be no precipitation at the surface or aloft in the proximity of the Orbiter;

*Thunderstorms, rain or the potential for lightning cannot be within 30 nautical miles of the landing site;

*Vertical cloud clearance at the 30 nautical mile range, must be greater than 2 nautical miles.

[NASA/KSC RELEASE NO. 95-91, Aug. 8, 1991, "Atlantis Set for Sunday Landing at KSC," FLORIDA TODAY, p. 1A, Aug. 10, 1991, Brown, FLORIDA TODAY, p. 1A, Aug. 11, 1991, Date, THE ORLANDO SENTINEL, p. A-15, Aug. 10, 1991, Date, THE ORLANDO SENTINEL, Aug. 11, 1991.]

August 9: **COLUMBIA: CALIFORNIA HERE IT COMES**

The Space Shuttle Columbia, the oldest of the four-vehicle Orbiter fleet, was scheduled to take off from the Shuttle Landing Facility for Palmdale, California this

morning at 10:30, but that was delayed a day due to deteriorating weather conditions. It has been stripped of its main engines, its nose-and-tail steering jets, fuel storage tanks and a number of other systems. The Orbiter will make the trip aboard the 747 Shuttle Carrier Aircraft. The first leg of the ferry flight is likely to be to Eglin Air Force Base (FL), with a possibility of continuing on to Tinker Air Field (Tulsa, OK); a decision will be made in flight. The final leg - to Palmdale, CA - will be made the following day. Takeoff tomorrow is scheduled for 7:00 a.m. In California, Columbia will its most extensive inspection ever on a veteran Space Shuttle. NASA spokesman **Ed Campion** said, "You could characterize it as your car going in for a major inspection." **Bascom Murrah**, NASA Manager for Columbia Processing said, "This is kind of an interim space station, to keep us up there longer and do more work." In addition to the new storage facilities, Columbia will have installed a new drag chute, stronger brakes and an improved nosewheel steering system. Discovery and Atlantis will be overhauled in 1992 and 1993 respectively. [Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 9, 1991, KSC SHUTTLE STATUS REPORT, 12:30 p.m., Aug. 9, 1991, "Weather Delays Columbia's Calif. Trip Until Today," FLORIDA TODAY, p. 6A, Aug. 10, 1991.]

STS 48/UARS PROCESSING

Main Propulsion System checks on Discovery have been completed as have liquid hydrogen and liquid oxygen fill and drain leak checks and the Orbiter and External Tank were electrically mated. The Shuttle Interface Test is underway as are a retest of the Master Events Controller, the final Orbiter/External Tank mate and umbilical closeouts and liquid hydrogen recirculation pump leak checks. Platform retractions are scheduled to begin tonight and rollout to Launch Complex 39A will begin at 12:01 a.m. August 12. [KSC SHUTTLE STATUS REPORT, Aug. 9, 1991.]

ENDEAVOUR'S STS 49 PROCESSING

Electrical power up operations have been completed on Endeavour (OV 105); they were begun yesterday for the first time as a member of the Shuttle Fleet. The payload bay doors were opened last night as well. Freon coolant loop service has begun and inspections of drag chute modifications are also underway. Technicians are cleaning and inspecting the RTLS (Return to Launch Site) dump line and the main propulsion system. Electrical system validations are scheduled. [KSC SHUTTLE STATUS REPORT, Aug. 9, 1991.]

INTERNATIONAL MICROGRAVITY LABORATORY (IML)

A pre-move review of the IML Spacelab module was held earlier this week at KSC, and a consensus was reached to proceed with plans to move the IML payload to a test stand where it will undergo many of the final portions of its pre-flight processing. IML is now positioned in the Operations & Checkout Building's Test Stand III. On August 14, IML is scheduled to be hoisted by a crane and placed into an adjoining test area where more extensive checkouts can be conducted. IML will fly aboard the Space Shuttle Discovery on STS 42, now targeted for

launch in January 1992. [INTERNATIONAL MICROGRAVITY LABORATORY (IML) STS 42 PROCESSING STATUS UPDATE, Aug. 8, 1991.]

PLAYALINDA BEACH CLOSURE

Playalinda Beach will be closed to visitors for a few hours August 12 as the Orbiter Atlantis makes a planned landing at Kennedy Space Center's Shuttle Landing Facility. The beach will close at 8:00 p.m., its normal time, but not reopen until an hour after landing which is scheduled for 8:24 a.m. [NASA/KSC RELEASE NO. 98-91, Aug. 9, 1991.]

August 10:

COLUMBIA'S FERRY FLIGHT BEGINS

Columbia, attached to its Shuttle Carrier Aircraft, left Kennedy Space Center today at 10:48 a.m., accompanied by a NASA Gulfstream jet. It spent the night at MacDill Air Force Base (Tampa, FL). [Brown, FLORIDA TODAY, p. 1A, Aug. 11, 1991, "Space Shuttle Columbia Has a Layover in Tampa," THE ORLANDO SENTINEL, Aug. 11, 1991.]

JONES MADE SI DIRECTOR

Kennedy Space Center Director **Forrest S. McCartney** today named **Marvin Jones** to be Director of Center Support Operations. Jones had been Deputy Director and Acting Director since the death of **Jim Rice** on June 12. "We are very fortunate to have someone with Marv's experience and ability to take over for Jim Rice," McCartney said. Jones (Merritt Islands, FL) joined NASA in 1985 when he managed KSC's security and safety, reliability and quality divisions. He had served as Rice's deputy since January 1990. Prior to joining NASA, Jones had been Commander at Patrick Air Force Base and retired with the rank of Colonel. ["Former Commander Gets New NASA Job," FLORIDA TODAY, Aug. 11, 1991.]

MDSSC AWARD WINNERS

Five employees of McDonnell Douglas Space Systems Co. have been awarded Manned Flight Awareness Program awards. These are: **Dena Pierce**, Materials Coordinator; **Arthur Culberson**, Safety Engineer; **Kimberly Serfozo**, Associate Project Support Analyst; **Throm, Ronald**, System Technician; **Margo Collier**, Financial Controls and Accounting Department. ["NASA Gives Honors to Contractor Employees," FLORIDA TODAY, Aug. 11, 1991.]

MORE TESTS FOR SPACE MIRROR

"We'll announce an opening date when we're satisfied the tests agree with our initial assessment" that there was no damage, said **Randy Barridge**, a board member of the Astronauts Memorial Foundation. The three-month old "Space Mirror," the Astronauts Memorial, will be closed for more tests and inspections, officials said today. [Brown, FLORIDA TODAY, p. 2B, Aug. 10, 1991.]

August 11: **ATLANTIS MAKES GRACEFUL LANDING**

At 8:23 a.m. this morning, preceded by twin sonic booms, the Space Shuttle Atlantis glided easily to a landing at Kennedy Space Center's Shuttle Landing Facility. "Welcome home Atlantis and congratulations on a picture-perfect mission," Spacecraft Communicator **Bob Cabana** greeted the crew. The crew emerged from the Orbiter an hour after landing; they were greeted by KSC Director **Forrest S. McCartney**, Shuttle Launch Director **Robert B. Sieck** and Shuttle Program Director **Robert L. Crippen** and then boarded a van to be taken to their medical checkups. The flight's only problem had been the overheating of an auxiliary power unit - one of three - used to power hydraulic systems during launch and landing. None of the units presented problem during the landing, but the crew delayed turning on one unit to avoid its overheating.
Crippen said that preliminary inspections showed minor tire wear on one of the four main landing gear wheels. He was referring to one tire which "did show some wear on the cords." He also said the sees no need to smooth the landing strip, "I'm happy with it the way it is." Nevertheless, Crippen said he expected landings to occur at Edwards Air Force Base about 60 percent of the time. Speaking for the crew Commander **John Blaha** said, "We're really happy to be back. Atlantis gave us no problems." After their checkups, the Atlantis crew - Blaha, Pilot **Michael Baker** and Mission Specialists **James Adamson**, **G. David Low** and **Shannon Lucid** - the crew showered and boarded a NASA plane for a flight to Houston.

NASA had been concerned about the landing to the extent that guests had been banned and the number of media representatives was limited at a special viewing site near the runway. Managers thought toxic fumes blowing toward the viewing site might be a danger to spectators and had prepared 200 oxygen masks in case of an emergency. No toxic gases were detected, though fans were in use as part of routine post-landing procedures. Atlantis was towed to its processing hangar at 3:00 p.m. so preparations could begin for a planned November flight to deploy a military satellite. At the Orbiter Processing Facility, the crew module was opened, the doors were removed from the aft compartment and access to the vehicle was established. Tomorrow activities will include post-flight operations to safe the pyrotechnics on the vehicle and preparations to offload residual propellants from the power reactant storage and distribution system tanks. [Brown, FLORIDA TODAY, pp. 1A-2A, Aug. 12, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 12, 1991, "Mission Accomplished for Atlantis," USA TODAY, p. 3A, Aug. 12, 1991, Rohter, THE NEW YORK TIMES, p. A10, Aug. 12, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, Aug. 12, 1991.]

August 12: **RUNWAY REPAIRS BEGIN**

Goodson Paving Inc. (Cocoa, FL) will begin a $350,000 project to resurface each end of the space center's aging Shuttle Landing Facility. Early next year a $4 million project to repair the facility's shoulders and upgrade lighting will begin. **David Wentworth**, Project Manager in KSC's Engineering Development Directorate, said that rainwater loosened and broke up the runway material over time.

"Normally, this type of surface is not a problem. But in the case of the Orbiter, with its tiles and tires and it coming in so hot, you can damage the tiles or possibly pop the tires," he said. Since the material would simply break up again, repairing the overruns won't help; managers have decided to put down a new surface, Wentworth said. [Banke, FLORIDA TODAY, pp. 1A-2A, Aug. 12, 1991, NASA/KSC RELEASE NO. 97-91, Aug. 12, 1991.]

DISCOVERY READY FOR ROLLOUT

Technicians have readied Discovery for rollout this morning, one month before projected launch date - September 12 - for the STS 48 mission. Discovery's cargo, the Upper Atmosphere Research Satellite (UARS), was moved out to Launch Complex 39A last week. The UARS will be installed in the Orbiter's cargo bay August 14 and will then be tested to ensure the spacecraft is working in concert with Discovery. The Shuttle's five-man crew will come to KSC this weekend for the Terminal Countdown Demonstration Test August 19-20. The STS 48 crew includes Commander **John Creighton**, Pilot **Kenneth Reightler**, and mission specialists **James Buchli**, **Mark Brown** and **Charles "Sam" Gemar**. Meanwhile, Columbia aboard the SCA, will try to fly as far as San Antonio, TX, today from MacDill Air Force Base (Tampa, FL). Bad weather had interrupted the ferry flight yesterday. [Banke, FLORIDA TODAY, p. 2A, Aug. 12, 1991, KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 12, 1991.]

ROLLOUT OF STS 48

Discovery was rolled out to Launch Complex 39A beginning at 1:37 a.m.; the vehicle was harddown at 9:19 a.m. Rollout was delayed an hour and a half because of thunderstorms in the area; weather rules required that the Shuttle not be moved if the chance of lightning within 20 miles is greater than 10 percent, according to KSC spokesman **Bruce Buckingham**. "Once we got under way, the rollout went extremely well," Buckingham said. At the pad technicians were occupied making connections between the vehicle, launch platform and the launch pad. There will be a hot firing of auxiliary power unit no. 3 tonight. Work scheduled includes: rotation of the service structure around the vehicle early tomorrow, installation of the UARS payload August 14, helium signature leak test of the main propulsion system and three Shuttle Main Engines August 15 and the Countdown Demonstration Test August 19-20. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 12, 1991, Banke, FLORIDA TODAY, p. 1A, Aug. 13, 1991.]

COLUMBIA'S FERRY FLIGHT CONTINUES

Columbia departed MacDill Air Force Base (Tampa, FL) at 9:30 a.m. today enroute for Kelly Air Force Base (San Antonio, TX). Ferry flight officials will evaluate the weather from Texas to California before making a decision on the next leg of the ferry flight. An engine problem on the pathfinder aircraft and adverse weather conditions have delayed the cross-country ferry flight. The escort jet will either be repaired or replaced and the ferry flight is expected to continue at 8 a.m. August 13. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 12, 1991, Banke, FLORIDA

TODAY, p. 1A, Aug. 13, 1991.]

ENDEAVOUR PREPARATIONS

Technicians continue to make preparations for Endeavour's maiden flight - STS 49. Platforms have been installed in the Orbiter's midbody. Validations of the electrical system are also underway as are the adjustment of payload bay door latches. Leak checks are being made of the ammonia system; the instrumentation system is being verified and the main propulsion system is being checked. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 12, 1991.]

SPACE MIRROR: NO STRUCTURAL DAMAGE

The Astronauts Memorial is not structurally damaged, but it will remain closed until later this week, according to officials. Workers will repair damaged screw which hold white panels to the rear of the memorial and they will operate the mirror for a day before reopening the Space Mirror to the public, according to **David Walsh** of the Astronauts Memorial Foundation. ["Memorial Damage Not Structural," FLORIDA TODAY, p. 1B, Aug. 13, 1991, Date, THE ORLANDO SENTINEL, Aug. 13, 1991.]

ATLANTIS IN FINE SHAPE

Robert Hill, a NASA manager, said that the Space Shuttle Atlantis will require little in the way of repair work. He said that four tiles must be replaced as well as a layer of haze which clouded two of Atlantis' six main cockpit windows. One of the vehicle's tires was worn slightly, but officials expressed little concern. Hill said, "The bottom line is KSC is back in the landing business, and we're glad to see it," Hill said. [Banke, FLORIDA TODAY, p. 1A, Aug. 13, 1991, Date, THE ORLANDO SENTINEL, Aug. 13, 1991.]

August 13:

ATLANTIS: FUEL CELL CONCERNS

Following power down procedures at about 4:00 a.m. August 12, fuel cells 2 and 3 were inadvertently left operating. The error was not noticed until about 5:00 p.m. and may result in replacement of the cells. Two of the three $7 million cells will be replaced. According to NASA Manager **Robert Hill**, "There's no real fear we have done any damage to them; we just want to be very careful." NASA is concerned that water from the cells may have backed up into the unit, potentially causing damage. Technicians discovered the problem when they were working in the crew cabin and heard a fan running when it should have not have been. According to KSC spokesman **Bruce Buckingham**, Orbiter power had been turned off at 4 o'clock on the morning of August 12, when an excess of gaseous helium was discovered to have entered the fuel cell system from a ground line which had been overpressurized. A momentary power drop occurred in the cells' electrical output, so engineers ordered an emergency power-down of the Orbiter. The method used to shut down the power inadvertently prevented the two suspect fuel cells from shutting down their electricity generating capacity. Buckingham said,

"We are concerned about the possible damage to the fuel cells and why the procedures allowed this to happen, but at no time was there any danger to the Orbiter." The 255-pound fuel cells will be removed and shipped to their manufacturer, International Fuel Cells Division of United Technologies (South Windsor, CT). Replacement with spare fuel cells is not expected to delay the projected November 19 launch of Atlantis' STS 44 mission. Meanwhile, crew module items have been destowed from the Orbiter. Technicians are at work on main engine drying operations, hypergolic fuel deservicing and cryogenic fuel offload preparations. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 13, 1991, Banke, FLORIDA TODAY, p. 2A, Aug. 14, 1991.]

[] **STS 48 PRE-LAUNCH STATUS**

After rolling out to Launch Complex 39A yesterday, Discovery was powered up and an auxiliary power unit was hot fired. Technicians are currently working on launch pad validations and rotating the service structure around the vehicle. Scheduled for completion: opening the payload bay doors, installing the payload August 14 and conducting a helium signature test of the main propulsion system. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 13, 1991.]

[] **COLUMBIA FERRY UPDATE**

The Space Shuttle Columbia departed Kelly Air Force Base (San Antonio, TX) at 9:34 a.m. EDT yesterday and arrived at Palmdale, CA, at 1:25 p.m. EDT. Columbia has been demated from the 747 Carrier Aircraft and was towed into the Rockwell Facility where it will spend the next six months being modified and inspected. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 13, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 14, 1991.]

[] **STS 49: ENDEAVOUR UPDATE**

Water flex lines have been installed on the Space Shuttle Endeavour; inspections of the Orbiter's drag chute modifications are underway. Technicians have begun freon coolant loop service, main propulsion system inspections and electrical system validations. The vehicle is presently in the Orbiter Processing Facility's High Bay 1. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 13, 1991.]

August 14: **FUEL CELL INVESTIGATION BOARD**

Kennedy Space Center Director **Forrest S. McCartney** has appointed a board to investigate the circumstances surrounding the August 12 mishap which involved possible damage to two of Atlantis' three fuel cells. Atlantis is presently located in Bay 2 of the Orbiter Processing Facility. The Orbiter landed at KSC August 11 to complete its nine-day STS 43 mission. **Jack Smith**, Director of Safety and Reliability, is designated as chairman of the board. Other board members are: **Harvey Crawford**, Chief of Fuel Cell Systems Section in the Vehicle Engineering Directorate; **Stephen Francois**, Deputy Director of Space Shuttle Payload Operations; **Albert Sofge**, Shuttle Test Director, Shuttle Operations; and **Thomas**

Williams, Chief of Shuttle Electrical and Telecommunications Systems Division in the Vehicle Engineering Directorate. Board functions include investigating the facts surrounding the mishap, determining its probable cause, assessing the possibility of a recurrence and recommending corrective actions. A final report is due by early October. Advisors appointed to the board are: **Alan Gettleman**, representing the Payload Safety Branch in the Safety and Reliability Directorate; **Dudley Cannon** from the Chief Counsel's office; **Lisa Malone** from the Public Affairs Office; and **Michael Generale** from the Engineering Branch of the Shuttle Logistics Project Management Directorate. The two fuel cells will be removed from their location in the midbody of the Orbiter next week and shipped to the vendor [See story dated August 13] where the extent of the damage, if any, to the units will be determined. The three fuel cells operate as independent electrical power sources fed by oxygen and hydrogen reactants. Power and water are produced through the chemical reaction that takes place in these power plants. Each cell measures 14 inches high, 15 inches wide and 40 inches long. Each weighs 255 pounds and is capable of supplying 12 kilowatts peak and 7 kilowatts of maximum continuous power. [NASA/KSC RELEASE NO. 99-91, Aug. 14, 1991, Brown, FLORIDA TODAY, p. 4A, Aug. 15, 1991, Date, THE ORLANDO SENTINEL, Aug. 15, 1991.]

[] **STS 48: DISCOVERY PREPARATIONS**

Discovery received its major cargo at Launch Complex 39A today: the Upper Atmosphere Research Satellite was loaded into the Orbiter's payload bay in preparation for the five-day STS 48 mission scheduled for September 12. Tomorrow technicians will conduct a routine leak test of Discovery's main engines; next week, a Terminal Countdown Demonstration Test will occur and the crew will participate. The STS 48 crew is expected to arrive at KSC on August 18 for the test and to familiarize themselves with the emergency egress system. [Brown, FLORIDA TODAY, p. 4A, Aug. 15, 1991.]

August 15: **DISCOVERY LAUNCH: SEPT. 12**

The STS 48 mission will begin with launch at 6:57 a.m. September 12, according to current planning at Kennedy Space Center. "We're about ready to go and in less than a month we'll be on our way," said Discovery Mission Specialist **James Buchli**. The Orbiter is expected to land at KSC at 1:55 a.m. September 18. Commander **John Creighton** noted, "I think there's a little higher risk landing at night than in daytime, but that's true of all airplanes." Pilot **Kenneth Reightler** added, "If we didn't think it's safe, we wouldn't be flying there." The other members of the crew are Mission Specialists **Charles "Sam" Gemar** and **Mark Brown**. The mission's primary job will be to study the Earth's atmosphere and Program Scientist **Joe McNeal** calls it "a new era in the study of our global environment." The Upper Atmosphere Research Satellite that the crew will launch is expected to provide atmospheric data for two years. The five-member STS 48 crew will fly to the space center August 18. [Banke, FLORIDA TODAY, p. 6A, Aug. 16, 1991.]

SOVIET ROCKET CARRIES U.S. DEVICE

A Soviet Cyclone rocket launched today at 5:15 a.m. EDT carrying a NASA-built Total Ozone Mapping Spectrometer (TOMS) which is designed to monitor holes in the ozone layer of the Earth's atmosphere. The liftoff came from Plisetsk Cosmodrome in northern Russian and carried a Soviet Meteor-3 Satellite which will also measure the ozone layer. NASA wants to have an ozone-monitoring device in orbit continually, according to **Stanley Way**, the agency's Deputy Manager for the project. The data gained from the mission will be jointly shared between Soviet and U.S. scientists. ["Soviet Rocket Carrying U.S. Device Blasts Off," FLORIDA TODAY, p. 6A, Aug. 16, 1991.]

August 16:

STS 48/DISCOVERY STATUS

A helium signature leak test of the Discovery's three main engines and main propulsion system have been completed. Technicians have also completed connections between the Upper Atmospheric Research Satellite (UARS) and the Orbiter and have replaced Tacan no. 1. Preparations have begun to service the vehicle with hypergolic propellants and to retest the Tacan antenna. Shortly, technicians will conduct purge tests of the cavity between the 17-inch external tank disconnect and the Orbiter. They will also be applying protective foam that hardens around the liquid hydrogen recirculation pump package located in the aft compartment. Scheduled work includes: payload interface verification tests (August 17), the Countdown Demonstration Test (August 19-20) and loading hypergolic propellants into the Orbiter's storage tanks next week. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 16, 1991.]

ATLANTIS POST-FLIGHT PROCESSING

Atlantis' payload bay doors have been opened and its Ku-band antenna has been deployed. Technicians have installed protective covers over the Orbiter's radiators and offload lubricating oil from the auxiliary power units. Post-flight inspections of the vehicle continue as do preparations to offload residual hypergolic propellant from the Orbiter's storage tanks. Workers are electrically disconnecting the Shuttle Solar Backscatter Ultraviolet (SSBUV) payload from the Orbiter and they have begun to remove the Space Station Heat Pipe Advanced Radiator Element-II (SHARE) from the Orbiter's payload bay. The vehicle's waste management system has also been removed. More payload items are still to be removed from the cargo area and checks must be made of the vehicle's navigation aids. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 16, 1991.]

WORK ON ENDEAVOUR CONTINUES

A functional test of Endeavour's payload bay doors has been scheduled for next week in OPF Bay 1. Workers are removing the simulator fuel cells from the Orbiter and are validating the electrical system. Checks of the main propulsion system are under way; the instrumentation system is being verified. Checks of all

the Orbiter systems are being made in preparation for the first flow processing. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 16, 1991.]

DISCOVERY: LEAK TEST CONTINUED

With an eye cocked in the direction of Tropical Storm Bob, technicians at Kennedy Space Center completed a leak test of Discovery's three main engines in preparation for the Orbiter's STS 48 mission. "There were no problems. Everything looks good," said KSC spokesman **Bruce Buckingham**. Onboard fuel storage tanks will be filled with propellant next week. The five-member crew arrives next week, too, to participate in the Terminal Countdown Demonstration Test (TCDT), receive training in emergency egress from Launch Complex 39A and attend briefings about the mission. ["Workers Test Discovery's Engines," FLORIDA TODAY, p. 2A, Aug. 17, 1991.]

ASTRONAUT MEMORIAL TO REOPEN

The Astronauts Memorial opened today at 9:00 a.m., having been closed the past two weeks for repair of a potential safety hazard. "It's great to have this behind us," said **David Walsh**, Astronauts Memorial Foundation board member. "With anything new you're going to have some glitches, and this one turned out to be minor. Hopefully, we won't have any more problems in the future." Once engineers determine what caused cracks in four of the Space Mirror's granite stones, they will be replaced. The cracks were unrelated to the malfunction in the mirror's swivel mechanism." [Banke, FLORIDA TODAY, p. 1B, Aug. 17, 1991, "Space Mirror Repaired, Will Reopen This Weekend," THE ORLANDO SENTINEL, Aug. 17, 1991.]

August 17:

SPACELAB READY FOR USE

The Spacelab module, used during Columbia's June mission (STS 40) has been disassembled by Kennedy Space Center workers. **Mitch Varnes**, KSC spokesman, said, "The experiments have been returned to their principal investigators and the hardware elements of the module have been turned over to the KSC processing teams." The next use of the Spacelab's tunnel will be for the International Microgravity Laboratory mission scheduled for January 1992; the pressure shell of the Spacelab will be used in the spring of 1992 for the U.S. Microgravity Laboratory mission. ["Spacelab Ready for Use," FLORIDA TODAY, p. 10E, Aug. 18, 1991.]

3RD OPF BAY TO OPEN

"It's going to be the bay to operate in," said **Ken Geiler**, Activation Project Office Director for Lockheed Space Operations Co. "The technicians that have been over there so far just love it." Geiler referred to the September 1 opening of KSC's third Orbiter Processing Facility work bay. The Space Shuttle Columbia, oldest member of the Orbiter fleet, spent one day in the facility before being flown to California for extensive modifications. The Space Shuttle was moved there for

technicians to check how well an Orbiter would fit within the facility. "There were no surprises when Columbia went in," said Geiler. Workers did note that some equipment in the facility protruded uncomfortably close to Columbia and that will be taken care of. The third OPF is actually the converted Orbiter Maintenance and Refurbishment Facility and houses equipment ferried from the moth-balled Shuttle facility at Vandenberg Air Force Base. Geiler said, "We transferred thousands of items out here. To see that equipment come back here and finally be utilized in the Shuttle program is a personal as well as a professional achievement." The OMRF was modified by Lockheed contract at a cost of $85 million; a completely new facility would have cost $170 million to construct. [Banke, FLORIDA TODAY, pp. 10E & 9E, Aug. 18, 1991, Memorandum dated Aug. 14, 1991, General Distribution, Subject: Area Permit Badging for Orbiter Processing Facility High Bay 3 (OPF H/B 3).]

August 18: **STS 48 CREW ARRIVES AT KSC**

The five-member crew of Discovery's STS 48 mission arrived today to take part in a TCDT, emergency egress training and mission briefings. Mission Specialist **Mark Brown** said, "It's always a pleasure to be in Florida - especially when the hurricane's (Bob) going someplace else." Fellow Mission Specialist **Charles "Sam" Gemar** said, "We have a healthy satellite, we've got a healthy Orbiter, and we're looking forward to putting this baby in orbit." The crew also includes veteran Mission Specialist **James Buchli**, Commander **John Creighton** and Pilot **Ken Reightler**. The commander and pilot will practice KSC landings in a Shuttle Training Aircraft. The STS 48 crew will be at Kennedy Space Center through Tuesday (August 20). [Crew Photograph, FLORIDA TODAY, p. 1A, Aug. 19, 1991, Brown, FLORIDA TODAY, p. 8A, Aug. 19, 1991.]

August 19: **W & J CONSTRUCTION CONTRACT**

W & J Construction Corp. (Cocoa, FL) will resurface about 1.5 miles of roadway on Kennedy Space Center and perform additional work at the KSC Prototype Lab in fulfillment of a $309,645 contract. The company will resurface and repaint swatches of the NASA Parkway, beginning later this month with a portion of the overpass west of the Headquarters Building. Afterward in the Industrial Area, segments of C, D and E Avenues will temporarily become single lanes while the paving is repaired. W & J also will install paving additions at the Prototype Lab located south of the Operations and Checkout Building. [NASA/KSC Release No. 101-91, Aug. 19, 1991.]

SAFETY SUPPORT CONTRACT

NASA at Kennedy Space Center has entered into the final negotiations with Hernandez Engineering Inc. (Houston, TX) for a new Safety Support Contract worth $6.5 million. The contract runs for two years and may have price options for an additional two years. Hernandez is to provide technical and engineering services in support of KSC's Safety, Reliability and Quality Assurance Directorate. The company's primary responsibilities will relate to flight and ground hardware

processing, and will involve independent safety assessments and analyses.Hernandez replaces Ebon Research Systems which has held the contract since 1986; most of Ebon's 46 employees will be hired by Hernandez, according to **Wesley H. Dean**, Director of Procurement, Center Support Operations at KSC. Both Hernandez and Ebon are minority-owned small businesses; Ebon has graduated from the Section 8A program, which has a seven-year limit, under the Small Business Administration Act. This is the first time at KSC that a Section 8A contract will be awarded on a competitive basis, Dean said. The other, unsuccessful, bidders were CEXEC Inc., (McLean, VA); Creative Management Technology Inc. (Cocoa Beach, FL) and ETC Technical and Professional Services Inc. (Oklahoma City, OK). [NASA/KSC Release No. 103-91, Aug. 19, 1991, "Firm Clinches Contract," FLORIDA TODAY, p. 10E, Aug. 25, 1991.]

GLOBE COMMUNICATIONS CONTRACT

Globe Communications Inc. (Durham, NC) has been awarded a fixed priced contract worth $889,557 to install new communication lines between three Kennedy Space Center facilities. The company will install audio and fiber optic cable between the central communications center at KSC, the Communications Distribution and Switching Center, the Tel IV Central Telemetry Station in the south area of the space center. The fiber optic cable replaces the older copper cable used previously. Globe will also install audio and fiber optic cable to link the Communications Distribution and Switching Center with the Canister Cleaning and Rotation Facility now under construction in the KSC Industrial Area. [NASA/KSC Release No. 102-91, Aug. 19, 1991.]

SPEEGLE CONSTRUCTION CO. CONTRACT

Speegle Construction Corp. (Cocoa, FL) will provide two buildings and upgrade the area on Contractors Road where heavy equipment is restored under a $523,950 contract at Kennedy Space Center. The company will provide labor, equipment and materials to furnish the two pre-engineered metal buildings, and associated services involving the exterior lighting, parking area, concealed fasteners and ceramic tile wainscotting. An old shed on the property will be razed; the area, which is located north of the Roads and Grounds Building and is operated by Lockheed Space Operations Co., was dedicated August 12. [NASA/KSC Release No. 100-91, Aug. 19, 1991.]

KSC FACES POSSIBLE LAYOFFS

NASA's manager have been drawing up plans to absorb cutbacks which are likely to occur when Congress passes the space agency's budget. That budget is expected to be up to $1 billion less than NASA asked Congress for. **Hugh Harris**, Deputy Director of Public Affairs at Kennedy Space Center, said "It's premature to talk about layoffs since a number of decisions haven't been made yet - mainly what NASA's budget is going to be. We're not excluding any options. No decision has been made, nor will any be made until Congress completes its work and we know where we stand and what we have to work with." Lockheed Space

Operations Co. spokesman J. B. **Klump** acknowledged that "we've been asked to give NASA options to cut costs. Reductions in the work force was among several suggestions." Lockheed, with 6,700 workers, is the biggest employer at KSC. [Brown, FLORIDA TODAY, p. 1A, Aug. 20, 1991.]

TERMINAL COUNTDOWN DEMONSTRATION TEST

Discovery's STS 48 Commander **John Creighton** said, speaking of today's Terminal Countdown Demonstration Test, "It's sort of a dress rehearsal for the real event. It's very similar to the real thing except we don't start the main engines when we get down to T-minus-zero." The TCDT started this morning and will be completed August 20. In the early portion of the test, the crew attended mission briefings participated in training exercises including emergency egress from the launch tower and practicing night landings. The crew also includes Pilot **Ken Reightler** and Mission Specialists **Mark Brown**, **James Buchli** and **Charles "Sam" Gemar**. STS 48 is planned to end in the first ever night landing at Kennedy Space Center. [Halvorson, FLORIDA TODAY, p. 6A, Aug. 20, 1991.]

August 20:

STS 48: PREPARATIONS CONTINUE

The five-member crew of STS 48 made a sharp edge inspection of the payload bay yesterday and were briefed today on emergency escape procedures at the launch pad, slidewire and bunker. The Terminal Countdown Demonstration Test ended at 11 a.m. with a simulated main engine cutoff; the astronauts are expected to return to Houston this afternoon. Preparations are underway to service Discovery with hypergolic propellants; calibration of the inertial measurement units has also begun. The payload bay doors will be closed tonight in preparation for hypergolic loading operations which begin tomorrow. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 20, 1991.]

TIRES REMOVED FROM ATLANTIS

Workers in OPF Bay 2 have removed the tires from the Space Shuttle Atlantis and are scheduled to remove carrier panels and heat shields this week. Other work in progress on the Orbiter includes post-flight (STS 43) inspections of the vehicle, preparations to offload residual hypergolic propellant from the Orbiter's storage tanks, troubleshooting the cabin vent valve, preparations to remove fuel cells no. 2 and 3, inspections of spare fuel cells in preparation for installation and main propulsion system tests. In addition, technicians will be engaged in main engine drying operations, post-flight inspections of the thermal protection system and the removal of payload equipment from the payload bay. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 20, 1991.]

STS 49: ENDEAVOUR PREPARATIONS

A functional test of the payload bay doors of Endeavour is scheduled to occur this week in OPF Bay 1. Work in progress includes: rigging the payload bay doors, preparing the freon coolant loop for servicing, validations of the electrical system,

tests of the main propulsion system gaseous oxygen system, verification of the instrumentation system, checks of all Orbiter systems for first flow processing, test and repair of orbital maneuvering system pods at the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 20, 1991.]

MIXED FLEET MANIFEST ISSUED

Today NASA issued its semi-annual Payload Flight Assignments - NASA Mixed Fleet Manifest, providing the latest schedules for payloads to fly on the Space Shuttle and on expendable launch vehicles (ELVs). The Shuttle schedule for the remainder of 1991 has the Upper Atmosphere Research Satellite mission (STS 49) being accelerated to September 1991 and the Defense Support Program (STS 44) planned in December. In 1992, 8 Shuttle missions are planned. International Microgravity Laboratory-1 (STS 42) will lead off the year, followed by Atlas-1 (STS 45), the Intelsat Reboost mission (STS 49), U.S. Microgravity Laboratory-1 (STS 50), Tether Satellite System/European Retrievable Carrier-1 (STS 46), Spacelab J (STS 47), Laser Geodynamics Satellite II/U.S. Microgravity Payload/CANEX-2 (STS 52), and a DOD mission (STS 53). Highlights in 1992 will include the first flight of the Shuttle Endeavour on STS 49 and the return of Columbia to flight status on STS 50 which is planned to be the first 13 day extended duration mission of the Space Shuttle Program. Several missions in 1992 will feature international collaboration and flights of foreign payload specialists including a European and a Canadian on STS 42, an Italian on STS 46, a Japanese on STS 47 and a Canadian on STS 52. Astro-2 has been added to the manifest in September 1994. This August manifest projects out through Fiscal Year 1997, which ends September 1997. Among the missions planned in that time frame are Shuttle assembly and utilization flights to complete the man-tended configuration of Space Station Freedom and to begin using the facility, a second visit to the Hubble Space Telescope, Atlas-5, Spacelab E-2 and Spacehab-8/U.S. Microgravity Payload-8. Two ELV launches remain in 1991 - the NOAA-1 weather satellite on an Atlas E rocket and the Extreme Ultraviolet Explorer on a Delta II vehicle. Five ELV launches are planned in 1992, including the joint U.S.-Japan Geotail mission in July and the Mars Observer in September. The Expendable Launch Vehicle manifest has been modified by the delay of the GOES I/J missions to December 1992 and August 1993, respectively. The ELV manifest now includes flights through September 1997 (FY 1997). [NASA/KSC Release No. 91-132, Aug. 20, 1991, Halvorson, FLORIDA TODAY, p. 9A, Aug. 21, 1991.]

BUDGET THREAT TO MARS PLAN

Air Force Col. **Frank Stirling** said today that Congress has proposed cutting the $1.2 billion Titan budget request by one-third. "That could pose a serious problem for us if we don't get that money restored," he said. "It would have fairly substantial impact across the program, including our ability to support Mars Observer." The Mars Observer is a NASA program scheduled for a September 1992 launch aboard a Commercial Titan rocket from Launch Complex 40 at Cape Canaveral Air Force Station. LC 40 is the only pad capable of handling the launch and is currently being extensively modified; a budget cut could seriously delay the

renovations, Stirling said. "Right now we're doing everything we can to get Launch Complex 50 on line. It's going to be tight, but we still think we can make it," he said." [Banke, FLORIDA TODAY, p. 9A, Aug. 21, 1991.]

August 22: **DISCOVERY: ONBOARD TANKS FILLED**

At Launch Complex 39A, the Space Shuttle Discovery's onboard storage tanks have been filled with propellants in preparation for its STS 48 mission scheduled for September 12. The reaction control system's storage tanks were loaded with monomethylhydrazine. Oxidizer was loaded into the Orbiter's orbital maneuvering system tanks and hydrazine will be loaded into tanks for the Orbiter's auxiliary power units and for the solid rocket boosters' hydraulic power units. After the propellant loading, the pad was reopened briefly, then closed again for another hazardous operation August 24 when technicians install explosive devices, said Kennedy Space Center spokesman **Bruce Buckingham**. The payload bay doors were closed today at 10:10 a.m. A Launch Readiness Review is scheduled for August 26 and a Flight Readiness Review is scheduled for August 28-29. [Brown, FLORIDA TODAY, p. 8A, Aug. 23, 1991, KSC SHUTTLE STATUS REPORT, 11 p.m., Aug. 22, 1991.]

ATLANTIS: STS 44 PROCESSING

Workers have deserviced freon from Atlantis' freon coolant loop and tests of the radar altimeter and heads up display have also been completed. The auxiliary power units will be deserviced this weekend. Work in progress includes: post-flight inspections of the Orbiter, removing and replacing fuel cells no. 2 and 3 - the old units will be shipped to their manufacturer for analysis while an investigation of the mishap regarding them continues. Also in progress are main propulsion system tests, removal of heat shields, shuttle main engine drying operations and post-flight inspections of the thermal protection system. [KSC SHUTTLE STATUS REPORT, 11 p.m., Aug. 22, 1991.]

STS 49 PROCESSING

A functional test of Endeavour's payload bay doors has been completed; the Orbiter's radiators will be tested next week. Work in progress includes: inspections of the vehicle's radiators, removal and replacement of the potable water lines, preparing the freon coolant loop for servicing, validations of the electrical system, tests of the main propulsion system gaseous oxygen system, verification of the instrumentation system, checks of all orbiter systems for first flow processing and testing and repair of orbital maneuvering system pods at the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 11 p.m., Aug. 22, 1991.]

August 23: **STS 48 STATUS REPORT**

Hypergolic propellants have been loaded into Discovery's onboard storage tanks for the reaction control system and the orbital maneuvering system. Hydrazine

was loaded into tanks for the vehicle's auxiliary power units and for the solid rocket booster's hydraulic power units. Launch Complex 39A will be opened tomorrow morning at 6 a.m. when preparations begin for installing ordnance. Work scheduled includes: the end-to-end testing of the Upper Atmosphere Research Satellite (UARS), the Launch Readiness Review begins August 26. On August 27 a flight readiness test will be conducted to cycle the Orbiter's main engine valves and calibrate engine sensors. A flight readiness review is planned for August 28-29; aft compartment closeouts begin next week. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 23, 1991, Banke, FLORIDA TODAY, p. 7A, Aug. 24, 1991.]

STS 44 STATUS REPORT

Fuel cells number 2 and 3 have been removed from Atlantis and will be shipped to the vendor for analysis and any necessary repair. The heat shields have been removed from around the main engines. Underway is the installation of equipment needed to remove the Orbiter's radiators; post-flight inspections of the vehicle; main propulsion system tests; main engine drying operations and post-flight inspections of the thermal protection system. Scheduled for completion is the deservicing of the auxiliary power units this weekend; removal of the three main engines and the radiators next week. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 23, 1991.]

STS 49: ENDEAVOUR STATUS REPORT

A functional test of Endeavour's payload bay doors has been completed; a functional test of the Orbiter's radiators is scheduled for next week as is the removal of the fuel cell simulators. Inspections of Endeavour's radiators are currently ongoing. Other work in progress includes: removal and replacement of a few of the potable water lines which are located in the middeck below the flooring; preparations to remove the fuel cell simulators; validations of the electrical system; preparing the freon coolant loop for servicing; tests of the main propulsion system gaseous oxygen system; verification of the instrumentation system; repair of the two orbital maneuvering system pods at the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 23, 1991.]

LOCKHEED ANNOUNCES LAYOFFS

The Shuttle Processing Contractor, Lockheed Space Operations Co., announced today that it will begin to layoff 400 workers in two to three weeks. All cuts will be completed by mid-October, according to spokesman J. B. Klump. The exact positions to be eliminated have not yet been determined; that will depend in part on haw many employees choose to leave voluntarily. Klump said, "We don't expect any adverse impact on our ability to meet Shuttle schedules. Orbiter technicians will be minimally impacted." Subcontractors Thiokol Corp., Grumman Corp. and Johnson Controls Inc. will also be impacted. The layoffs are expected to save Kennedy Space Center $15 to $20 million of the $50 million shortfall for the fiscal year beginning in October, said Center Deputy Director Gene Thomas.

"We're not promising there won't be any more layoffs, but we hope this will be the last one we have," he said. "We've been taking this real seriously and it looked like (layoffs) were the only way." He added that with the new OPF ready to open September 1, about 100 jobs would be eliminated there. "We decided to just do it all at once," he said. [Brown, FLORIDA TODAY, p. 12C, Aug. 24, 1991.]

HUMAN RESOURCES & EDUCATION ADMINISTRATOR NAMED

Lieutenant General **Spence (Sam) M. Armstrong** (USAF, Ret.) was named today to the new position of Associate Administrator for Human Resources and Education by NASA Administrator **Richard H. Truly**. Armstrong (Columbia, TN) is a 1956 graduate of the U. S. Naval Academy with a B.S. in engineering; he has an M.S. in astronautical engineering and M.S. in instrumentation engineering from the University of Michigan and has attended Columbia University's Executive Program in Business Administration and the Senior Managers in Government program at Harvard University. Armstrong retired from the Air Force in 1990 after a 34- year career including positions as Vice Commander of the U.S. Air Force Systems Command, Chief, U.S. Military Training Mission to Saudi Arabia, the U.S. Central Command. On retirement, he served as Director, Program Architecture for the Synthesis Group, in support of President Bush's Space Exploration Initiative. Truly said, "This new Associate Administrator will be responsible for developing NASA's human resources strategic plan and for furthering NASA's emphasis on national education goals. I feel very fortunate to have the opportunity to appoint an individual with the extensive qualifications of General Armstrong to this very important position. [NASA/KSC Release No. 91-138, Aug. 23, 1991.]

EXPLORATION ADMINISTRATOR NAMED

Dr. **Michael D. Griffin** was named Associate Administrator for Exploration today by NASA Administrator **Richard H. Truly**. Griffin, in his new position, is expected to provide direction, integration and oversight of activities involving NASA's exploration goals, including program, technical and fiscal management for matters relating to the Office of Exploration. Griffin is currently Deputy for Technology, Strategic Defense Initiative Organization (SDIO), U.S. Department of Defense, responsible for all technical research within the program. He has been awarded the Defense Department's Distinguished Public Service Medal for his key role in defining and technically directing the SDIO "Delta series" of space missions. He has also worked at JPL and Goddard Space Flight Center. Griffin received his B.A. in physics from Johns Hopkins University and master's degrees in Aerospace science from Catholic University, in electrical engineering from the University of Southern California, in applied physics from Johns Hopkins University and in Business Administration from Loyola College of Maryland. He has a Ph. D. in aerospace engineering from the University of Maryland and is a registered engineer in both Maryland and California.In his announcement of Griffin's selection, Administrator Truly said, "NASA is very fortunate to have Mike Griffin on the NASA team. He brings a wealth of knowledge, experience and dedication that will be instrumental in leading NASA's efforts to expand exploration beyond Earth orbit into the solar system." [NASA/KSC Release No. 91-139, Aug. 23, 1991.]

August 24: **NEW LOCKHEED BOSS**

Gerald Oppliger has been named President of Lockheed Space Operations Co. (Titusville, FL) and Program Manager of the Shuttle Processing Contract. "Lockheed is a big corporation, and to think that you were given the job out of all those thousands of people that are out there, it's a big honor," Oppliger said. [Banke, FLORIDA TODAY, pp. 10E & 9E, Aug. 25, 1991.]

August 26: **DISCOVERY LAUNCH PREPARATIONS**

Troubleshooting of software used to check ordnance firing circuitry for Discovery's STS 48 solid rocket boosters has been completed at Launch Complex 39A. Late on the night of August 23, testing failed for the right booster's forward frustrum parachute deploy firing circuit. A change has been made to the software and the test has been rescheduled this week; the launch schedule is not expected to be impacted. Ordnance installation and tests of the firing circuits had been planned for late August 23 and early August 24. The STS 48 Launch Readiness Review begins this afternoon. End-to-end tests of the Upper Atmosphere Research Satellite (UARS) are underway at the pad. In addition, technicians are circulating hydraulic fluid in the Orbiter and testing Discovery's communications system. Scheduled work includes a UARS launch readiness test for August 27; a flight readiness test to cycle the Shuttle's main engine valves and calibrate engine sensors will also take place August 27. Ordnance devices will be installed late on August 28 and aft closeouts will be started as well. The STS 48 Flight Readiness Review begins August 28 and runs through August 29. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 26, 1991.]

ATLANTIS: POST-FLIGHT WORK

Technicians in OPF Bay 2 have drained residual fluid from Atlantis' APU catch bottles and are preparing to remove the right hand radiators for inspections. Other work in progress includes: leak checks of the two newly installed fuel cells; rigging and cycling of the main landing gear doors; removal of auxiliary power unit (APU) no. 1; post-flight inspections of the vehicle; main propulsion system tests; preparations to remove the three Shuttle main engines, scheduled for tomorrow; and post-flight inspections of the thermal protection system. Also scheduled are leak and functional tests of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 26, 1991.]

STS 49/ENDEAVOUR STATUS

The fuel cell simulators have been removed from Endeavour as processing for the newest Shuttle's STS 49 mission continues. The Orbiter's radiators will undergo a functional test this week. In progress are: inspections of the radiators; removal and replacement of several flexible metal potable water lines; preparing the freon coolant loop for servicing; validations of the electrical system; tests of the main propulsion system gaseous oxygen system; verification of the instrumentation

system and repair of the two orbital maneuvering system pods at the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 26, 1991.]

LAUNCH READINESS REVIEW STATEMENT

Kennedy Space Center managers decided that Discovery's STS 48 mission will commence on or about September 12. That decision was made during today's Launch Readiness Review. "The Launch Readiness Review was a smooth one, and there were no significant concerns expressed by either the Discovery or UARS management teams. I hope the Flight Readiness Review will also go as uneventfully, since work at the launch pad [Launch Complex 39A] is essentially going as planned," said **Robert B. Sieck**, Shuttle Launch Director today at the conclusion of the LRR at Kennedy Space Center. A firm date will be set following the Flight Readiness Review scheduled for August 28-29. Meanwhile, prelaunch activities continue at LC 39A where payload technicians will test the 15,000-pound environmental research satellite (UARS) inside the Orbiter's payload bay. "It's a fairly major test for the payload guys. It will be their last major test before launch," said KSC spokesman **George Diller**. A test of the Shuttle main engines will also be conducted; the test will involve cycling engine valves and calibrating main engine sensors. ["Statement Following Launch Readiness Review," Aug. 26, 1991, Halvorson, FLORIDA TODAY, p. 4A, Aug. 27, 1991.]

LIGHTNING PROJECT INJURY

A approximately 1:15 p.m. today, a Mighty Mouse rocket being used in the Rocket Triggered Lightning Program at KSC inadvertently launched, slightly injuring a French electrical engineer from one of the French research teams here for the summer program. Kennedy Space Center spokesman **Karl Kristofferson** said, "He had just finished wiring the rocket and then he took two or three steps away from it, and the rocket just went up." Mr. **Louis Barret** was taken to the Complex 39 Dispensary and then to Parrish Medical Center (Titusville, FL) where his injuries are reported to be minor burns to his left leg. He was treated and released. The accident occurred shortly after final adjustments to the rocket had been made for launch. The rocket was not armed and standard safety procedures were being observed. The rocket landed in the normal impact zone on the east side of Mosquito Lagoon. There were no injuries at the impact site. Two rockets remaining in the launcher and a third in a nearby servicing area are being returned to an ordnance storage facility. A mishap investigation team has been established and is currently gathering data. At this time, the cause of the misfire is unknown. Launches at the Rocket Triggered Lightning Site have been suspended pending the findings of the team, expected to take less than a week. The Rocket Triggered Lightning Program is an annual research project involving several federal agencies, universities and international lightning research teams. The Mighty Mouse Rocket, used in the program, is 2.75 inches in diameter and 4 feet, eight inches long and carries a payload consisting of an airborne field mill (an electric field sensor) and a pressure transducer which is a barometric device. [Rocket Triggered Lightning Program Incident, Aug. 26, 1991, Halvorson, FLORIDA TODAY, p. 5A, Aug. 28, 1991.]

August 27: **DISCOVERY PRE-LAUNCH STATUS**

End-to-end tests of the Upper Research Satellite have been completed; UARS is the primary cargo of Discovery's STS 48 mission. The Orbiter's communications systems have also been tested. A Flight Readiness Test of Discovery's main engines has been conducted; engine valves will be cycled and the sensors will be calibrated. Discovery's flight control system is being tested and the vehicle's aerosurfaces will be positioned for launch. The UARS will be tested for launch readiness. Ordnance will be installed August 28 and the aft closeouts will also begin. On August 30, the astronauts' contingency space suits will be installed and tested in the Orbiter's airlock. The STS 48 Flight Readiness Review begins tomorrow. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 27, 1991.]

STS 44 PROCESSING

Atlantis' freon system has been deserviced and leak and functional tests of the auxiliary power units have been scheduled. Work in progress includes: removal of the main engines; functional testing of the forward reaction control system; preparations to remove the right hand radiators for inspections; inspections of the chin panel; leak checks of the two newly installed fuel cells; rigging and cycling of the main landing gear doors; post-flight inspections of the vehicle and post-flight inspections of the thermal protection system. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 27, 1991.]

APPLIED RESEARCH CONTRACT

Applied Research and Systems Division of Ensco, Inc. (Springfield, VA) has been selected for negotiation of a NASA contract to support weather tracking activities for the Space Shuttle Program at Kennedy Space Center. The new Applied Meteorological Unit (AMU) support contract will be worth $1.4 million; it will begin September 1991 and, with options, could extend through August 1996. The contract calls for supporting and conducting Shuttle weather application studies; supporting the Meteorological Interactive Data Display System (MIDDS) automated network used to track weather; and for the company to analyze, develop and/or evaluate and apply transitioning technology to operational products and systems. Procurement Director **Wes Dean** said the effort will further enhance Shuttle meteorological capabilities. Other bidders for the contract were Aeromet Inc. (Tulsa, OK) and Nyma Inc. (Greenbelt, MD). [KSC Release No. 104-91, Aug. 27, 1991.]

FLIGHT READINESS REVIEW BEGINS

The STS 48 Flight Readiness Review begins tomorrow at Kennedy Space Center and concludes August 29. "We look pretty good for the 12th. There are no major issues or concerns right now," said KSC spokeswoman **Lisa Malone**. A faulty valve has been replaced and will be tested August 29. A readiness test on the UARS payload went off without a problem, said Malone. [Halvorson, FLORIDA TODAY, p. 5A, Aug. 28, 1991.]

August 28: **STS 48 PREPARATIONS**

The flight readiness test of Discovery's main engines has been completed; during the test, the main oxidizer valve and its actuator for engine 2 failed. The valve was removed overnight; the replacement was not expected to have an adverse impact on the launch of STS 48 on September 12. Tests were also completed of the Orbiter's flight control system and the flight readiness of UARS; aerosurfaces were positioned for launch. Work in progress included: replacement of the main oxidizer valve and its actuator on main engine no.2; the Flight Readiness Review began at 8 a.m. and the official launch date and time will be announced at the conclusion of the review. Preparations are underway to install ordnance devices in the Orbiter, external tank and in the tail service masts on the mobile launcher platform; the pad will be closed and the job will be performed overnight. Technicians are charging the batteries on the Upper Atmosphere Research Satellite. A retest of the main oxidizer valve is scheduled for tomorrow; aft closeouts will begin shortly; installation and testing of the contingency space suits in the Orbiter's airlock will occur August 30. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 28, 1991.]

STS 44 PROCESSING

The number 2 main engine of Atlantis has been removed as have the right hand radiators for structural inspections. Workers have begun the following tasks: removal of the main engines; functional testing of the forward reaction control system; inspections of the chin panel; tests of the fuel cells; rigging and cycling of the main landing gear doors; post-flight inspection of the vehicle and its thermal protection system; leak and functional tests of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 28, 1991.]

STS 48 LAUNCH ADVISORY

NASA managers have targeted September 12, 1991, for the launch of Discovery's STS 48 mission and its primary payload, the Upper Atmosphere Research Satellite (UARS). The announcement came at the conclusion of today's Flight Readiness Review at Kennedy Space Center. "We're not working any major problems at the pad and everything looks good. Managers are confident that September 12 is a very achievable launch date," said KSC spokesman **Bruce Buckingham**. The launch window on the 12th opens at 6:57 p.m. EDT and can be extended for approximately 2 1/2 hours. If the launch is postponed the window will open approximately 20 minutes earlier each day. A nighttime landing at KSC is expected at the conclusion of the five-day mission. [STS-48/UARS LAUNCH ADVISORY, 5:30 p.m., Aug. 28, 1991, Banke, FLORIDA TODAY, p. 1A, Aug. 29, 1991.]

August 29: **VALVE TEST RESULTS ANALYZED**

Data from tests on a new liquid oxygen valve on Discovery's main engine no. 2 will be analyzed by engineers at Kennedy Space Center today. The valve allows

liquid oxygen to flow through the engine; it was replaced last week after shown to be faulty by earlier testing. Installation of two space suits - to be used in an emergency by Mission Specialists **Charles "Sam" Gemar** and **James Buchli** in Discovery's airlock will be completed today. KSC spokesman **Bruce Buckingham** said that mission managers were unconcerned about a five-inch crack in an engine compartment steel beam; a repair is planned. [Banke, FLORIDA TODAY, p. 16A, Aug. 30, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 29, 1991.]

STS 48 LAUNCH PREPARATIONS

Ordnance has been installed in Discovery, its external tank and in the tail service masts on the mobile launcher platform. The batteries have been charged on the Upper Atmosphere Research Satellite - main payload for STS 48. Aft compartment closeouts are underway. Work at Launch Complex 39A will be suspended for the Labor Day holiday weekend; afterward a number of activities are planned: continuation of the aft closeouts; purges of the external tank; pressurization of the hypergolic propellant storage tanks; final ordnance activities and payload closeouts. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 29, 1991.]

STS 44 PROCESSING

All three main engines have been removed from Atlantis; the engines are now in the VAB engine hop for post-flight inspections, tests and any needed repairs. The 17-inch disconnect pre-valves have been inspected and a new seal has been installed in the 4-inch hydrogen recirculation line located in the 17-inch disconnect umbilical. Work in progress includes: functional testing of the forward reaction control system; inspections of the chin panel; tests of the fuel cells; rigging and cycling of the main landing gear doors; post-flight inspections of the vehicle; post-flight inspections of the thermal protection system and leak and functional tests of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 29, 1991.]

ENDEAVOUR PROCESSING

Processing work continues on the newest Space Shuttle Endeavour (OV 105) in OPF Bay 1; these activities include: replacement of a floor beam cap in the Orbiter's aft compartment. A five-inch crack was found in this floor cap which provides structural strength for a beam in the small compartment. Additionally, a few of the flexible metal potable water lines were replaced in the vehicle's middeck; the fuel cell simulators were removed. Other tasks include: installation and rigging of the right hand external tank umbilical door; validations of the electrical system; verification of the instrumentation system; installation of thermal control blankets in the midbody; repair of the two orbital maneuvering system pods at the Hypergolic Maintenance Facility; tile operations around the nose landing gear doors. [KSC SHUTTLE STATUS REPORT, 10 a.m., Aug. 29, 1991.]

August 30: **FEES FOR PLAYALINDA?**

Entrance fees for access to Playalinda Beach may be in the offing if Canaveral National Seashore Superintendent **Wendell Simpson** has his way. Simpson contends that without more money, the park service will be hard pressed to protect the beaches, ancient Indian sites and beach visitors and their property. The park service has nine rangers. He said, "Without fees, it will be hard to maintain the level of service we currently have, which is not adequate." He is proposing that residents of Brevard, Orange and Volusia Counties pay a $10 annual fee and that others would pay $3 per car per visit. [Fiorini, FLORIDA TODAY, pp. 1A-2A, Aug. 31, 1991.]

STS 48 PRE-LAUNCH PREPARATIONS

The replaced actuator valve on engine no. 2 failed three of five retests; the valve exceeded specifications margins in each case and a decision was made to replace this unit. Work in progress includes: removal and replacement of the main oxidizer valve on engine no. 2; battery conditioning of the Upper Atmosphere Research Satellite; loading of computer mass memory units; closeouts of the aft compartment. Scheduled work includes: retests of the newly installed actuator valve on engine no. 2 and final tile inspections. Launch remains planned for September 12, 1991. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 30, 1991.]

ATLANTIS PROCESSING

Leak and functional tests of Atlantis' auxiliary power units have been completed in preparation for the Orbiter's next mission, STS 44. Checkouts of flutter buffers (accelerometers) and the vehicle's forward reaction control system functional test have been completed also. Post-flight (STS 43) inspections of the vehicle and its thermal protection system are underway as are checkouts of the chin panel. [KSC SHUTTLE STATUS REPORT, 11 a.m., Aug. 30, 1991.]

TREKKERS BEAMED TO KSC

"This is like stepping back in time and seeing where we came from," commented **Nichelle Nichols** during the visit she made with fellow Star Trek cast members **George Takei** and **James Doohan** to Kennedy Space Center. The three were in Central Florida for a convention marking the 25th anniversary of the beginning of the Star Trek television series. Nichols, who played communications officer Lt. Uhuru has worked for NASA in minority recruitment, and Doohan. who played chief engineer Scott, have visited KSC often, but this was a first for George Takei who played Sulu on the series. "It was frightening to be in the control center," Takei said. "With all those buttons and blinkers, and to know that if I touched something, something would happen." He said the opposite was true on the bridge of the USS Enterprise. The cast members also met astronauts **Curt Brown**, **Rick Searfoss** and **Dave Wolf**. [Banke, FLORIDA TODAY, p. 1A, Aug. 31, 1991.]

SECOND VALVE REPLACEMENT ON DISCOVERY

Discovery's liquid oxygen valve replacement on engine no. 2 was replaced itself when it failed a test August 27, according to KSC spokesman **Mitch Varnes.** "Once that valve passes its test, those workers should be able to take the rest of the weekend of," Varnes said. "We see no problem in catching up, and we're still looking good for a September 12 launch," he said. [Banke, FLORIDA TODAY, p. 4A, Aug. 31, 1991.]

SEPTEMBER

September 1: HOLIDAY FOR KSC WORKERS

No work is scheduled upon any of the three resident Space Shuttles at KSC today; all three are powered down for the Labor Day holiday. The only workers on duty today are safety and security personnel. The first order of business for pad workers tomorrow, however, is the replacement, again, of the liquid oxygen valve on Discovery's no. 2 main engine. The first replacement valve failed tests for leaks. The second replacement will be tested September 2, according to KSC spokesman **Mitch Varnes**. [Banke, FLORIDA TODAY, p. 1A, Sept. 2, 1991.]

September 3: NEW OPF OPENED

"We believe the work force is going to consider it Cadillac of OPFs," said **Walter Murphy**, Kennedy Space Center's Director of Engineering Development today as the space center's new $170 million OPF was officially opened. Lockheed's **Ken Geller** described the new facility as being identical in size to KSC's other two processing facilities, but the new high bay utilizes modernized systems, more efficient work platforms and a brighter work environment. Center Director **Forrest S. McCartney** said, "What we have here today is an example of ingenuity, and looking to see how you can really recycle things, if you will, to the ultimate. This is the most modern processing facility we have, and one that should serve this nation well in the years ahead." Discovery, on its return from the STS 48 mission, will be the first Orbiter to use the new facility. The new OPF was formerly named the Orbiter Maintenance and Refurbishment Facility and is located just north of the Vehicle Assembly Building in the Launch Complex 39 area. The basic structure, completed in 1987, has been used primarily for offline Orbiter inspection, modification and repair work. In 1988, upgrade to full OPF flight processing status was targeted for early September 1991. "We had a good team that worked together smoothly and made it happen," said Design Engineering's **Jim Bean**, Bay 3 Project Manager. Bean said, "About $114 million in portable ground support equipment (GSE) already on hand is shared between all three OPF bays, leaving us about $16 billion worth of GSE we had to purchase outright. The rest came when Shuttle activities were curtailed unexpectedly at Vandenberg Air Force Base in California. We ended up with $40 million worth of GSE equipment that would have cost considerably more if purchased today." Other Shuttle-unique equipment was also shipped from California to Kennedy Space Center. [Banke, FLORIDA TODAY, p. 1A, Sept. 4, 1991, NASA/KSC News Release No. 105-91, Aug. 30, 1991.]

STS 48 PRELAUNCH STATUS

Replacement of the second main oxidizer valve on the no. 2 main engine of Discovery has been completed; the flight readiness test of the no. 2 main engine was successful. The two contingency space suits have been installed and tested. Work in progress includes: the helium signature leak test of the no. 2 main engine; launch countdown preparations; closeouts of the aft compartment;

preparations of the payload for flight; stowing equipment in the crew cabin; cleaning and inspecting the radiators and final thermal protection system inspections. Scheduled work includes: purges of the external tank; pressurization of the hypergolic propellant storage tanks; purging of the power reactant storage and distribution system tanks. The STS 48 crew is expected to arrive at Kennedy Space Center at 7:30 p.m. on September 9. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 3, 1991.]

STS 44: ATLANTIS PREPARATIONS

Functional tests of Atlantis' forward reaction control system have been completed. Preparations have begun to: replace a thruster on the left orbital maneuvering system pod; replace of the auxiliary power unit water valve; rigging of the main landing gear doors; inspect payload bay door nut plates; functional testing of the payload bay doors; inspect the main propulsion system lines; service the ammonia boiler. Scheduled work includes tests of the power reactant storage and distribution system and installation of the three main engines. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 3, 1991.]

September 4: DISCOVERY'S ORDNANCE LOADED

Launch Complex 39A will be closed today to all but essential personnel for the installation of explosive devices aboard Discovery; the vehicle's onboard fuel tanks will also be pressurized. Operations began at 4 a.m., according to KSC spokesman **Bruce Buckingham**. The helium signature leak test of the three main engines has been completed. Leak checks of the main engine seals have also been completed. Work in progress includes purges of the external tank as a conditioner prior to loading of propellants during the countdown. The power reactant storage and distribution system tanks will be purged September 6. The three-day launch countdown begins at 5 p.m. September 9. The crew arrives at Kennedy Space Center about 9:30 on the 9th. The five-member crew includes Commander **John Creighton**, Pilot **Kenneth Reightler** and Mission Specialists **Mark Brown, Charles "Sam" Gemar** and **James Buchli**. The launch window for the September 12 launch extends from 6:57 p.m. until 9:54 p.m. [Banke, FLORIDA TODAY, p. 5A, Sept. 5, 1991, KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 4, 1991.]

OPF BAY 2: ATLANTIS PROCESSING

In Orbiter Processing Facility Bay 2, the Space Shuttle Atlantis had a thruster replaced on the left orbital maneuvering system pod and the Orbiter's payload bay doors were opened. Functional tests of the vehicle's power reactant storage and distribution system have begun; other tasks have begun as well: replacement of the auxiliary power unit water valve; rigging the main landing gear doors; inspections of the main propulsion system lines; repair of a crack in the chin panel at the vendor; electrical checks of the main propulsion system. Atlantis' three main engines will be installed next week. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 4, 1991.]

OPF BAY 1: ENDEAVOUR PROCESSING

The Space Shuttle Endeavour remains in Orbiter Processing Facility Bay 1 where the pressure test of its no. 1 freon coolant loop has been completed; the controller for auxiliary power unit no. 2 has also been installed. A functional test of the Orbiter's radiators has been scheduled for this week. Work in progress on Endeavour includes: preparations to install the right hand external tank door; replacement of an intercostal beam cap in the aft compartment; installation of the new general purpose computers; replacement of potable water lines in the middeck; rigging the radiators, preparing the freon coolant loop for servicing; test and repair of the two orbital maneuvering system pods at the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 4, 1991.]

September 5: DISCOVERY STATUS

The final installation and connection of ordnance devices have been completed on the Space Shuttle Discovery; purges of the Orbiter's external tank have also been completed. Work in progress on Discovery includes: pressurization of the hypergolic propellant system storage tanks for flight; tests of ordnance firing circuits; launch countdown preparations; closeouts of the avionics bays in the aft compartment; preparing the payload for flight; stowing equipment in the crew cabin. Work scheduled includes the purging of the power reactant storage and distribution system tanks. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 5, 1991, Banke, FLORIDA TODAY, p. 2A, Sept. 6, 1991.]

September 6: DISCOVERY LEAK IMPACT

"Our operations people are optimistic. They've seen this situation before and have been able to fix it. But they're not going to uncross their fingers yet," said Kennedy Space Center spokesman **Bruce Buckingham** about a leak found in Discovery's in-orbit steering system. "We need it to keep the system safe. We've flown with that type of configuration before." The valve is in a helium line which clears propellants in the steering thrusters. Buckingham conceded the possibility that in a worst-case scenario the liftoff might be delayed for several weeks while Discovery is rolled back to the VAB for repairs. [Brown, FLORIDA TODAY, p. 1A, Sept. 7, 1991.]

DISCOVERY: PRE-LAUNCH OPERATIONS

Ordnance devices have been installed on Discovery and tested in preparation for its September 12 STS 48 launch. The hypergolic propellant system storage tanks have been pressurized for flight and the solid rocket booster forward skirts have been closed out. Among those tasks still in progress are: purges of the power reactant storage and distribution system tanks; checks of a helium regulator on the right reaction control system; flushing and sampling of the crew's potable water supply and closeouts of the aft compartment. Technicians working on Discovery at Launch Complex 39A are circulating helium through the Cryogenic Limb Array Etalon Spectrometer (CLAES) on the Upper Atmosphere Research

Satellite. This process, which began last night, will cool the instrument down for launch. Helium circulation will continue through September 8; closeouts of the aft compartment are also scheduled for the 8th. The countdown is scheduled to begin at 5 p.m. EDT, September 9 and the flight crew arrives the same evening at 9:30. Launch remains scheduled for 6:57 p.m. EDT on September 12. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 6, 1991.]

ATLANTIS PROCESSING

Atlantis' Processing work in behalf of STS 44 continues with the installation of the vehicle's radiators, main landing gear brakes, wheel and tire assemblies. Technicians are replacing the water valves for the auxiliary power units, servicing the ammonia boiler and are undertaking functional tests of the power reactant storage and distribution system. They are also installing thermal blankets in the Orbiter and will be installing the three main engines next week. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 6, 1991.]

ENDEAVOUR PROCESSING

Work continues in the processing of OV 105 (Endeavour). Tasks include: preparations to install the right hand external tank door; replacement of an intercostal beam cap in the aft compartment; installation of the new general purpose computers; replacement of potable water lines in the Orbiter middeck; rigging the radiators; drying the freon coolant loop in preparation for servicing; test and repair of the two orbital maneuvering system pods at the Hypergolic Maintenance Facility. A functional test of the Orbiter's radiators is scheduled for this week. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 6, 1991.]

September 7: LAUNCH PLANS PROCEED DESPITE LEAK

"Right now we think it'll be OK for flight, but they still want to gather some more data," said Kennedy Space Center spokeswoman **Lisa Malone** concerning the impact of a leak discovered in the orbital steering system. Plans to launch the Shuttle continue while technicians study the leak. "The leak has not gotten any worse, and the engineers think they understand how it's behaving, so they can manage it," Malone said. A landing at Kennedy Space Center is planned for September 18 at 1:55 a.m. [Brown, FLORIDA TODAY, p. 1A, Sept. 8, 1991, Date, THE ORLANDO SENTINEL, Sept. 8, 1991, "NASA Prepares for Launch, Looks for Bugs," THE ORLANDO SENTINEL, Sept. 8, 1991.]

September 9: DISCOVERY COUNTDOWN TO START

Countdown for the STS 48 mission begins today at 5 p.m. Kennedy Space Center spokeswoman **Lisa Malone** said, "Everything's going smoothly." Engineers will recheck a helium line which is part of Discovery's onboard steering system; if a leak reappears, the problem is not expected to affect the launch because an alternate line can be used, said Malone. The five-member crew of Commander **John Creighton**, Pilot **Ken Reightler** and Mission Specialists **James Buchli, Charles**

"Sam" Gemar and **Mark Brown** is expected to arrive tonight at 9:30 p.m. The payload bay doors will be shut tomorrow morning. [Brown, FLORIDA TODAY, p. 1A, Sept. 9, 1991.]

DISCOVERY PASSES LEAK TEST

The countdown to the launch of Discovery's STS 48 mission will continue uninterrupted; the Orbiter passed a crucial steering system leak test today. Tests over the weekend showed that the leak was so small as to present no significant problem, according to NASA Test Director **Mike Leinbach**. "Once the leak rate was quantified, everyone was happy," said Leinbach, noting that Columbia had flown in 1990 with a similar leak. When Discovery's crew arrived at Kennedy Space Center at 9:30 p.m., Commander **John Creighton** said, "It's been a long training period, and we feel ready to go. Now it's time to go do it for real." If the launch goes on time at 6:57 p.m. September 12, the landing at KSC is expected to occur at 1:55 a.m. on September 18. [Halvorson and Banke, FLORIDA TODAY, p. 1A, Sept. 10, 1991.]

September 10:

LAUNCH MINUS 2 DAYS

The overall probability of having acceptable weather conditions at T minus zero is 70 percent. For the duration of the window - 6:57 p.m. until 9:54 p.m. EDT - the chance of having acceptable weather is 80 percent. Loading of liquid oxygen and liquid hydrogen reactants into the Orbiter's onboard fuel cell storage tanks begins this afternoon and will complete this evening. The rotating service structure will be moved to the launch position at 5 p.m. September 11. Loading propellants into the external tank begins at 10:37 a.m. September 12. "Our status looks pretty good and we're looking forward to a good launch," said **Roelof Schuiling**, the Kennedy Space Center manager in charge of preparing the Upper Atmosphere Research Satellite for launch. Discovery's payload bay doors were closed for flight at 4:26 a.m. today. Tests and calibrations of leak detectors in the hazardous gas detection system in the mobile launcher platform were completed. Routine pre-countdown inspections of the Orbiter performed by safety and engineering personnel. The right hand reaction control system was pressurized for flight. The known helium leak in this system has been determined to be acceptable for flight; the leak is being managed with the reaction control system helium isolation valves. Today, STS 48 Commander **John Creighton** and Pilot **Mike Baker**, who is not a member of the STS 48 crew, are practicing approaches to the Shuttle Landing Facility in the Shuttle Training Aircraft. Forecasters predict a 70 to 80 percent chance the weather will be acceptable for launch with the possibility of thunderstorms the only concern. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 10, 1991, Banke, FLORIDA TODAY, p. 2A, Sept. 11, 1991.]

STS 44 PROCESSING: ATLANTIS

Work in progress on Atlantis for its STS 44 mission includes: connection of the Shuttle's no. 1 and 2 main engines; fill and bleed of the brakes; installation of the brakes; tests of the power reactant storage and distribution system; repair of a

crack in the chin panel at the vendor; installation of thermal blankets in the Orbiter. Scheduled work includes: installation of main engine no. 3 later this week and replacement of a leaking check valve in the main propulsion system. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 10, 1991.]

PUBLIC INVITED TO LAUNCH

Visitors at Kennedy Space Center's Spaceport USA on September 12 will be able to stay for the launch at 6:57 p.m. and for $6.00 will be transported to the NASA Causeway Shuttle Viewing Site on the Banana River. The catch is, those persons wishing to stay for the launch must be at Spaceport USA by noon when KSC security will close the main gates to the space center. "At that time, anyone on the property at Spaceport USA will be allowed to stay," according to Spaceport spokesman **Tom Blair**. [Banke, FLORIDA TODAY, p. 1A, Sept. 11, 1991.]

September 12:

DISCOVERY ROARS OFF PAD

"It was definitely the loudest one I've ever heard. And it was bright; it hurt my eyes," said Kennedy Space Center spokesman **Bruce Buckingham** about the launch at 7:11 p.m. today of STS 48. Discovery reached an orbital height of 336 miles above the earth about nine minutes after launch. The launch was delayed for 14 minutes to check a vital radio link between Discovery and Johnson Space Center's Mission Control. Launch Director **Robert B. Sieck** commenting on the liftoff said, "We enjoyed a smooth launch count, but then we had the proverbial glitch in a ground-system circuit." The mission, NASA's 43 Shuttle flight, is commanded by **John Creighton** and piloted by space rookie **Ken Reightler**. The Mission Specialists aboard include: **James Buchli, Charles "Sam" Gemar** and **Mark Brown**. [Brown, FLORIDA TODAY, p. 1A, Sept. 13, 1991, Date, THE ORLANDO SENTINEL, pp. A-1 +, Sept. 13, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 13, 1991.]

REPAIRS MAY DELAY ATLANTIS LAUNCH

Repairs to a heat-absorbing panel on the Space Shuttle Atlantis might delay its STS 44 mission until after Thanksgiving. Launch Director **Robert B. Sieck** said today that it would be difficult for Atlantis to be ready in time for its projected November 19 liftoff. "Our goal is to launch before Thanksgiving, but we'll see," he said. "We haven't given up on launching before December." The panel in question was shipped to its manufacturer and is expected to be returned to KSC this weekend. [Halvorson, FLORIDA TODAY, p. 4A, Sept. 13, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 13, 1991.]

September 13:

AMF SUED BY BUILDER

Industrial Steel Inc. (Mims, FL) which helped construct the Astronauts Memorial at Spaceport USA is suing two contractors, a bonding agency and the Astronaut Memorial Foundation. The company is seeking money it claims it is owed. **David Walsh**, speaking in behalf of the AMF said, "We shouldn't even be a part of this

suit. It's between the general contractor [VSL Corporation (CA)] and subcontractors, in a domino fashion." [Brown, FLORIDA TODAY, p. 3B, Sept. 14, 1991.]

ATLANTIS PROCESSING: OPF BAY 2

The third Shuttle main engine has been installed on Atlantis; the waste containment system, main wheels and tire assembly have also been installed. The mating of the left aft center solid rocket booster segment is also complete. Work in progress includes: orbital maneuvering system and reaction control system functional tests; auxiliary power unit water valve installation; Shuttle main engine electrical mates. Further work has been scheduled for Atlantis' STS 44 processing: the chin panel is due to arrive at KSC tomorrow with fit checks of the panel this weekend; service freon coolant loop; engine heat shield installation; left forward center solid rocket booster segment mates. [KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 13, 1991.]

ENDEAVOUR PROCESSING: STS 49

Endeavour's external tank leak checks have been completed in Orbiter Processing Facility High Bay 1. Technicians are currently running Shuttle main engine checks and main propulsion system checks. They are installing thermal protection system blankets and performing power reactant and storage distribution tank checks. The external tank is scheduled to be pressurized. [KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 13, 1991.]

TITUSVILLE TO LIGHT LANDING

The mayor of Titusville, FL, has asked the residents of his city to leave its porch lights on September 18 as an aid to the night landing of the Space Shuttle Discovery. The first-ever night landing is to occur at Kennedy Space Center at 2:09 a.m. The porch light idea came from **Bobbie Carlson**, wife of **Norm Carlson**, NASA Deputy Director of Launch operations. The mayor of Titusville is **Tom Mariani** who is employed at KSC in Payload Operations. ["Titusville Shines," FLORIDA TODAY, p. 1A, Sept. 14, 1991.]

PAD DAMAGE NORMAL, BOOSTERS RECOVERED

"We didn't find anything that doesn't usually come with a launch," said KSC spokesman **George Diller** concerning damage to Launch Complex 39A following Discovery's liftoff September 12. Damage included burned wiring, singed metal and a few broken light bulbs; this was considered minor. Discovery's two solid rocket boosters were recovered at sea by the ships Liberty Star and Freedom Star and are expected to be towed back to Port Canaveral for an 8:45 a.m. arrival tomorrow. Preliminary inspections of the boosters at sea revealed no problems, according to Diller. [Banke, FLORIDA TODAY, p. 2A, Sept. 14, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 13, 1991.]

September 14: LC 34 CLEANED BY VOLUNTEERS

A group of volunteers numbering more than 400 cleared debris from a mile-long stretch of beach at Cape Canaveral Air Force Station while NASA Administrator **Richard Truly** and former Apollo astronaut **Tom Stafford** helped rededicate the Apollo 1 launch site at Launch Complex 34. LC 34 is the pad where AS 204 astronauts **Ed White, Roger Chaffee** and **Virgil "Gus" Grissom** died in a fire during a test there. On hand for the cleanup besides Truly and Stafford were U. S. Representative **Jim Bacchus**, Spaceport Florida Executive Director **Ed O'Connor** and Kennedy Space Center Director **Forrest S. McCartney**. The group planted three small oak trees near the site of the January 27, 1967, fire. Bacchus said, "I think it's been a moving experience for all of us who turned out today and a reminder of the fact that we need to rebuild the launch infrastructure to better compete with Japanese and European space agencies. The trees will serve as a living memorial [to White, Chaffee and Grissom]. [Rowe, FLORIDA TODAY, p. 1A, Sept. 15, 1991.]

RUNWAY PAVING FINISHED

Goodson Paving Inc. (Sharpes, FL) finished its runway paving job at Kennedy Space Center in 13 days, instead of the 72 days which had been allotted for the company to pave extra runway space on the Shuttle Landing Facility. **Kim Fortier**, the company's vice president, said, "The contract administrator asked 'could we push?' and we pushed." **T. K. Gwin**, Shuttle Landing Facility Operations Manager, said, "With the type of aircraft operations that we've had, it seemed feasible to work on both ends of the runway at the same time. Everybody was very willing to do everything it took to get it done." **Brewster Shaw**, NASA's Deputy Director for Shuttle Operations, said, that the lengthened overruns "are just there for insurance. Now we have better insurance." [Banke, (FLORIDA TODAY, p. 10E, Sept. 15, 1991.]

ITALIAN SPACECRAFT TECHNICIANS

This week a team of some 24 Italian engineers will arrive at Kennedy Space Center to help assemble a spacecraft which is a September 1992 Atlantis payload. The engineers are employees of the Italian satellite contractor Alenia; their satellite will be part of the Tethered Satellite System. The engineers will participate in the electronic integration of the satellite into a support assembly which will remain in the cargo bay during the seven-day mission. KSC spokesman **George Diller** said, "The whole thing has been very challenging electrically because there is so much wiring associated with the system." [Halvorson, FLORIDA TODAY, Sept. 15, 1991.]

September 16: DISCOVERY TO LAND AT KSC

The Space Shuttle Discovery is expected to conclude its STS 48 mission by coming from the north over Jacksonville, FL, shortly before 2 a.m. September 18; it will pass over St. Augustine, Daytona Beach and Titusville and land at KSC about 2:06 a.m. A second landing opportunity at the SLF is at 3:38 a.m. KSC

spokesman **Bruce Buckingham** said, "Brevardians won't see anything, but they will hear the sonic booms. If they're watching NASA Select television, they'll see the Orbiter coming in on infrared camera. It'll look like a negative image with hot spots from re-entry. The hot spots will show up in white." Buckingham also noted that "there's a slight chance of light, patchy ground fog, but that shouldn't present a problem." Shuttle Program Director **Robert L. Crippen** added, "We normally prefer to go when we can land in the daylight. But we have demonstrated several times that we can land very well at night."

Kennedy Space Center's Shuttle Landing Facility was constructed in 1975. It is 300 feet wide and 15,000 feet long with 1,000 foot overruns at each end. (See story above.) The strip runs northwest to southeast. It is located about 3 miles northwest of the Vehicle Assembly Building. Until Atlantis landed at KSC last month, the prime landing site had been Edwards Air Force Base, CA. Discovery's landing on the 18th will be the ninth at KSC in the 10-year history of the Space Shuttle Program. Previous landings at the space center are noted in the following chart:

SHUTTLE LANDINGS AT KSC

Mission	Orbiter	Landing Date
STS 41-B	Challenger	February 11, 1984
STS 41-G	Challenger	October 13, 1984
STS 51-A	Discovery	November 16, 1991
STS 51-C	Discovery	January 27, 1985
STS 51-D	Discovery	April 19, 1985
STS 38	Atlantis	November 20, 1990
STS 39	Discovery	May 6, 1991
STS 43	Atlantis	August 11, 1991

There are a number of general weather restrictions which apply for a landing at Kennedy Space Center to take place:

*Surface winds must be less than 20 knots in any direction, and less than 12 knots for crosswinds;

*The ceiling must be greater than 10,000 feet. For scattered clouds below 10,000 feet, cloud cover must be observed to be less than 20 percent at the deorbit burn go/no go decision time;

*Visibility must be seven miles or greater;

*There can be no precipitation at the surface or aloft in the proximity of the Orbiter;

*Thunderstorms, rain or the potential for lightning cannot be within 30 nautical miles of the landing site;

*Vertical cloud clearance at the 30 nautical mile range, must be greater than 2 nautical miles.

[Halvorson, FLORIDA TODAY, p. 1A, Sept. 17, 1991, Buckingham, NASA/KSC RELEASE NO. 113-91, Sept. 16, 1991, Date, THE ORLANDO SENTINEL, Sept. 18, 1991.]

September 17: **LANDING WEATHER FORECAST**

Kennedy Space Center spokesman **George Diller** provided a forecast of the expected weather for Discovery's landing tomorrow morning at 2:06 a.m. The temperature is expected to be 77 degrees; wind variable at 3 knots. Scattered clouds are expected at 2,500 feet with visibility for seven miles. There is a chance of patchy ground fog. [NOAA Space Flight Meteorology Group, JSC, 3 p.m., September 17, 1991.]

September 18: **DISCOVERY LANDS AT EDWARDS**

Cloudy skies and a threat of rain necessitated a searchlight-illuminated landing at Edwards Air Force Base, CA, for the Space Shuttle Discovery at the conclusion of its STS 48 mission early this morning; the landing was at 3:38 a.m. It was the fifth night landing in California. After the attempt to land at Kennedy Space Center was scrapped, Discovery made an extra orbit and crossed the Pacific Ocean and over land near Newport, OR. Six hours after the landing, the STS 48 crew flew to Houston, where a group of 50 people greeted them on arrival. Rookie Pilot **Ken Reightler** enthused about the mission saying, "That was a most excellent adventure." Mission Specialist **James Buchli** added, "We really had a ball." Shuttle Program Director **Robert L. Crippen** said, "The weather [in Florida] was just dynamic enough that we were not comfortable with it, and consequently we landed some place that we were comfortable with. All in all, it was a super flight. I'm proud of the way the team executed it." The Orbiter underwent preliminary inspections at Edwards at NASA Test Director **Eric Redding** said, "It looked very good." The Shuttle's tires, brakes and heat protection tiles held up well. Redding said that technicians in California will now concentrate on getting the Orbiter ready for its cross-country ferry ride to Florida. The next Space Shuttle mission will be STS 44 with Atlantis and is expected to come in late November. [Banke, FLORIDA TODAY, p. 1A, Sept. 19, 1991, "Shuttle Lands," USA TODAY, p. 3A, Sept. 19, 1991, "Weather Diverts Shuttle to Landing in California," THE NEW YORK TIMES, p. 12A, Sept. 19, 1991.]

September 19: **DISCOVERY: STATUS REPORT**

Discovery appears to be in good shape following the STS 48 flight. The Orbiter rolled out a distance of 8,790 feet from its touchdown point on concrete Runway 22 at Edwards Air Force Base. The total mission elapsed time for STS 48 was 5

days, 8 hours and 27 minutes. KSC's landing and recovery teams are in California preparing Discovery for the return trip to Florida. The cross-country ferry flight is scheduled to begin early September 24. Pending favorable weather conditions, a one-day ferry flight is possible. The Orbiter has been towed to the Mate Demate Device and ground cooling has been established to the vehicle. Post-flight work on the two boosters is continuing at Hangar AF at the Cape Canaveral Air Force Station. Hydrolasing activities have been completed to remove the exterior foam and cork. The safe and arm devices have been removed. Today, technicians are removing the nozzle on the right booster and removing the external tank attach ring on the left booster. The left nozzle has already been removed. Stiffener rings are being removed from the left booster. Disassembly of the boosters is scheduled to begin this weekend. [KSC SHUTTLE STATUS REPORT, Sept. 19, 1991, Date, THE ORLANDO SENTINEL, Sept. 19, 1991.]

ATLANTIS IN OPF BAY 2

Work in progress on Atlantis for its STS 44 mission in November includes: functional tests of the radiators, preparations to service the freon coolant loop system, removal of window no. 5 (pilot's window) because of a ding, tests of the external tank door latches, functional testing of the orbital maneuvering system (OMS) and reaction control system, thermal protection system operations around the external tank doors and nose landing gear doors, functional testing of the waste containment system and work to ready the chin panel for installation. Scheduled work includes: functional testing of the external tank doors and servicing of the Orbiter's cooling system with freon by the end of the week. [KSC SHUTTLE STATUS REPORT, Sept. 19, 1991.]

ENDEAVOUR STATUS REPORT

The newest Space Shuttle, Endeavour (OV 105) continues to undergo processing for its first mission STS 49 in OPF Bay 1. That work includes: preparations to install the remote manipulator system, installation of the fuel cells, leak and functional tests of the ammonia system, repair of the intercostal beam in the aft compartment, installation of thermal control blankets in the midbody, inspections of struts in the midbody and main propulsion system work. Scheduled work includes: a flush of the orbital maneuvering system crossfeed system, inspections of the radiators, servicing the Orbiter's cooling system with freon this week and installation of the robot arm (RMS). [KSC SHUTTLE STATUS REPORT, Sept. 19, 1991.]

CALIFORNIA BOUND

Technicians gathered today at Edwards Air Force Base to prepare Discovery for its ferry-flight back to Kennedy Space Center. The team included nearly 200 workers from KSC. **Chris Fairey**, NASA manager in charge of preparing Discovery for both launch and landing, said that initial inspections showed Discovery to be in excellent shape. More detailed inspection results will be released tomorrow, he

said. Hardware problems which required post-flight attention included a false alarm from a smoke detector, two faulty readings from instrumentation and a leaky water valve. Fairey said, "They will require a little bit of troubleshooting but all of those are really something we can handle without any problems." [Banke, FLORIDA TODAY, p. 2A, Sept. 20, 1991.]

September 20: **DISCOVERY: PREPARING TO FERRY**

Discovery, still at Edwards Air Force Base after its September 18 landing in California, has been transferred to ground power and the fuel cells are in the cool-down process. Residual propellants will be offloaded tomorrow. The external tank ferry flight doors are being rigged. Bearings in the main engine high pressure pumps have been dried. Post-flight inspections are continuing. Shuttle engineers report that Discovery's tiles sustained average damage during its STS 48 mission.

Post-flight work continues on the two solid rocket boosters now at Hangar AF at the Cape Canaveral Air Force Station. Technicians are scheduled to remove the right forward skirt today. Both nozzles have been removed; the external tank attach ring and stiffener rings on the left booster have been removed. Disassembly of the boosters is scheduled to begin this weekend. Mobile launcher platform no. 3 was brought back from Launch Complex 39A to the Vehicle Assembly Building yesterday; the platform will be prepared to stack boosters for the next Shuttle mission, STS 44 with Atlantis in November. [KSC SHUTTLE STATUS REPORT, Sept. 20, 1991.]

STS 44 PREPARATIONS

Technicians in Orbiter Processing Facility Bay 2 have completed tests of the external tank door latches for the STS 44 configuration; they have also finished the functional testing of the radiators, removed window no. 5 and completed functional tests of the waste containment system of Atlantis. Work in progress includes: removing the brake module; preparations to service the freon coolant loop system; functional tests of the orbital maneuvering system (OMS) and reaction control system; thermal protection system operations around the external tank doors and nose landing gear doors and the installation of instrumentation and wiring on the chin panel. Scheduled work includes a functional test of the external tank doors and servicing of the coolant system by the end of the week. [KSC SHUTTLE STATUS REPORT, Sept. 20, 1991.]

ENDEAVOUR PROCESSING/STS 49

Main propulsion system helium tank leak checks and installation of the left external tank door have been completed for the STS 49 mission of Endeavour. Technicians in OPF Bay 1 are rigging the left hand external tank door, preparing to install the remote manipulator system, installing the fuel cells, conducting leak and functional tests of the ammonia system, installing thermal control blankets in the Orbiter's midbody, inspecting midbody struts and continuing main propulsion

system work. Workers are scheduled to flush the orbital maneuvering system crossfeed system this weekend and will be inspecting the vehicle's radiators, servicing its cooling system with freon and installing the robot arm. [KSC SHUTTLE STATUS REPORT, Sept. 20, 1991.]

LOCKHEED LAYS OFF 300

Lockheed Space Operations, prime contractor for Space Shuttle processing today informed 300 of its Kennedy Space Center workers that they will be laid off in two weeks. Two reasons were cited for the layoffs: expected NASA budget cutbacks and the completed renovation of the third Orbiter Processing Facility which was formerly the Orbiter Refurbishment and Maintenance Facility. Lockheed subcontractors Thiokol Corp., Grumman Corp. and Johnson Controls Inc. were expected to experience another 100 layoffs. The employee reductions were expected to save KSC approximately $20 million a year. [Liden and Brown, FLORIDA TODAY, p. Sept. 21, 1991.]

September 21:

SPACE FLIGHT DEVELOPMENT

The Office of Space Flight Development has been created by NASA to oversee the development of large propulsion systems, an advanced main engine and advanced space transportation systems. Administrator **Richard H. Truly** said the new office will allow the current Office of Space Flight "to devote undivided attention to the safety and efficiency of space flight operation;" the office will retain responsibility for the Space Shuttle Program, space station and Spacelab operations and utilization, expendable launch vehicle operations and upper stages. A new associate administrator will be appointed to head the newly created office. The decision to create the new office was shared with former Chairman **Norman Augustine** and the individuals who served on the Advisory Committee on the Future of the U.S. Space Program, gathered at Kennedy Space Center. ["NASA Creates New Office," FLORIDA TODAY, p. 10E, Sept. 22, 1991.]

MORGAN WINS SNOOPY AWARD

USBI Co. Project Planner **William Oscar Morgan Jr.** was presented NASA's Manned Flight Awareness "Silver Snoopy" award recently by astronaut **G. David Low.** "Your technical expertise," said Low at the presentation, "and attention to detail had proven invaluable in ensuring astronaut safety and mission success. Those of us who are astronauts thank you for the continued and outstanding support you have given us through your work." ["USBI Co. Planner Wins Silver Snoopy," FLORIDA TODAY, Sept. 22, 1991.]

NOV. 19: NO GO FOR ATLANTIS

"We know we won't be able to make Nov. 19 [for the launch of Atlantis' STS 44 mission]. We're probably going to be a few days past that, but we think it will only be a couple of days," said Kennedy Space Center spokeswoman **Lisa Malone.** The launch date hangs on the completion date for workers in an OPF

hangar who are reinstalling a heat protection panel which had cracked. The panel, which was sent to California for repairs, is made of reinforced carbon and is located on the Orbiter's belly between the nose cap and the nose landing gear. The panel's installation proved difficult for workers previously; it took several days longer than planned. The work procedures have been refined since then, but officials say the job is still a difficult one and may again take longer than planned, according to Malone. NASA managers would like to launch STS 44 before Thanksgiving; if that cannot occur, the launch would be scheduled about December 5. [Banke, FLORIDA TODAY, p. 1A, Sept. 22, 1991.]

DISCOVERY FERRY FLIGHT UPDATE

In California, Kennedy Space Center workers are slightly ahead of schedule in readying Discovery for its return flight to Florida, officials said. They reported the possibility of a takeoff late on September 23 with an overnight stay in Texas. That would return Discovery aboard its Shuttle Carrier Aircraft on the afternoon of September 24. [Banke, FLORIDA TODAY, p. 1A, Sept. 22, 1991.]

September 22: **DISCOVERY AT DRYDEN**

Turnaround operations are continuing to prepare Discovery for the return trip to Florida. The cross-country ferry flight is scheduled to begin early tomorrow morning. Pending favorable weather conditions, a one-day ferry flight is possible. However, officials are concerned about a low pressure system in the southwest and a cold front in the southeast. Weather forecasters are assessing the possibility of thunderstorms, rain and turbulence in the Orbiter's flight path. The tail cone has been installed over the three main engines and the Orbiter is mated to its 747 Shuttle Carrier Aircraft. Whenever Discovery arrives in Florida it will be towed to the space center's new $170 million Orbiter Processing Facility Hangar No. 3; it will become the first Orbiter to be processed for flight in the new facility. Columbia spent a day in the facility for fit checks before it was flown to California for major modifications; officials are confident the new facility will not present any new problems. **Chris Fairey**, Discovery Processing Manager, said, "At this point no one thinks we should have any large problems. It's just a gorgeous facility. We're kind of excited about it." According to current planning schedules, Discovery should spend about 79 days in the new facility being readied for its International Microgravity Mission. It should be moved to the VAB on December 15, rolled out to the launch pad on December 20 and launched January 22.
Meanwhile, in Florida, the STS 48 solid rocket boosters have been disassembled at Hangar AF at the Cape Canaveral Air Force Station. Technicians are scheduled to install end rings on the segments and prepare them for shipment back to Thiokol in Utah for refurbishment. The nose cones and aft skirts will be refurbished locally by USBI. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 23, 1991, Banke, FLORIDA TODAY, p. 2A, Sept. 23, 1991.]

ATLANTIS PREPARATIONS: STS 44

Functional tests of Atlantis' external tank doors have been completed; in addition,

functional tests of the waste containment system are complete as is the check out of the orbital maneuvering system. Work in progress for the STS 44 mission includes: preparations to service the freon coolant loop system; preparations to install the chin panel; installation of window no. 5 (the pilot's window); leak checks of helium tanks in the Orbiter's midbody and checks of reinforced carbon gap filler panels on the wings. Leak and functional tests have been scheduled for the water spray boilers. [[KSC SHUTTLE STATUS REPORT, 10 a.m.,Sept. 23, 1991.]

ENDEAVOUR PROCESSING

The left hand external tank door has been installed and the orbital maneuvering system oxidizer crossfeed system of Endeavour has been flushed. The fuel crossfeed system is also scheduled to be flushed. A number of other processing operations are underway on Endeavour; among these are: the installation of the Ku-band drive assembly; preparations for leak and functional tests of the auxiliary power units; rigging of the external tank doors; preparations to install the remote manipulator system; installation of the fuel cells; installation of thermal control blankets in the Orbiter's midbody; and main propulsion system work. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 23, 1991.]

STS 44: SOLID ROCKET BOOSTERS

Atlantis has had its left forward assembly/nose cone mated to the booster. Preparations are underway to mate the external tank to the boosters. Mating of the external tank to the solid rocket boosters is scheduled for September 26, 1991. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 23, 1991.]

September 24: DISCOVERY AT DRYDEN

Discovery began its cross-country ferry flight today with a departure from Edwards Air Force Base, CA, at about 12:30 p.m. EDT. Weather, however, forced a landing at Tinker Air Force Base (Oklahoma City, OK). Discovery is expected to return to KSC tomorrow about 12 noon. Once here, the Shuttle will be towed to the Mate Demate Device and removed from the 747 Shuttle Carrier Aircraft. The Orbiter will be towed to OPF Bay 3 for post-flight inspections. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 24, 1991, "Discovery to Head Home," FLORIDA TODAY, p. 4A, Sept. 24, 1991, Banke, FLORIDA TODAY, p. 2A, Sept. 25, 1991, "Weather May Get in Way for Shuttle's Trip Home," THE ORLANDO SENTINEL, p. A-10, Sept. 25, 1991.]

STS 44: ATLANTIS STATUS

The Space Shuttle Atlantis, currently being readied for its STS 44 mission, has had its freon coolant loop no. 2 serviced. In addition, technicians have removed a leaking oxidizer thruster on the left orbital maneuvering system pod. Work in progress includes: installation of heat shields around the three main engines; installation of the chin panel; installation of window no. 5 (the pilot's window); leak checks of helium tanks in the midbody; checks of reinforced carbon-carbon gap

filler panels on the wings. Scheduled work includes: the replacement of an oxidizer thruster on the left orbital maneuvering system pod; leak and functional tests of the water spray boilers. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 24, 1991.]

STS 49: ENDEAVOUR STATUS

Technicians in OPF Bay 2 have installed the commander and pilot seats in the Space Shuttle Endeavour, in preparation for its maiden flight, STS 49. Work currently underway includes: installation of the Ku-band drive assembly; preparations for leak and functional tests of the auxiliary power units; rigging of the external tank doors; preparations to install the remote manipulator system; installation of the fuel cells; installation of thermal control blankets in the midbody; main propulsion system; a flush of the orbital maneuvering system fuel crossfeed system. The robot arm is scheduled for installation on September 26. [KSC SHUTTLE STATUS REPORT, 10 a.m., Sept. 24, 1991.]

September 25:

DISCOVERY'S FERRY FLIGHT

The Space Shuttle Discovery (OV 103) departed Tinker Air Force Base (Oklahoma City, OK) at 1 p.m. EDT enroute to Columbus Air Force Base (Columbus, MS) where the vehicle will remain overnight because of adverse weather in the flight path to Florida. Weather will be assessed once at Columbus to determine weather conditions tomorrow and at departure times. The Orbiter departed Edwards Air Force Base (CA) at about 12:39 p.m. EDT yesterday and landed at Biggs Army Air Field (El Paso, TX) for a brief refueling stop for the 747 Shuttle Carrier Aircraft. The 747 and Shuttle departed Biggs at 4:41 p.m. EDT yesterday and remained overnight at Tinker Air Force Base (Oklahoma City, OK). Discovery, atop the SCA, arrived at Columbus Air Force Base (Columbus, MS) at 2:32 p.m., EDT. After arrival at Kennedy Space Center tomorrow, Discovery will be demated from the Shuttle Carrier Aircraft and towed to OPF Bay 3. [KSC SHUTTLE STATUS REPORT, September 26, 1991, KSC SHUTTLE STATUS REPORT, 3:30 p.m., Sept. 25, 1991, "Weather Might Stop Discovery," FLORIDA TODAY, p. 4A, Sept. 26, 1991.]

ATLANTIS IN OPF BAY 2

During structural inspections, cracks were observed on the inside of several RCC T-seal panels on left and right wings of the Space Shuttle Atlantis during preparations for its upcoming STS 44 mission. "This is something new for us. We have not seen this problem before," said Kennedy Space Center spokeswoman **Lisa Malone**. The T-seals prevent the direct flow of the hot gas on the wing leading edge cavity during reentry. There are 22 seals per wing and plans are in work to remove all of them for inspection. Officials are gathering information to indicate the kinds of loads the T-seals are under during ground operations as well as during launch, ascent, mission operations and reentry. Measurements are being made of the gap between T-seals and the reinforced carbon-carbon panels. Pre-launch and post-flight measurements will be compared. Installation

procedures also are being reviewed. Once the data is collected, officials will determine the next course of action. Possible schedule impacts - if any - have not been determined.

"We're going to open up all of the panels on Atlantis, collect a bunch of data and try to make some decisions," said Shuttle Processing Manager **Conrad Nagel**. "We've got our work cut out for us." He added, "We're going to be a whole lot smarter on Monday or Tuesday," referring to the inspections and tests which will be conducted September 30 and October 1. Other processing work in progress includes: installation of heat shields around the three main engines; installation of the chin panel; installation of window no. 5; leak checks of helium tanks in the midbody; removing the reinforced carbon-carbon gap T-seal panels on the wings. OPF Bay 2 workers are scheduled to replace an oxidizer thruster on the left orbital maneuvering system pod. [KSC SHUTTLE STATUS REPORT, 3:30 p.m., Sept. 25, 1991, Banke, FLORIDA TODAY, p. 4A, Sept. 26, 1991.]

ENDEAVOUR PROCESSING: STS 49

Fuel cells no. 1 and 3 have been installed in the Space Shuttle Endeavour in OPF Bay 1. Work in progress for the STS 49 mission includes: preparations for leak and functional tests of the auxiliary power units; rigging of the left hand external tank door; preparations to install the remote manipulator system; installation of the fuel cell no. 2; leak checks of the main propulsion system pneumatic system; a flush of the orbital maneuvering system fuel crossfeed system. Workers will install the robot arm on September 26. [KSC SHUTTLE STATUS REPORT, 3:30 p.m., Sept. 25, 1991.]

September 26:

ATLANTIS PROCESSING WORK

The removal and replacement of Inertial Measurement Unit #3 and the retesting of oxidizer thruster on left OMS pod has been completed in the processing of Atlantis in OPF Bay 2. Work in progress includes: removal and inspection of right and left wing T-Seal panels; realignment of #5 window; midbody closeouts; foaming of main propulsion system lines; retest of Inertial Measurement Unit #3; testing of orbiter hydraulics; mating of external tank to solid rocket boosters in the Vehicle Assembly Building. The Crew Equipment Interface Test (CEIT) is scheduled for October 5-6. [KSC SHUTTLE STATUS REPORT, September 26, 1991.]

ENDEAVOUR: FUEL CELL #2 INSTALLED

Fuel cell number 2 has been installed upon Space Shuttle Endeavour; in addition, contamination checks of OMS Crossfeed Lines have been completed. Work in progress includes: thermal protection system tiles; rigging of the left hand external tank door; main propulsion system pressure testing. The checkout of fuel cell #2 and installation of the remote manipulator system have been scheduled. [KSC SHUTTLE STATUS REPORT, September 26, 1991.]

NASA BUDGET AGREEMENT

House and Senate conferees met today and agreed on a 1992 NASA budget of $14.32 billion; that is $1.5 billion less than requested, but is 10 percent more than last year's budget. The Space Shuttle budget will take a $200 million hit. Kennedy Space Center has already moved to cut its budget by $20 million in anticipation of cuts in its request; Shuttle Processing Contractor Lockheed Space Operations Co. has already laid off 300 workers and another 100 layoffs are expected shortly from Lockheed subcontractors. In addition to the Shuttle budget, the National Space Plane's budget is being reduced from $47 million to $5 million; the National Launch System's funding will slip from $175 million to less than $35 million; and the Earth Observing System's resources shrink from $286 million to $271 million. NASA spokesman **Don Savage** said, "We're still studying the numbers." Congress is expected to vote on the compromise shortly and President Bush is expected to sign the bill within weeks. [Eisler, FLORIDA TODAY, p. 1A, Sept. 27, 1991.]

DISCOVERY RETURNS TO KSC

The Space Shuttle arrived at Kennedy Space Center arrived at the Shuttle Landing Facility at 1:16 p.m. Clouds and rain forecast for this area moved on through faster than expected. **Chris Fairey**, NASA's Processing Manager for Discovery, said, "It feels great to have Discovery back." He said extra post-flight inspections will be conducted on the Orbiter's heat protection system. [Banke, FLORIDA TODAY, p. 5A, Sept. 27, 1991.]

September 27:

ATLANTIS' T-SEALS REMOVED

All T-seals on the left wing of Atlantis have been removed, inspected and measured. Technicians are removing and inspecting the remaining T-seals on the right wing. About half of the seals on the right wing have already been removed. So far, a total of eight T-seals our of the 44, have cracks. The cracked seals will be shipped back to the vendor. Those seals without cracks are being reinstalled on the vehicle and spares are being installed where the cracked seals were located. Data collection and analysis is continuing to determine the cause of the cracks. Possible schedule impacts - if any - have not been determined. Window no. 5's installation has been completed; a leaking oxidizer thruster on the left orbital maneuvering system pod has been replaced on the Orbiter. Hydraulic system activities are scheduled for next week. Work in progress includes: installation of the chin panel; removing the reinforced carbon-carbon gap T-seal panels on the right wing and inspecting for cracks; tests of payload equipment on the aft flight deck; troubleshooting of the S-band antenna; leak and functional tests of the water spray boilers. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 27, 1991.]

DISCOVERY: POST-FERRY FLIGHT OPERATIONS

After Discovery and its SCA landed at Kennedy Space Center yesterday at 1:16

p.m., the Orbiter was demated overnight. Work in progress includes: removing the flight nose landing gear tires; installing the "roll-around" tires; towing the vehicle to bay 3 about noon today. Scheduled work includes post-flight inspections and removal of the tail cone early next week. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 27, 1991.]

STS 49: ENDEAVOUR IN OPF BAY 1

Fuel cell no. 2 was installed in Endeavour. Work in progress includes: flushing of the freon cooling system; cycling of the left hand external tank door; tests of the ammonia system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; connections of the three fuel cells; leak checks of the main propulsion system pneumatic system; a flush of the orbital maneuvering system fuel crossfeed system. The robot arm is scheduled to be installed upon Endeavour on September 30. [KSC SHUTTLE STATUS REPORT, 11:30 a.m., Sept. 27, 1991.]

THANKS, TITUSVILLE!

"It was very heartwarming to know those folks [in Titusville, FL] were going to stay up so late and keep all those lights burning in the window," said Discovery Pilot **Kenneth Reightler**. "We really appreciated that." The citizens of Titusville had been asked by Mayor **Tom Mariani** to light up the sky, "not only to welcome the crew back to Earth, but also to help guide Commander **John Creighton** toward the Kennedy Space Center runway." Creighton said, "We were all psyched up and ready to come into Kennedy, and we were kind of disappointed when it didn't happen. We came close but didn't quite make it." STS 48 concluded its mission at Edwards Air Force Base, CA, because of unacceptable weather conditions at KSC. [Banke, FLORIDA TODAY, p. 5A, Sept. 28, 1991.]

September 29:

HEAT PANELS SENT TO TEXAS

By today, all 44 heat panels on Atlantis have been removed and inspected; of these, only eight were found to be cracked, according to Kennedy Space Center spokeswoman **Lisa Malone**. The cracked panels will be sent to their manufacturer in Texas and will be replaced with spares. A failure of the panels would have led to a catastrophe for the crew and the Orbiter. Investigators say they do not believe the cracks were caused by the mission itself, but may have been the result of a flaw in ground procedures. Columbia's panels have shown no cracks; Discovery and Endeavour have not yet been inspected. KSC workers have tried to fit spare panels on Atlantis' wings, but none were installed this weekend, Malone said. Fitting the custom-made panels is a lengthy, tedious process. When workers understand how long this process will take, NASA managers will be able to project a launch date for the STS 44 mission. KSC workers will continue to process Atlantis for a November 19 launch. [Banke, FLORIDA TODAY, p. 4A, Sept. 30, 1991, [KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 30, 1991, Banke, FLORIDA TODAY, p. 12A, Oct. 1, 1991.]

September 30: **DISCOVERY: OPF BAY 3**

Discovery arrived at OPF Bay 3 September 27; in the OPF it was jacked up and leveled and access to the crew compartment was established. Work in progress on the Orbiter includes: preparations to power up the vehicle; positioning of the body flap; removal of the tail cone; opened payload bay doors. Scheduled work includes: functional test of the payload bay doors; frequency response test of the aerosurfaces; post-flight inspections; removal of one of the auxiliary power units later this week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 30, 1991.]

ENDEAVOUR: OPF BAY 1

The Space Shuttle Endeavour will have its robot arm installed this week. Work in progress includes: leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; electrical connections of the fuel cells; a flush of the orbital maneuvering system fuel crossfeed system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Sept. 30, 1991.]

OCTOBER

October 1: **ATLANTIS PROCESSING: OPF BAY 2**

The Space Shuttle Atlantis' eight T-seals with cracks have been shipped to the vendor in Dallas, TX, for analysis and thermal barriers have been installed around the Orbiter's chin panel. Work in progress on the vehicle includes: a brake anti-skid test; functional tests of the inertial measurement units; self-test of the Ku-band antenna; reinstalling the reinforced carbon T-seals on the Orbiter's wings; installation of carrier panels around the RCC leading edges; troubleshooting of the S-band antenna; servicing of the water spray boilers. The Crew Equipment Interface Test takes place this weekend with the STS-44 flight crew on hand. [KSC SHUTTLE STATUS REPORT, 10 a.m., Oct. 1, 1991.

DISCOVERY IN OPF BAY 3

Discovery's body flap has been repositioned in preparation for removal of the tail cone which had covered its main engines during its recently completed ferry flight from California. Current work includes: removal of the tail cone; preparations to open the payload bay doors; removal of the wing leading edge tile carrier panels in preparation for inspection of several T-seals; post-flight inspections. Scheduled work includes: functional tests of the payload bay doors; frequency response test of the aerosurfaces; removal of one of the auxiliary power units later this week; inspections of several T-seals later this week. [KSC SHUTTLE STATUS REPORT, 10 a.m., Oct. 1, 1991.]

ENDEAVOUR IN OPF BAY 1

Endeavour has had its water dump nozzle installed in Orbiter Processing Facility Bay 1. Other scheduled installations include: fuel cell no. 2; the robot arm. Processing work underway includes: elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; electrical connections of the fuel cells and blowdowns of the main propulsion system helium system. [KSC SHUTTLE STATUS REPORT, 10 a.m., Oct. 1, 1991.]

CRACKS FOUND IN COLUMBIA PANELS

Inspections of the Space Shuttle Columbia have revealed cracks in three of 44 of its heat-protection panels; Columbia is presently being modified and refurbished in California where it was manufactured originally. The cracks on Columbia's panels are reported to be small. The cracks on eight of Atlantis' panels range in size from microscopic to four inches long and are in nearly identical places toward the outer tips of the vehicle's wings; there are four cracked panels on each wing. Kennedy Space Center spokesman **Bruce Buckingham** said today, "It doesn't seem to be a random problem. There appears to be some symmetry." Though the cause of the cracks is still under investigation, some engineers believe that the

cracks may have resulted from improper installation. Buckingham said that rollover to the Vehicle Assembly Building, currently slated for October 17, may be delayed a few days to allow technicians time to replace the cracked panels. [Brown, FLORIDA TODAY, p. 2A, Oct. 2, 1991.]

October 2: **BUDGET MAY DELAY 1992 LAUNCH**

Officials at NASA said today that Congress's order to cut $330 million from its budget might result in the delay of at least one Shuttle launch between now and next September. "We have people looking at the various options. When you have a budget cut, you either don't do things as often, defer work or don't start new projects as soon," said NASA spokesman **Ed Campion**. Kennedy Space Center has already made cuts which have resulted in 400 workers being laid off at a savings of an estimated $20 million. Director **Forrest S. McCartney** said the budget for the center is still under review but sees no prospect of further layoffs. "We've already taken action to live with a smaller budget," McCartney said. "It's really too early to tell, but so far it doesn't look like we'll have any further significant impact." [Brown, FLORIDA TODAY, p. 1A, Oct. 3, 1991, "NASA Wins, Loses in 1992 Budget Battle," FLORIDA TODAY, p. 10E, Oct. 6, 1991, Brown, FLORIDA TODAY, p. 1A, Oct. 6, 1991.]

STS 44 MAY BE DELAYED

Atlantis' cracked T-seals are being replaced by technicians in Orbiter Processing Facility Bay 2, but officials continue discussing a possible delay for the STS 44 mission currently targeted for November 19. **Lisa Malone**, NASA spokeswoman, said, "We don't have a crystal ball; it's too early to tell whether this will affect the schedule." The replacement of T-seals is expected to be completed October 4, Malone said. She also said that a total of nine cracked T-seals had been found on Columbia which is undergoing extensive modification in California. Discovery's T-seals will be inspected next week. [Halvorson, FLORIDA TODAY, p. 6A, Oct. 3, 1991, Date, THE ORLANDO SENTINEL, Oct. 3, 1991.]

CREW EQUIPMENT INTERFACE TEST: STS 44

This weekend the STS 44 crew of Atlantis will be at Kennedy Space Center to take part in a Crew Equipment Interface Test (CEIT). Technicians have just completed installing thermal barriers around the Orbiter's chin panel. Work in progress includes: replacement of cracked T-seals; a brake anti-skid test; functional tests of the inertial measurement units; hot lube oil flush of the auxiliary power unit system no. 2; installation of carrier panels around the RCC leading edges. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 2, 1991.]

DISCOVERY'S TAIL CONE REMOVED

The tail cone which protected Discovery's main engines during its ferry flight from California has been removed in OPF Bay 3. Currently, technicians are inspecting payload bay door hinges and preparing to open the doors, conducting a flight

readiness test of the aerosurfaces, removing the wing leading edge tile carrier panels in preparation for inspecting Discovery's T-seals; waterproofing the payload bay doors and are continuing post-flight inspections. In the next few days, OPF Bay 3 workers will conduct functional tests of the payload bay doors, remove one of the auxiliary power units and begin inspecting T-seals. [KSC SHUTTLE STATUS REPORT, 10 a.m., Oct. 2, 1991.]

ENDEAVOUR: LEAK CHECKS

In Orbiter Processing Facility Bay 1, the Space Shuttle Endeavour is undergoing, among other things, a variety of tests and checks including: elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; checks of the main propulsion system pneumatic system. The robot arm will be installed next week while the right orbital maneuvering system pod will be installed this weekend. [KSC SHUTTLE STATUS REPORT, 10 a.m., Oct. 2, 1991.]

October 3: **NASA MANAGEMENT SYSTEMS OFFICE**

NASA Administrator **Richard H. Truly** announced today the intended creation of the Office of Management Systems and Facilities. This Office will represent the consolidation of the Offices of Management and Headquarters Operations. **Benita A. Cooper** has been selected to be the Associate Administrator for this new organization. She is currently the Assistant Administrator for the Office of Headquarters Operations. Prior to assuming her current position at Headquarters, Cooper was the Director of Management Operations at Goddard Space Flight Center from 1880-88. Dr. **C. Howard Robbins Jr.**, currently the Associate Administrator for the Office of Management, will be on a special assignment for the Office of Management, will be on a special assignment to assist the Deputy Administrator in ensuring smooth organizational transition activities at NASA Headquarters, and then will be returning to a senior technical position. Dr. Robins worked at the Langley Research Center and the Johnson Space Center prior to transferring to Headquarters in 1976 where he managed programs in the Office of Aeronautics and Space Technology and Space Science and Applications.

This new Office of Management Systems and Facilities will provide synergy between operational responsibilities and Agency policy development in the areas of Information Systems, Facilities and Maintenance, Logistics, Aircraft Management, and Security. The Office also will be responsible for Industrial Relations, the Board of Contract Appeals, and the Inventions and Contributions Board. The NASA Headquarters Equal Opportunity function will be consolidated within the existing Office of Equal Opportunity Programs. In announcing this intended consolidation, Admiral Truly said, "Benita Cooper is a natural choice to lead this new organization, which will nicely complement our Office of Human Resources and Education. Both she and Howard Robins have played a major role in making this consolidation a success. This will greatly facilitate our efforts to enhance total quality management in NASA's institutional management.

"With today's announcements of new appointments and office consolidation at NASA Headquarters, I will have in place an extremely strong team that will enhance NASA's overall program and personnel management. This restructuring culminates other changes earlier in the year. It is consistent with the recommendations from external advisory groups and with my intention to better align our capabilities to successfully oversee the implementation of today's program's and plan for the missions of tomorrow." [NASA/KSC News Release No. 91-160, Oct. 3, 1991, NASA/KSC News Release No. 91-162, Oct. 3, 1991, "NASA Veteran to Head New Major Projects Office," FLORIDA TODAY, p. 9E, Oct. 7, 1991.]

STS 44/ATLANTIS

Technicians have completed the brake anti-skid test on the Space Shuttle Atlantis (OV-104); they have also conducted a hot lube oil flush of auxiliary power unit no. 2 and functional tests of the inertial measurement units. Processing managers have set a goal of having all T-seals and reinforced carbon panels installed on both wings of the Orbiter by the end this week. Other work in progress in OPF Bay 2: cycles of the nose landing gear doors; potable water servicing; inspections of the payload bay door hinges; reinstalling the T-seals on the wings of Atlantis and the installation of carrier panels around the RCC (Reinforced carbon carbon) leading edges. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 3, 1991.]

STS 42/DISCOVERY STATUS

The Space Shuttle Discovery (OV-103) is currently being worked on in Orbital Processing Facility Bay 3; activities include: inspections of payload bay door hinges; flight readiness test of the aerosurfaces; preparations to open the payload bay doors; removal of the wing leading edge tile carrier panels; waterproofing the payload bay doors; inspections of the RCC T-Seals. Functional tests of the payload bay doors are scheduled as is the removal of one of the auxiliary power units later this week. NASA spokeswoman **Lisa Malone** said today that a crack had been found on one of Discovery's wings; it was spotted in one of five seals inspected. The remainder of the seals will be inspected next week. A team of engineers is studying the problem at Johnson Space Center and suspect that the cracks may have been caused during installation. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 3, 1991, Banke, FLORIDA TODAY, p. 5A, Oct. 4, 1991, "Cracked Seals Found on Another Shuttle," THE NEW YORK TIMES, p. A15, Oct. 4, 1991.]

ENDEAVOUR PROCESSING

In OPF Bay 1, workers are processing the Space Shuttle Endeavour for its maiden voyage next year - STS 49. The work in progress includes: elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system and checks of the main propulsion system pneumatic

system. Scheduled work includes: installation of the robot arm next week; installation of the right orbital maneuvering system pod this weekend and installation of fuel cell no. 2. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 3, 1991.]

October 4: **STS 44 PROCESSING: ATLANTIS**

The Crew Equipment Interface Test is scheduled for this weekend and the members of the STS 44 crew will attend; technicians have also set a goal of having all T-seals and reinforced carbon carbon panels installed on both wings by this weekend. Work in progress includes: servicing of the environmental control life support system with gaseous nitrogen; checks of the cabin pressure; cycles of the nose landing gear doors; potable water servicing. The reinstallation of T-seals and carrier panels around the RCC leading edges is about 50 percent complete. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991.]

DISCOVERY IN OPF BAY 3

A frequency response test of Discovery's flight control system has been completed in Orbiter Processing Facility Bay 3. Processing activity for Discovery's STS 42 (IML) mission continues in a number of areas: preparations to offload residual propellant from the auxiliary power units and the orbital maneuvering system; inspections of payload bay door hinges; flight readiness test of the aerosurfaces; preparations to open the payload bay doors; removal of the wing leading edge tile carrier panels; waterproofing the payload bay doors; inspections of the RCC T-seals. Out of ten T-seals removed only one, on the left wing, was cracked. Only one more T-seal is scheduled for inspection. Technicians have scheduled functional tests of the payload bay doors and removal of one of the auxiliary power units later this week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991.]

STS 49: ENDEAVOUR'S INTELSAT REBOOST

Technicians continue processing Endeavour for its STS 49 mission next year - the Intelsat Reboost; current activities include: preparations to install the right orbital maneuvering system pod; filling and bleeding the hydraulic system; elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; checks of the main propulsion system pneumatic system. Scheduled work includes: installation of the robot arm next week; installation of the right maneuvering system pod on October 11; installation of fuel cell no. 2. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991.]

$1 MILLION FOR REPAIRS

NASA estimates that repairs to cracked Orbiter wings will cost nearly $1 million, but officials say that Atlantis' STS 44 mission will not be delayed significantly by the cracks problem. "We think we've got an excellent shot that week [November

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19]," said **William Lenoir**, NASA's Associate Administrator for Space Flight. "My guess is the 21st or 22nd." According to **Keith Hudkins**, Chief of the Shuttle Division at NASA Headquarters, the Shuttles could fly and land safely with the cracked seals. "No one is looking at this as being a reason not to go fly Atlantis," he said. The cause of the cracks is still unknown, but Hudkins has said hot temperatures during re-entry may be the culprit rather than improper installation. The cracked seals will be repaired at a cost of $50,000 each and will be replaced by spares. [Banke, FLORIDA TODAY, p. 1A, Oct. 5, 1991.]

1992 LAUNCH SCHEDULE IMPACT

NASA expects to be able to keep its 1992 schedule intact, but may postpone future flights if other economic measures don't work. The space agency will reduce staffing levels and inspections and cut spending by 3 percent a year over the next five years for a total savings of $1 billion. Associate Administrator for Space Flight **William Lenoir** said, "Frequently, we're not doing things as efficiently as we can be. We find lots of cases...where we're inspecting the same system three times. We've got to be very careful we don't do anything that compromises safety, and I'm convinced we won't." More than 400 employees have been laid off from the Shuttle Processing Contract headed by Lockheed Space Operations Co (Titusville, FL). BAMSI Inc. (Titusville, FL), an engineering firm, will lay off 95 persons by the end of next month. A plan to consolidate Shuttle support services is under consideration at Kennedy Space Center. Lenoir said, "It is going to be very tight." [Eisler, FLORIDA TODAY, p. 1A, Oct. 5, 1991.]

October 5: **SLAYTON SUPPORTS AMF**

"Space is the centerpiece of the future and the centerpiece of things we are interested in education. The timing is right for this foundation [Astronauts Memorial Foundation] to do what it is on track with," said former Mercury and Apollo-Soyuz astronaut **Donald "Deke" Slayton** at the AMF's fifth annual banquet at the Cocoa Beach Howard Johnson Plaza-Hotel tonight. **Ed White**, son of the late Apollo astronaut of the same name, presented AMF with a check for $25,000 which he raised from the sale of astronaut trading cards marketed by his firm, Space Ventures Inc. **Ed White, Sr.** is one of 15 astronauts honored with his name on the Astronauts Memorial at Spaceport USA. ["Astronaut Gives Support to Foundation," FLORIDA TODAY, p. 2B, Oct. 6, 1991.]

October 6: **LOCKHEED ENVISIONS SMALLER SHUTTLE**

Lockheed Advanced Development Co. (informally known as the Skunk Works) has begun work on a $1.7 million feasibility study for a smaller version of the Space Shuttle. The smaller craft would carry a two-person crew and up to eight passengers along with a limited cargo on missions to and from low Earth orbit. ["Skunk Works Begins Spaceship Study," FLORIDA TODAY, p. 10E, Oct. 7, 1991.]

STS 44 LANDING AT KSC

Atlantis will land at Kennedy Space Center at the conclusion of its upcoming STS 44 mission. As currently scheduled the landing would occur at 3:27 p.m. on November 29. The mission was originally scheduled to land at Edwards Air Force Base, CA, until Kennedy Space Center was made the primary landing site for Orbiters. "The prime landing site was switched accordingly to KSC," said NASA spokesman **James Hartsfield**. This will mark the third scheduled KSC landing this year; earlier, Atlantis was landed as scheduled on August 11 and Discovery was diverted from Kennedy Space Center to Edwards on September 18 due to cloudy skies and rain showers. [Halvorson, FLORIDA TODAY, p. 10E, Oct. 7, 1991.]

ALDRICH HEADS NEW NASA OFFICE

Arnold Aldrich has been named by NASA Administrator **Richard H. Truly** to head the newly created Office of Space Systems Development where he will oversee the development of such big projects as Space Station Freedom. Aldrich will pick up some of the responsibilities of Associate Administrator **William Lenoir**, who heads the Office of Space Flight. Lenoir will continue to direct Space Shuttle operations. ["NASA Veteran to Head New Major Projects Office," FLORIDA TODAY, p. 9E, Oct. 7, 1991.]

October 7:

ATLANTIS PROCESSING: OPF BAY 2

A number of processing tasks for STS 44 (Atlantis) have been completed: the Crew Equipment Interface Test; the auxiliary power unit no. 3 was installed and electrically mated; the vehicle's thermal protection system was waterproofed; a functional test was conducted of the crew module hatch and technicians installed and tested several small pyrotechnic devices in the Orbiter. Current activities include: a positive pressure test of the Orbiter's wings; cleaning of the midbody; reinstalling the reinforced carbon carbon T-seals and panels on the Orbiter's wings; installation of carrier panels around the RCC leading edges; repairs of minor dings in the radiators; servicing the Orbiter with potable water. Atlantis is scheduled to be transferred to the Vehicle Assembly Building by October 18. "The work is going excellently. It's looking really good," said **Bill Chatterly**, Atlantis' manager with Lockheed Space Operations Co. Space Shuttles Discovery and Columbia have been inspected for cracks in T-seals, but NASA managers have not yet decided when to start inspecting Endeavour for cracked thermal protection seals. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991, Brown, FLORIDA TODAY, p. 4A, Oct. 7, 1991, Banke, FLORIDA TODAY, p. 4A, Oct. 8, 1991.]

DISCOVERY PROCESSING: OPF BAY 3

In Orbiter Processing Facility Bay 3, technicians have drained residuals from the auxiliary power unit catch bottles on Discovery and from its orbital maneuvering system and reaction control system tanks. They have also removed one of the auxiliary power units. Work in progress includes: opening the payload bay doors; preparations to perform a functional test of the payload bay doors;

removing STS 48 payload equipment from the payload bay; post-flight inspections and testing; inspections of the RCC T-seals. One T-seal was found cracked out of the elevon seals inspected so far; all 42 T-seals will be inspected. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991.]

ENDEAVOUR (OV-105): OPF BAY 1

Fuel cell no. 2 has been installed on Endeavour. Work in progress includes: installation of wing struts; filling and bleeding of the hydraulic system; elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; preparations to install the remote manipulator system; checks of the main propulsion system pneumatic system. The Orbiter's robot arm has been scheduled for installation. Also scheduled is the installation of the right orbital maneuvering system pod. The oxidizer primary and secondary seals are leaking and need to be replaced. This will delay the installation of the pod by one to two weeks. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 4, 1991.]

October 8:

ATLANTIS IN OPF BAY 2

The Space Shuttle Atlantis has been hooked up to auxiliary power unit no. 1 and a positive pressure test has been conducted on the Orbiter's wings. Technicians in the OPF are: cleaning of the midbody; reinstalling the reinforced carbon carbon T-seals and panels on the Orbiter's wings; installing carrier panels around the RCC leading edges; repairing minor dings in the radiators; servicing the Orbiter with potable water and closing out the aft compartment. Scheduled work includes a functional test of the landing gear later this week and the transfer of Atlantis to the VAB is targeted for the end of next week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 8, 1991.]

DISCOVERY'S PAYLOAD BAY DOORS OPEN

Technicians in Orbiter Processing Bay 3 have opened the payload bay doors and performed a functional test on Discovery. In progress: post-flight measurements and inspections of the 17-inch disconnects; removing STS 48 payload equipment from the payload bay; post-flight inspections and testing; preparations to inspect the reinforced carbon carbon T-seals on the leading edges of the wings. One T-seal was found cracked out of the eleven seals inspected so far. All 42 T-seals will be inspected. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 8, 1991.]

ENDEAVOUR PROCESSING: OPF BAY 1

In Orbiter Processing Facility Bay 1, the Space Shuttle Endeavour is being readied for its STS 49 mission: rigging of the left external tank door; inspections of the gaseous oxygen main propulsion system; installation of wing struts; filling and bleeding of the hydraulic system; elevon cove seal leak checks; leak and functional leaks of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; checks of the main propulsion system

pneumatic system. Scheduled work includes: installation of the robot arm and installation of the left orbital maneuvering system pod this coming weekend. The right pod is scheduled to be installed the following weekend. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 8, 1991.]

HOLIDAY MIGHT DELAY STS 44

NASA's may take advantage of the Thanksgiving holiday to delay the expected November 19 launch of STS 44; the delay would mean that landing crews at both Kennedy Space Center and Edwards Air Force Base, CA, would not have to work during the holiday and would save NASA the extra expense of holiday pay. **Conrad Nagel**, NASA Processing Manager for Atlantis, said, "If there's any way we can make that [delay] happen, we'd love to do it." A firm launch date will not be set until the Flight Readiness Review in early November. "In the meantime, we're going to keep going toward the 19th. We're in good shape, but we're busy, real busy," Nagel added. Another potential delay for the launch results from the replacement of an auxiliary power unit with one taken from Discovery following its landing in California last month. Atlantis' original APU failed a test, Nagel explained. The replacement is a hazardous operation which requires the Orbiter Processing Unit to be cleared of nonessential personnel. Atlantis is expected to be rolled from OPF Bay 2 to the Vehicle Assembly Building on October 18 and to Launch Complex 39A five days afterward. [Banke, FLORIDA TODAY, p. 4A, Oct. 9, 1991.]

October 9:

ATLANTIS: TIGHT WORK SCHEDULE

"We've got a full slate for the next two weeks," said NASA spokeswoman **Lisa Malone** concerning the processing effort underway for the STS 44 mission of Atlantis. "Our processing for Atlantis is moving right along," she said. A firm launch date for the STS 44 mission will be set following the Flight Readiness Review currently scheduled for November 5-6. Today, technicians in OPF Bay 2 cleaned the 60-foot-long cargo bay and worked on the following additional processes: closeouts of the thermal protection system around the vehicle's chin panel; replacement and retest of several check valves in the main propulsion system; cleaning of the payload bay area; reinstalling of the reinforced carbon carbon T-seals and panels on the wings of Atlantis; installation of carrier panels around the RCC leading edges; closing out the aft compartment. Scheduled work includes: functional test of the galley; functional test of the landing gear later this week; final payload bay door closure early next week; determining the orbiter's weight and center of gravity; transfer of Atlantis to the VAB continues to be targeted for October 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 9, 1991, Banke, FLORIDA TODAY, p. 6A, Oct. 10, 1991.]

DISCOVERY IN OPF BAY 3

In Orbiter Processing Bay 3 technicians working on the Space Shuttle Discovery (OV 103) opened the vehicle's payload bay doors and performed a functional test earlier this week. Work in progress includes: post-flight measurements and

inspections of the 17-inch disconnects; removing STS 48 payload equipment from the payload bay; preparations to inspect the reinforced carbon carbon T-seals on the leading edges of the wings; removal of carrier panels from around the main engines; reconfiguration of the aft flight deck; post-flight inspections and testing. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 9, 1991.]

ENDEAVOUR (OV 105) PROCESSING

Work in progress in OPF bay 1 on the Space Shuttle Endeavour (OV 105) includes: rigging of the left external tank door; inspections of the gaseous oxygen main propulsion system; installation of wing struts; filling and bleeding of the hydraulic system; elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; checks of the main propulsion system pneumatic system. Scheduled work includes: installation of the robot arm and of the left orbital maneuvering system pod this weekend and of the right pod next weekend. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 9, 1991.]

NASA LEADERSHIP MEETING

NASA Administrator **Richard H. Truly** met today with senior NASA Headquarters and field center executives in Washington, D.C., to receive and discuss Deputy Administrator **James R. Thompson's** interim viewpoints on roles and responsibilities of NASA centers and Headquarters offices. Truly had assigned this comprehensive review to Thompson earlier this year as a result of key recommendations of the Advisory Committee on the Future of the U.S. Space Program. At the conclusion of today's meeting, Truly asked Thompson to discuss each proposal in greater detail with the appropriate managers and to report back to him in early November with final recommendations and a proposed implementation plan."When J. R.'s review is completed, it will represent the first comprehensive look at NASA roles and responsibilities in over 10 years," Truly said. "The dialogue in today's meeting was excellent, and all of us are committed to a continually improving organization to achieve the nation's aeronautics research and civil space goals." Thompson's interim recommendations centered on reemphasizing NASA centers of excellence; a sharpened focus in science, engineering and technology; revising some responsibilities at Headquarters offices; streamlining both Space Shuttle and Space Station lines of authority; and improving overall NASA program management. NASA's recently announced changes in Headquarters management and organization are consistent with Thompson's views, and reflect the resolve of NASA's senior management to strengthen the agency's overall efficiency and effectiveness today and in the future. [NASA/KSC NEWS RELEASE NO: 91-169, October 9, 1991.]

October 10:

RCC T-SEALS/PANELS INSTALLED

In Orbiter Processing Facility Bay 2, workers have completed the installation on Atlantis of all RCC T-seals and panels on the vehicle's left wing. Technicians are also at work on the following tasks: closeouts of the thermal protection system

around the chin panel; closeouts of the payload bay area; reinstalling the reinforced carbon carbon (RCC) T-seals and panels on the Orbiter's right wing; installation of carrier panels around the RCC leading edges; measurements of the T-seals and panels; closing out the aft compartment. Scheduled tasks include: functional testing of the Orbiter's galley; functional testing of the landing gear October 11; final payload bay door closure early next week; determining of the orbiter's weight and center of gravity; transfer of Atlantis to the VAB October 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 10, 1991.]

DISCOVERY: UARS EQUIPMENT REMOVED

Technicians working on the Space Shuttle Discovery in OPF Bay 3 have removed the UARS support equipment from the Orbiter's payload bay; carrier panels have also been removed from around the vehicle's three main engines. Work in progress includes: checks of the Ku-band antenna drive assembly; post-flight measurements and inspections of the 17-inch disconnects; inspections of the RCC T-seals on the leading edge of Discovery's wings; reconfiguration of the aft flight deck; post-flight inspections and testing. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 10, 1991.]

WORK IN PROGRESS: ENDEAVOUR (OV 105)

In OPF Bay 1, workers have a number of tasks in progress in the processing of Endeavour for its STS 49 mission scheduled for next year. Work in progress includes: rigging of the left external tank door; inspections of the gaseous oxygen main propulsion system; installation of wing struts; filling and bleeding of the hydraulic system; elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; leak and functional tests of the auxiliary power units; checks of the main propulsion system pneumatic system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 10, 1991.]

October 11: ATLANTIS' GALLEY TESTED

Technicians in OPF Bay 2 completed a functional test of the Space Shuttle Atlantis' galley and checked out auxiliary power unit no. 1. Work in progress includes: a functional test of the main landing gear; closeouts of the thermal protection system around the chin panel; closeouts of the payload bay area; reinstalling the reinforced carbon carbon (RCC) T-seals and panels on the Orbiter's right wing; installation of carrier panels around the RCC leading panels; measurements of the T-seals and panels; closing out the aft compartment. Scheduled work includes: final payload bay door closure early next week; determining the Orbiter's weight and center of gravity and the transfer of Atlantis to the Vehicle Assembly Building is targeted for October 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 11, 1991.]

DISCOVERY IN OPF BAY 3

A number of processing tasks are in progress upon Discovery in OPF Bay 3;

these include: preparations to perform leak checks of the orbital maneuvering system; checks of the Ku-band antenna drive assembly; post-flight measurements and inspections of the 17-inch disconnects; reconfiguration of the aft flight deck and post-flight inspections and testing. Scheduled work includes: drying of the Shuttle main engines; validation of the electrical system; leak and functional test of the main propulsion system helium system and removal of the robot arm. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 11, 1991.]

WORK CONTINUES ON ENDEAVOUR (OV 105)

Processing activities on the Space Shuttle Endeavour continue in OPF Bay 1; tasks include: installation of the inertial measurement units; checks of the communications system; inspections of the 17-inch disconnects; fitting lines for the gaseous oxygen main propulsion system; elevon cove seal leak checks; leak and functional tests of the liquid hydrogen main propulsion system; inspections of the main propulsion system pneumatic system. Scheduled work includes: installation of the robot arm and installation of both the left and right orbital maneuvering system pods over the next two weeks. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 11, 1991.

October 12: GREENE TO HEAD EXPLORATION OFFICE

Jay Greene has been named to be Deputy Associate Administrator of NASA's newly created Office of Exploration; he was previously Deputy Manager of the Space Shuttle Program at Johnson Space Center (Houston, TX). The Office of Exploration, headed by **Michael Griffin**, will develop future U.S. space missions including a permanently occupied base on the moon and a manned mission to Mars. ["NASA Names New Exploration Official," FLORIDA TODAY, p. 9E, Oct. 13, 1991.]

CRANE ACCIDENT INJURES THREE

Three Lockheed Space Operations Co. employees were injured in OPF Bay 3 today when a small crane fell onto a work platform near Discovery's three main engines. Each was treated for head and back injuries at Parrish Medical Center (Titusville, FL) and were released. Lockheed's spokesman **J. B. Klump** said it was company policy not to reveal the names of the workers injured in the accident. Kennedy Space Center spokesman **Dick Young** said that the Orbiter sustained no damage. The accident is under investigation. Speaking of the technician's injuries, Klump said, "I think we were fortunate. It happened right near flight hardware. We don't take this lightly." [Brown, FLORIDA TODAY, p. 4A, Oct. 13, 1991, "Crane Accident Injures 3 Working on Discovery," THE ORLANDO SENTINEL, p. A-14, Oct. 14, 1991, Klump, "LSOC Workers' Quick Action 'Saves the Day' In OPF Incident," Star Gazer, p. 3, Nov. 7, 1991.]

October 14: ATLANTIS MOVE ANTICIPATED

Technicians over the weekend finished installing heat-protective panels and seals

on the wings of Space Shuttle Atlantis in Orbiter Processing Facility Bay 2. Inspections showed that 8 of 42 T-seals on Atlantis had cracks; each was replaced with a spare; cracks were also found on Discovery and Columbia. Current plans continue to call for a move to the Vehicle Assembly Building on October 18. [Brown, FLORIDA TODAY, p. 4A, Oct. 15, 1991.]

EUTELSAT LAUNCH DELAYED

At Cape Canaveral Air Force Station, the launch of Eutelsat, a European communications satellite, has been delayed until early November. Eutelsat Project Manager **Jean Jacques Dumesnil** said that the delay was caused by the need to replace a faulty electronics box. The launch of this mission had originally be set for August after the spring failure of an Atlas launch. Dumesnil said the nose cone and its enclosed payload would be moved to Launch Complex 36 on October 28. [Halvorson, FLORIDA TODAY, p. 4A, Oct. 15, 1991.]

October 15:

ATLANTIS: APU CHECKS COMPLETED

Technicians working in Orbiter Processing Facility Bay 2 have completed auxiliary power unit leak checks on the Space Shuttle Atlantis in preparation for its STS 44 mission; they also completed payload bay closeouts and main landing gear functional checks. Processing workers are currently working on: flipper door closeouts; nose landing gear final functional test; aft engine compartment closeouts; last RCC panel installation today; wing tile step and gap work. Processing work yet to be completed includes: final structural leak checks; final cleaning of the payload bay; functional testing of payload bay doors and closing them for rollout; Orbiter weight and center of gravity determination; rollover to the Vehicle Assembly Building on October 18. Managers expressed a degree of optimism that the target launch date of November 19 might yet be met. Kennedy Space Center spokesman **Bruce Buckingham** said, "We're only one day off from our original rollover date. That would make it fairly comfortable for us to meet the [November] 19th." [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 15, 1991, Brown, FLORIDA TODAY, p. 5A, Oct. 16, 1991.]

ENDEAVOUR IMU'S INSTALLED

The Space Shuttle Endeavour has had its inertial measurement units installed. Technicians in OPF High Bay 1 are working on several tasks: main propulsion system checks for contamination; installation of thermal protection system blankets; hydraulic cycling of aerospace surfaces; nose wheel checks and functional tests. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 15, 1991.]

DISCOVERY: T-SEAL INSPECTIONS

The inspection of all of Discovery's T-Seals has been completed; only one was found to be cracked and will be replaced with a spare already on site at Kennedy Space Center. Discovery's water dump nozzle has also been removed. Work in progress includes: heat shield installations; Spacelab module brazing and remote

manipulator system operations. Reinstallation of the Orbiter's T-seals has been scheduled. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 15, 1991.]

CRANE ACCIDENT: HUMAN ERROR

Kennedy Space Center spokesman **Bruce Buckingham** today said it appeared that human error and equipment problems caused a crane accident on October 12 [see story above]. Buckingham noted that the hoist, which runs along a structural beam, apparently left its track because locks on the beam to prevent the hoist from slipping were either an improper size or missing. Two workers were injured by falling equipment and a third was injured as he successfully prevented the hoist and crane from falling off a processing platform; if it had fallen off the platform the Orbiter Discovery would have been damaged. [Brown, FLORIDA TODAY, p. 5A, Oct. 16, 1991.]

October 16:

ATLANTIS: WING PANELS INSTALLED

Technicians in OPF Bay 2 have completed the final installation of the last carrier wing panels on Atlantis in preparation for its STS 44 mission next month. Other completed work includes: payload bay closeouts and cleaning; APU leak checks; tire flight pressurization; aft structural leakage test. Work in progress includes: payload bay door functional test and final closing; landing gear final functional test; aft engine compartment closeouts; wing tile step and gap work; forward compartment closeouts. Scheduled tasks include: Orbiter weight and center of gravity determinations and the rollover to the Vehicle Assembly Building October 18. [KSC SHUTTLE STATUS REPORT, 10 A. M., Oct. 16, 1991, "Atlantis Ready to Go to VAB," FLORIDA TODAY, p. 2A, Oct. 17, 1991.]

STS 49 PROCESSING

Endeavour's inertial measurement units have been installed during Shuttle processing in OPF High Bay 1. Technicians have also completed hydraulic fill and bleed operations on the Orbiter. Work in progress includes: main propulsion system checks for contamination; installation of thermal protection system blankets; hydraulic cycling, checks and calibrations of aerosurfaces; nose wheel checks and functional tests and wing strut inspections. Scheduled work includes: right hand OMS pod delivery to OPF October 19 and left hand pod delivery Oct. 22. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 16, 1991.]

DISCOVERY: WATER DUMP NOZZLE

Discovery's water dump nozzle has been removed during processing in OPF High Bay 3; all T-seals have been inspected and helium tank vents have been completed. Work in progress includes: heat shield removal; Spacelab module brazing; remote manipulator system operations; reinstallation of T-seals; tile work around nose landing gear. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 16, 1991, "Atlantis Ready to Go to VAB," FLORIDA TODAY, p. 2A, Oct. 17, 1991.]

October 17: **STS 44: LANDING GEAR TEST COMPLETED**

Shuttle processing technicians in Orbiter Processing Facility Bay 2 conducted the final landing gear functional test today. They also removed the payload bay door strongbacks; they completed the functional test, cycling and final closing of the payload bay doors; completed the installation of and checks of all wing carrier panels; completed carrier panel and tile work around the payload bay door hinges and conducted an aft structural leakage test. Technicians are continuing the following tasks: aft engine compartment closeouts; tile step and gap work; Orbiter weight and center of gravity determinations; retraction of work platforms in the VAB for Orbiter delivery October 18. Scheduled work includes: positioning the Orbiter transporter in the OPF tonight; rollover to VAB; transporting the payload to Launch Complex 39A next week; rolling out Atlantis to LC 39A at 12:01 a.m. October 24. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 17, 1991.]

ENDEAVOUR PROCESSING

Hydraulic cycling, checks and calibrations of Endeavour's aerosurfaces have been completed in OPF High Bay 1 this week; other completed operations include: nose wheel checks and functional tests; helium system checkouts; inertial measurement units installed; hydraulic fill and bleed operations. Work in progress: main propulsion system checks for contamination; installation of thermal protection system blankets; auxiliary power unit leak and functional tests; wing strut inspections; gaseous nitrogen system leak checks. The right hand OMS pod is scheduled for delivery to the OPF on October 19; the left hand pod will be delivered October 22, following final leak checks. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 17, 1991.]

STS 42/DISCOVERY

All T-seals on wing leading edges on Discovery have been inspected; technicians have also completed ventilating the helium tank and down processing of Discovery's previous mission, STS 48. Work in progress: heat shield removal on engines 1 and 2; removal of the remote manipulator arm; reinstallation of T-seals; tile work around nose landing gear; installation of dump valve nozzle; reaction control system regulator flow. Technicians will shortly close the Orbiter's payload bay doors for bulb seal measurements. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 17, 1991.]

ENDEAVOUR'S FIRST LAUNCH THREATENED

The first mission of the newest Space Shuttle, Endeavour, is currently scheduled for April 9, 1992, but hundreds of problems with the Orbiter may cause the launch to be delayed as much as two months. Nearly 1,500 problems have been reported so far, ranging from crossed electrical wires which would make parts move the wrong way to contaminated fuel lines which have had to be flushed several times. Some of the Orbiter's heat protection tiles do not fit properly, either. None of these problems is thought to be a serious flight safety issue, but

all of them must be solved before launch, NASA officials said. NASA spokesman **Ed Campion** said, "It's true we are several weeks down of where we'd like to be at this point. However, there is every reason to believe we will be able to make up that time." A number of the problems arose from decisions made to "borrow" flight hardware to use on Discovery and Columbia, so that tasks that manufacturer Rockwell International were originally supposed to complete have now been shifted to Kennedy Space Center workers. Additionally, some problems usually found and corrected by the manufacturer before delivery were not discovered until after delivery to KSC. Endeavour will be rolled to Launch Complex 39B about February 20 and readied for a crucial test-firing of its main engines on March 5. [Banke, FLORIDA TODAY, p. 1A, Oct. 18, 1991.]

October 18: **ATLANTIS MOVES TO VAB TODAY**

"It appears everything is right on schedule," said Kennedy Space Center spokesman **Bruce Buckingham** about the Space Shuttle Atlantis's scheduled move to the Vehicle Assembly Building today. The Shuttle has been bolted to the transporter and the weight and center of gravity of the vehicle has been determined. The move to the VAB should occur between noon and 1 p.m., according to Buckingham. The Orbiter will be mated to its external tank and launch platform this weekend and rolled out to Launch Complex 39A on October 24 and have its payload loaded on October 31. A Terminal Countdown Demonstration Test is scheduled for October 31-November 1. The payload is a 5,000-pound Department of Defense satellite. [Brown, FLORIDA TODAY, p. 6A, Oct. 18, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 18, 1991.]

OPF BAY 3: DISCOVERY PROCESSING

The robot arm has been removed and the dump nozzle has been installed in the Space Shuttle Discovery in Orbiter Processing Facility Bay 3. Ongoing tasks include: removal of heat shields from around the main engines; validation of the orbiter electrical system; reinstallation of the reinforced carbon carbon T-seals and panels on the leading edges of both wings; closing of the payload bay doors. Work remaining to be completed: removal of the Shuttle main engines next week; leak and functional testing of the main propulsion system helium system; inspections of the payload bay bulb seal. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 18, 1991.]

ENDEAVOUR PROCESSING/OPF BAY 1

Nose wheel steering tests on Endeavour have been completed in OPF Bay 1. OMS pods remain on the schedule for installation in the Orbiter. Other work in progress: preparations to install the power reactant storage and distribution system tank set No. 3; inspections of the 17-inch disconnects; leak and functional tests of the liquid hydrogen main propulsion system; inspections of the main propulsion system pneumatic system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 18, 1991.]

NASA PROUD OF ENDEAVOUR

Despite an increasing number of problems with its newest Space Shuttle, NASA is remaining confident about capability of Endeavour to take its place in the four-vehicle fleet. "We're looking forward to tidying up what needs to be done and go fly. I think Endeavour will still prove to be the gem of the fleet," said Kennedy Space Center Director **Forrest S. McCartney**. Engineers expect the total number of problems with the new Orbiter to range between two and three thousand; Discovery had 2,788 problems and there were 2,876 with Columbia and 1,573 with Atlantis. "Make no mistake, we want our people to write up anything and everything they see on all of these vehicles. They all must be critically inspected," said McCartney. He added, "If you had left the vehicle longer on the West Coast, they would have done a lot of the work there that we are doing now." The Lockheed manager in charge of Endeavour, **Eric Clanton**, said, "When you consider the millions of man-hours that went into that vehicle, what we're finding may not be significant at all." [Banke, FLORIDA TODAY, p. 2A, Oct. 19, 1991.]

October 19:

NASA MAY CLOSE A PAD

"I really think there is a good chance, better than 50-50, that we will put one pad down," said KSC Director **Forrest S. McCartney** today. The budget of Kennedy Space Center must be cut $30 million a year for each of the next five years. Closing a pad is perceived by KSC officials as one way to avoid additional layoffs. "Not laying off people is dependent on keeping the overtime down," McCartney said. At NASA headquarters, however, the attitude is different, according to McCartney. He said, "They want us to continue to work the overtime without over-stressing the work force to try to make up as much time as possible." Currently, the overtime rate at the space center is near 6 percent - down 4 percent from the previous year. "The program has got to decide whether this is worth the money or not. They've got to understand we cannot have all this flexibility we've had before and still cut the budget. It just can't be done." [Banke, FLORIDA TODAY, p. 1A, Oct. 20, 1991.]

CRIPPEN INDUCTED IN SPACE HALL OF FAME

Shuttle Program Director **Robert L. Crippen** has been inducted into the International Space Hall of Fame at the Space Center (Alamogordo, NM). Crippen, also known as "Crip," piloted the STS 1 Shuttle mission and flew three other Orbiter missions. Also inducted with Crippen were **Galileo Galilei**, **Alexei Isayev**, **Rodolfo Neri Vela** and **Robert Rushworth**. ["Robert L. Crippen Inducted into International Space Hall of Fame," FLORIDA TODAY, p. 9E, Oct. 20, 1991. [See: November 1.]

October 20:

ATLANTIS PREPARED FOR TEST

The mechanical and electrical connections made today between Atlantis and its external tank and solid rocket boosters will be tested tomorrow in the Vehicle Assembly Building. Rollout to Launch Complex 39A is set for October 24 at 12:01

a.m., according to KSC spokesman **George Diller**. The Terminal Countdown Demonstration Test for STS 44 begins October 31 and the Launch Readiness Review begins November 7. [Banke, FLORIDA TODAY, p. 5A, Oct. 21, 1991.]

October 21: **GROUNDWATER CLEANUP PLAN**

NASA has been working with state and federal environmental agencies to identify areas of contaminated groundwater and to develop treatment plans, according to NASA's environmental analyst **John Ryan**. He said that NASA will explain its groundwater program and respond to questions at an informal public workshop to be held October 24 at 6 p.m. at the North Brevard Public Library (Titusville, FL). [Fiorini, FLORIDA TODAY, p. 1B, Oct. 22, 1991.]

STS 44: ATLANTIS STATUS REPORT

Atlantis completed its transfer to the Vehicle Assembly Building at 12:05 p.m., October 18. It was mated to its external tank and solid rocket boosters by 1:07 p.m., October 19 and its payload was transferred to Launch Complex 39A early this morning. A Shuttle Interface Test is currently in progress to verify critical connections between the vehicle elements and the launch platform. Atlantis is scheduled to be rolled out to LC 39A at 8 p.m., Oct. 23 and a Terminal Countdown Demonstration Test is scheduled for October 31. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 21, 1991.]

STS 42: DISCOVERY PROCESSING

Inspections of Discovery's payload bay bulb seal and validation of the vehicle's electrical system have been completed. Work in progress includes: preparations to remove the shuttle main engines; reinstallation of the reinforced carbon carbon T-seals and panels on the leading edges of both wings; open the payload bay doors; functional test of the radiators; thermal protection system operations; leak and functional tests of the main propulsion system; testing of the communications system. Technicians are scheduled to remove the Shuttle main engines on October 22 and to conduct a leak and functional test of the main propulsion system helium system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 21, 1991.]

ENDEAVOUR PROCESSING REPORT

Technicians in Orbiter Processing Facility Bay 1 are engaged in a variety of activities in processing Endeavour: leak and functional tests of the auxiliary power units; preparations to install the power reactant storage and distribution system tank set No. 3; rigging of the left external tank door; checks of the main propulsion system; inspections of the main propulsion system pneumatic system; installing strain gauges on the wings. Technicians are planning to install the right orbital maneuvering system pod this week and the left pod next week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 21, 1991.]

October 22: **ATLANTIS: SHUTTLE INTERFACE TEST**

A Shuttle Interface Test is now underway in the VAB to verify critical connections between the elements of Atlantis and the launch platform. In addition, checks of the solid rocket booster thruster vector control system and leak tests of the T-zero umbilicals on the liquid oxygen tail service mast are in progress. The STS 44 cargo - a Defense Support Program satellite - has been transferred into the payload changeout room; that took place October 21. Rollout to Launch Complex 39A is scheduled for 8 p.m. October 23 with a Terminal Countdown Demonstration Test set for October 31 through November 1. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 22, 1991.]

[] **DISCOVERY IN OPF BAY 3: STS 42**

The drying of Discovery's engines has been completed in preparation for its STS 42 mission. Work in progress in OPF Bay 3 includes: removal of the three Shuttle main engines; reinstallation of the reinforced carbon carbon T-seals and panels on the leading edges of both wings; inspections of the radiators; thermal protection system operations; leak and functional tests of the main propulsion system; testing of the communication system. Technicians are preparing for the installation of the three Shuttle main engines beginning October 24 and for leak and functional tests of the main propulsion system helium system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 22, 1991.]

October 23: **MCCARTNEY TO STEP DOWN**

Kennedy Space Center Director **Forrest S. McCartney** is expected to retire soon, perhaps a year. "I've been here five years and watched 18 Shuttles lift off so far," he said of his time at the space center. "You can't do this forever. I plan on staying here and launching another eight birds." Former astronaut and the current Space Shuttle Program Director **Robert L. Crippen** is expected to be a likely successor. [Banke, FLORIDA TODAY, p. 1A, Oct. 23, 1991, SEE: October 31 and November 1.]

[] **ATLANTIS ROLLS TO 39A**

The Space Shuttle Atlantis, now being readied for its November 19, STS 44 mission, was rolled from the Vehicle Assembly Building to Launch Complex 39A tonight starting at 7:48 p.m. The 3.5-mile trip was expected to take about six hours. "We've got another four weeks ahead of us, including a countdown test next week and the installation of the payload in the cargo bay," said KSC spokeswoman **Lisa Malone**. "We continue to be in good shape for the November 19 target date." The Defense Support Program satellite will be loaded into Atlantis' cargo bay on October 31; the six-man crew will begin on-site training on that date as well. The Shuttle Interface Test was completed this morning at 1:00 a.m. Currently technicians are installing Atlantis' IUS flight Redundant Inertial Measurement Unit (RIMU) for the Defense Support Program (DSP). Scheduled work includes: establishment of electrical and mechanical connections once

Atlantis is at LC 39A; hot firing of an auxiliary power unit is scheduled for October 24; moving the rotating service structure into position around the vehicle to establish access and weather protection; TCDT (October 31) and FRR (November 7). [Halvorson, FLORIDA TODAY, p. 4A, Oct. 23, 1991, Banke, FLORIDA TODAY, p. 1A, Oct. 24, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 23, 1991.]

DISCOVERY PROCESSING STATUS

Discovery's Engine #2 was transported to the Vehicle Assembly Building's main engine maintenance facility; engine #1 has also been removed and will be delivered for maintenance on October 28. Discovery's heat dissipation radiators on its payload bay doors have been inspected and an X-ray and leak check of the Orbiter's water dump nozzle has also been completed. Work in progress on Discovery includes: powered-on testing; removal of SSME #3; mating of right forward center booster segment in the VAB; reinstallation of the T-seals; routine tile work. Scheduled work includes: the installation of main engines for Discovery's STS 42 mission and a leak and functional test of the main propulsion system. [KSC SHUTTLE STATUS REPORT, Oct. 23, 1991.]

ENDEAVOUR/OV 105: PROCESSING

Endeavour has had its PRSD Tank Set #3 hydrogen tank installed; leak and functional checks have been completed on the Orbiter's auxiliary power units. Work in progress includes: inertial measurement unit calibrations on the flight deck; communications systems checks; liquid oxygen pneumatic system checks; drag chute fit checks; carrier panel installation. Scheduled work includes: installation of PRSD Tank Set 3 oxygen tank; installation of remote manipulator system next week; main propulsion system leak checks; arrival of right-hand OMS pod from HMF next week. [KSC SHUTTLE STATUS REPORT, Oct. 23, 1991.]

October 24:

ATLANTIS AT LC 39A

NASA is preparing for the last launch of 1991 with Atlantis now at Launch Complex 39A. First motion of the Shuttle on its route to the pad came at 7:48 p.m. last night and the vehicle was reported hard down on the pad's pedestals at 2:05 a.m. Atlantis is being prepared for its STS 44 Department of Defense mission; launch is set for November 19. [SEE: Flight Readiness Review, November 7.] The primary objective of the mission is to deploy the Department of Defense Support Program (DSP) satellite from Atlantis'; the satellite, which arrived at the pad on October 21, will be loaded into the Orbiter's payload bay on October 31. STS 44 flight crew members are scheduled to arrive at KSC October 29 at 4:30 p.m., to participate in the Terminal Countdown Demonstration Test, a full dress rehearsal of launch day activities. While at Kennedy Space Center, the crew will be trained for an emergency escape from the launch pad and will practice driving in the M113, the armored personnel carrier which serves as an astronaut rescue vehicle. In addition, Commander **Fred Gregory** and Pilot **Tom Henricks** will practice approaches to the Shuttle Landing Facility in the Shuttle

Training Aircraft. The mock countdown is set to begin at 8 a.m., October 31 and will culminate in a simulated launch after 11 a.m. EST on November 1.

Following its STS 43 mission in August, about a dozen modifications or enhancements were made to Atlantis during its two month stay in the Orbiter Processing Facility. For instance, this flight will be the first test of an improved inertial measurement unit (IMU) called HAINS (High Accuracy Inertial Navigation System). The new unit features improved performance and accuracy and was installed in the No. 3 position. The Orbiter's three redundant IMUs are part of the guidance and navigation system. Eventually all IMUs in the Shuttle fleet will be replaced with the HAINS model as part of the continuous improvement program. While in the OPF, small cracks were found in eight of the reinforced carbon carbon T-seals on the wings' leading edges. Those seals were replaced with spares. An analysis has indicated that the cracks are caused from the thermal cycling the leading edges were exposed to during re-entry. All of Atlantis' systems were fully tested while in the OPF, including both orbital maneuvering system pods and the forward reaction control system. Space Shuttle main engine locations for this flight are as follows: engine 2015 in the No. 1 position, engine 2030 in the No. 2 position, and engine 2029 in the No. 3 position. These engines were installed in September.

The Crew Equipment Interface Test with the STS 44 flight crew was conducted on October 5 in the OPF. This test provided an opportunity for the crew to become familiar with the configuration of the Orbiter and anything that is unique to the STS 44 mission. Booster stacking operations on mobile launcher platform 1 began August 26 and were completed September 20. The external tank was mated to the boosters on September 16 and Atlantis was transferred to the Vehicle Assembly Building on October 18 where it was mated to the external tank and solid rocket boosters. A standard 43-hour launch countdown, with built-in holds, is scheduled to begin three days prior to launch. During the countdown, the Orbiter's onboard fuel and oxidizer storage tanks will be loaded and all Orbiter systems will be prepared for flight. About 9 hours before launch the external tank will be filled with its flight load of a half a million gallons of liquid oxygen and liquid hydrogen propellants. About two and one-half hours before liftoff the flight crew will begin taking their assigned seats in the crew cabin. Landing of the STS 44 mission is scheduled to occur at Kennedy Space Center's Shuttle Landing Facility on the afternoon of November 29. [NASA/KSC Release No. 121-91, October 24, 1991.]

ROCKWELL: CONTRACT EXTENSION

Rockwell International Corp.'s Space Systems Division has been awarded a three-year extension of its Space Shuttle logistics operations contract worth $453.3 million. The contract runs from October 1, 1991, until September 30, 1994, and calls for the provision of spare parts for Orbiter flight, ground-support equipment, launch and landing ground-support equipment and maintenance-support equipment. Rockwell's Kennedy Space Center workforce numbers 1,375.

"Rockwell Wins NASA Contract Extension," FLORIDA TODAY, p. 12C, Oct. 24, 1991.]

PEGASUS LAUNCH PLANS

Next year, an air-launched Pegasus rocket will lift a satellite designed to monitor the Brazilian rain forests. It will be the first such launch from the Space Coast and, according to Orbital Sciences Corp. spokeswoman **Laura Ayres**, "The Cape has the best geographic location to get into the orbit the customer wants." Two previous Pegasus flights have taken place from Edwards Air Force Base (CA). Ayres said that Orbital Sciences Corp. plans to contract with NASA for launch support. [Brown, FLORIDA TODAY, p. 1A, Oct. 22, 1991.]

GROUNDWATER CONTAMINATION NOT SERIOUS THREAT

At a workshop in Titusville, FL, NASA's Environmental Analyst **John Ryan** and others described the program initiated in 1988 to clean up about 11 acres of contaminated groundwater at Wilson Corners. He said that the groundwater contaminated on NASA property in the 1960s did not pose a serious health risk. The Environmental Protection Agency monitors the cleanup program. Treated clean water is sprayed on the ground to help replenish the water supply and retard saltwater intrusion, according to Ryan. NASA hopes to expand the project to raise the number of pumps involved from five to ten. [Fiorini, Radonna, FLORIDA TODAY, p. 2B, Oct. 26, 1991.]

ATLANTIS: CARGO TO BE LOADED

A Defense Support Program satellite will be loaded into the payload bay of the Space Shuttle Atlantis in preparation for its STS 44 mission, scheduled for November 19. **Lisa Malone**, KSC spokeswoman, said, "The rollout was uneventful." The rollout came about four hours ahead of schedule because technicians were able to attach the vehicle to its external tank and solid rocket boosters and test the connections more quickly than anticipated. The Shuttle was reported hard down on the pad's pedestals at 2:05 this morning. At the pad technicians also tested one of the Orbiter's APUs; the seven-minute test was required because the unit had been borrowed from Discovery. After the test, the Rotating Service Structure was moved into place around the Orbiter; the RSS protects the vehicle from bad weather and allows technicians to continue preparing the Space Shuttle for launch. Scheduled work includes: opening of the payload bay doors tomorrow; helium signature leak test of the main propulsion system and main engines on Sunday (October 27); loading of hypergolic propellants into the Orbiter next week; Terminal Countdown Demonstration Test (October 31); installation of Defense Support Satellite into the payload bay October 31. [Banke, FLORIDA TODAY, p. 2A, Oct. 25, 1991, KSC SHUTTLE STATUS REPORT, 11 A.M., Oct.24, 1991.]

IML-1/STS 42: DISCOVERY PROCESSING

All three Shuttle engines have been removed from Discovery in OPF Bay 3. Technicians in OPF Bay 3 are installing the wheels and tires on the main landing gear; reinstallation of the reinforced carbon carbon T-seals and panels on the leading edges of both wings; functional tests of the Orbiter's radiators; thermal protection system operations; leak and functional tests of the main propulsion system; testing of the communications system. Leak and functional tests of the main propulsion system helium system. [KSC SHUTTLE STATUS REPORT, 11 A.M., Oct. 24, 1991.]

OMS POD PREPARATIONS: ENDEAVOUR

Technicians in OPF Bay 1 are preparing to install the right orbital maneuvering system pod in the Space Shuttle Endeavour. Other processing activities in progress include: calibration of the three inertial measurement units; installation of the Ku-band antenna; leak and functional tests of the auxiliary power units; preparations to install the power reactant storage and distribution system tank set No. 3; preparations for an end-to-end test of the flight control system; tests of the main propulsion system; installation of strain gauges on the wings. Overnight, workers will be installing the right OMS pod and will install the left-hand pod this weekend. [KSC SHUTTLE STATUS REPORT, 11 A.M., Oct. 24, 1991.]

SPACELAB MODULE PROCESSING

Years of planning and several months of pre-launch processing and testing of flight hardware are nearing the final stages for Kennedy Space Center engineers and scientists working on the first International Microgravity Laboratory (IML-1) Spacelab module. Scheduled to be flown aboard the Orbiter Discovery in January 1992, IML-1 is the primary payload for the seven-day-long STS 42 Space Shuttle mission. IML-1 is now housed inside the cleanroom-like environment of the Operations and Checkout Building's highbay, but next month will be moved to bay 3 of the Orbiter Processing Facility where it will be installed inside the Shuttle Discovery's payload bay. Stowage of some experiments and further testing will continue on IML-1 once it's inside Discovery, but the majority of pre-launch work will be completed by the time it leaves the Operations and Checkout Building. "I've been associated with the IML-1 mission since 1989, and it's really nice to see the payload shaping up so well," remarked **Glenn Snyder**, KSC's STS 42 payload processing manager. "We've handled IML-1 in a careful, methodical fashion, and the product really exemplifies that. I think it's the cleanest and most trouble-free Spacelab we've ever processed." IML-1 is the first in a series of IML missions scheduled to be launched aboard the Shuttle during the next decade. All of these missions are dedicated to the study of life and materials sciences in microgravity. The missions will specifically concentrate on the intricate effects of weightlessness on living organisms and how materials react when mixed in space.

The IML program is a continuation of NASA's peaceful and successful multi-national space efforts. The venture is a combined partnership of NASA, the 14-nation European Space Agency (ESA), the Canadian Space Agency (CSA), the

French National Center for Space Studies (CNES), the German Space Agency and the German Aerospace Research Establishment (DARA/DLR), and the National Space Development Agency of Japan (NASDA). A seven-member astronaut flight crew is scheduled to fly aboard Discovery on the IML-1 Space Shuttle mission. The crew of the fourteenth flight of the Orbiter Discovery will consist of Commander **Ron Grabe**, Pilot **Steve Oswald**, Mission Specialists **Norman Thagard**, **David Hilmers** and **Bill Readdy** and Payload Specialists **Roberta Bondar** and **Ulf Merbold**. Bondar is a Canadian astronaut representing the Canadian Space Agency. Merbold represents the European Space Agency. [Varnes, NASA/KSC RELEASE NO. 120-91, Oct. 24, 1991.]

October 25: **ATLANTIS: PROPULSION TEST**

The Space Shuttle Atlantis is hard down at the pad and awaiting a critical test of its main propulsion system. KSC spokeswoman **Lisa Malone** said, "Things are going along pretty smoothly." At LC 39A, technicians are continuing fueling operations for STS 44. The pad will be closed to all but essential operations. A helium signature leak test begins tomorrow and concludes October 27; it involves pumping gaseous helium through the system to help detect leaks. The test is conducted before every mission. A successful hot firing of auxiliary power unit No. 1 was conducted last night. The service structure around Atlantis was rotated at 11:07 p.m. last night. At LC 39A, technicians today will continue preparations for fueling operations, a hazardous undertaking which requires clearing the pad area of all but essential personnel. A TCDT begins October 31 and concludes November 1. The Department of Defense Support Satellite will be loaded aboard Atlantis October 31. [Halvorson, FLORIDA TODAY, p. 5A, Oct. 26, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 25, 1991, "Shuttle Atlantis Arrives On Pad for Nov. 19 Launch," THE ORLANDO SENTINEL, Oct. 25, 1991.]

DISCOVERY'S STS 42 PROCESSING

Engine No. 1 has been installed aboard Discovery and a functional test of the Orbiter's radiators has been completed in preparation for the vehicle's STS 42 mission. Work in progress includes: installation of the two remaining main engines; installation of the wheels and tires on the main gear; reinstallation of the reinforced carbon carbon T-seals and panels on the leading edges of both wings; thermal protection system operations; leak and functional tests of the main propulsion system and its helium system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 25, 1991.]

ENDEAVOUR: KU-BAND ANTENNA INSTALLED

Endeavour's Ku-band antenna has been installed while the vehicle is being processed in Orbiter Processing Facility Bay 1. Other current processing operations include: connections of the right orbital maneuvering system pod; leak and functional tests of the auxiliary power units; preparations to install the power reactant storage and distribution system tank set No. 3; preparations for an end-to-end test of the flight control system; tests of the main propulsion system.

Scheduled work includes: installation of the left orbital maneuvering system pod this weekend; tests of the flight controls planned for next week and installation of Endeavour's star tracker. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 25, 1991.]

BUY SOVIET STATION?

Two congressmen have inquired of NASA Administrator **Richard H. Truly** why the agency is not planning to buy the Soviet Mir Space Station. He replied, "The administration is intensely concerned about the health and capabilities of the U.S. aerospace industry," he said in a letter to the congressmen. "Depending on the specific case, procuring a Soviet system or technology in place of a procurement from U.S. industry may or may not be in the overall national interest." ["Lawmakers: Why Not Buy Soviet Station?" FLORIDA TODAY, p. 5A, Oct. 26, 1991.]

3-DAY CONFERENCE TO FEATURE MCCARTNEY

A three-day space conference set for Cocoa Beach, FL, entitled: "Logistics Outward Bound - The Earth, Moon and Mars," will offer discussions of the following topics: space transportation, financing, the space station, ground support operations, commercial space ventures, computer applications and future programs. Kennedy Space Center **Forrest S. McCartney** is expected to address the opening session November 4 at 8 a.m. at the Cocoa Beach Holiday Inn. Panelists include: **Richard Kohrs**, NASA's Space Station Freedom Director; **Michelle Griffin**, Associate Administrator for the Space Exploration Initiative, NASA; **Jack Lee**, Marshall Space Flight Center Director (Huntsville, AL); Maj. Gen. **Carl O'Berry**, Director of Command and Control Systems and Logistics at U.S. Space Command; **Kumar Krishen**, Johnson Space Center Chief Technologist, **Michael McCulley**, former Shuttle astronaut and Lockheed Launch Site Deputy Director; **Marcia Smith**, Space Policy Expert with Congressional Research Service. "Three-Day Conference to Attract Top Officials," FLORIDA TODAY, p. 9E, Oct. 27, 1991.]

October 28:

BUSH SIGNS SPACE STATION BILL

President George Bush today signed a bill which allows NASA to proceed with the building of the Space Station Freedom; about $2 billion was provided in an $81 billion appropriation bill. Construction will start in the current fiscal year. ["Bush Signs Bill Providing Money for Space Station," FLORIDA TODAY, p. 2A, Oct. 29, 1991.]

SIGNATURE LEAK TEST COMPLETE: ATLANTIS

Technicians at Launch Complex 39A have completed cleaning up Atlantis' payload bay and launch pad validations; the Orbiter's helium signature leak test of the main engines and main propulsion system was also completed. In progress: Preparations for loading hypergolic propellants into the Orbiter's onboard storage tanks. In addition, hydrazine will be loaded into the Orbiter's auxiliary power units

and the boosters' hydraulic power units. The pad will be closed at 8 p.m. tonight through October 31 when this operation is scheduled to conclude. Closure of the payload bay doors for the hypergolic propellant loading activities are also underway. The STS 44 crew arrives at Kennedy Space Center tomorrow, October 30, at the Shuttle Landing Facility to participate in the Terminal Countdown Demonstration Test. On October 31, the Defense Support Program satellite will be loaded into Atlantis' cargo bay. The Terminal Countdown Demonstration Test begins October 31 and will be concluded the following day with a simulated launch. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 28, 1991.]

DISCOVERY: T-SEALS INSTALLATION

In OPF Bay 3, technicians are installing Discovery's T-seals on the leading edges of the Orbiter's wings. They are also installing the vehicle's water dump nozzle. Preparations are underway for a fuel cell single cell voltage test, the installation of the landing gear wheels and tires and servicing of the Orbiter's water spray boiler No. 3. Discovery's three main engines have been installed. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 28, 1991.]

ENDEAVOUR: OMS POD INSTALLED

The right orbital maneuvering system pod has been installed in the Space Shuttle Endeavour which is currently undergoing processing in OPF Bay 1 for its STS 49 mission. The right hand external tank door has also been attached to the Orbiter. Work in progress: electrical connections between the left orbital maneuvering system pod and the Orbiter; installation of the star trackers; installation of the power reactant storage and distribution system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 28, 1991.]

GOODSON PAVING WINS NEW CONTRACT

Goodson Paving Inc. (Sharpes, FL) has won a contract from NASA's Kennedy Space Center to pave several new roadways and parking lots. The fixed price contract is valued at $123,675 and covers all labor, equipment and materials for the three-stage project. Work is tentatively scheduled to begin next week and is expected to be completed within 120 calendar days. Construction will occur in three different phases. Task one consists of paving several new roadways and parking lots in the vicinity of the Rotation Processing and Surge Facility and the Crawler Maintenance Facility in the LC 39 area. A road lane extension will be added to existing lanes near Launch Complex 39A during the second phase of work. The final phase of paving will occur near the KSC Industrial Area with the construction of a 60-space parking lot to be used by employees working in the Contract Management Office and other contract facilities in the immediate area. [NASA/KSC News Release No. 123-91, Oct. 28, 1991.]

October 29: ATLANTIS CREW ARRIVES AT KSC TODAY

"We've got a big week coming up. I's been so quiet out here for so long, and

now it's finally picking up," said Kennedy Space Center spokeswoman **Lisa Malone**. The six-member crew of Atlantis' STS 44 mission is expected to arrive today at Kennedy Space Center at about 3:45 p.m. The crew which consists of Commander **Frederick D. Gregory**, Pilot **Terence "Tom" Henricks**, Payload Specialist **Thomas Hennen** and Mission Specialists **Mario Runco**, **F. Story Musgrave** and **James Voss**, will stay at KSC until November 1. At Launch Complex 39A, Atlantis' payload bay doors have been closed for the hypergolic propellant loading operations which are underway now. In addition, hydrazine will be loaded into the Orbiter's auxiliary power units and the boosters' hydraulic power units. The pad will be closed to all non-essential personnel through October 30 when the operation is expected to be concluded. [Halvorson, FLORIDA TODAY, p. 2A, Oct. 28, 1991, Banke, FLORIDA TODAY, p. 2A, Oct. 29, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 29, 1991.]

DISCOVERY: VOLTAGE TEST COMPLETED

In Orbiter Processing Facility Bay 3, technicians have completed Discovery's fuel cell single cell voltage test and have installed the main landing gear wheels and tires. They also repositioned the aerosurfaces for thermal protection system operations. Technicians are working a variety of tasks: installation of T-seals on the leading edges of the wings; installation of the water dump nozzle; servicing of the water spray boilers; preparations for a hot oil flush of the auxiliary power units; preparations to install the Spacelab tunnel adapter; inspections of thermal control blankets in the payload bay. In the VAB next week, the external tank will be mated to the solid rocket boosters. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 29, 1991.]

STAR TRACKERS INSTALLED: ENDEAVOUR

Workers in OPF Bay 1 have installed the star trackers in the Space Shuttle Endeavour. Work in progress: electrical connections between the left orbital maneuvering system pod and the Orbiter; installation of a power reactant storage and distribution system oxygen tank; rigging of the right hand external tank umbilical door; preparation for a complete end-to-end test of the hydraulics system; elevon cove seal installation; preparations for a leak and functional test of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 29, 1991.]

KSC IMPACT ON FLORIDA ECONOMY

Space-related employment and contracts at NASA's Kennedy Space Center generated a $1.416 billion boost to Florida's economy during the 1991 Fiscal Year which ended September 30. This represents an increase of about $100 million over the previous year. Of KSC's expenditures, $1,033 billion went to contractors operating on-site at the space center. An additional $224 million went off-site businesses in Brevard County. Other purchases and contracts awarded to Florida businesses outside of Brevard County totaled about $44 million. Space center purchases and contracts to businesses out of state totaled about $50 million.

However, at least 75 percent of the on-site and Brevard County expenditures were estimated to have stayed in the local area in the form of payrolls and purchases. Civil service salaries and personnel benefits through the end of FY91 amounted to $142 million, an increase of about $11 million over the previous year. About $117 million was for regular salary, lump-sum payments, overtime and awards programs. (The $25 million civil service benefits package and $50 million in out of state business awards increase KSC's total spending during the year to $1.493 billion.) Permanent federal employees at KSC edged over the 2,700 mark during the same period. While 3,450 individuals were employed through construction and tenant jobs at KSC, the majority of workers at KSC are employed by the on-site contractors and number almost 12,900. Overall, approximately 19,050 workers were employed at KSC through the close of the Fiscal Year on Sept. 30. Major contractors at KSC include Lockheed Space Operations, Co., the Shuttle Processing Contractor; EG&G Florida, Inc., the Base Operations Contractor; McDonnell-Douglas Space Systems, Inc., the Payload Ground Operations Contractor; and Rockwell International Corp., which provides Shuttle Orbiter logistics support. [NASA/KSC Release No. 126-91, Oct. 29, 1991.]

COMPUTRAC CONTRACT: KSC

NASA's John F. Kennedy Space Center has contracted CompuTrac (Titusville, FL), to supply computer hardware and integration services. The contract is valued at $91,209 and covers all materials, labor and equipment. CompuTrac will furnish 386/33 type computers and integrate 53 existing systems with government furnished equipment. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 29, 1991.]

BARED AND COMPANY CONTRACT

The Bared and Co. (Tampa, FL) has received a contract from NASA's John F. Kennedy Space Center to replace heating ventilating and air conditioning equipment. The fixed price contract is valued at $1,593,000 and covers all labor, equipment and materials necessary to replace heating and air systems in three buildings located at the Hypergol Maintenance Facility in KSC's Industrial Area. Work is tentatively scheduled to begin in early November and is expected to be completed in about a year. [NASA/KSC Release No. 124-91, Oct. 29, 1991.]

October 30:

STS 44 PAD PREPARATIONS

Nitrogen tetroxide has been loaded into the storage tanks of the Space Shuttle Atlantis at Launch Complex 39A. The STS 44 crew arrived at Kennedy Space Center yesterday at 3:45 p.m. to take part in the Terminal Countdown Demonstration Test which will culminate at 11 a.m. October 31. The six-member crew includes: Commander **Frederick D. "Fred" Gregory**, Pilot **Terence T. "Tom" Henricks** Payload Specialist **Thomas Hennen** and Mission Specialists **F. Story Musgrave, Mario Runco Jr.** and **James S. Voss**. Commander Gregory and Pilot Henricks will practice landings in the Shuttle Training Aircraft tonight; the Defense Support Program satellite will be loaded into Atlantis' cargo bay. Monomethylhydrazine is being loaded into the Orbiter's onboard storage tanks.

Hydrazine will be loaded into the Orbiter's auxiliary power units and the boosters' hydraulic power units. The pad will be closed to all non-essential personnel until this afternoon at the conclusion of the fueling operation. There will be a hot firing of the right hand hydraulic power units later today and the entire crew is scheduled for emergency egress training and M113 driver training. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 30, 1991, Banke, FLORIDA TODAY, p. 2A, Oct. 29, 1991.]

STS 42 PROCESSING: DISCOVERY

The Space Shuttle Discovery is undergoing a number of processing tasks: checks of the hydraulic and flight control systems; servicing of the Orbiter with potable water; installation of T-seals on the leading edge of the wings; servicing of the water spray boilers; preparations for a hot oil flush of the auxiliary power units; preparations to install the Spacelab tunnel adapter; inspections of thermal control blankets in the payload bay. Next week, Discovery's external tank will be mated with its solid rocket boosters. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 30, 1991.]

STS 49 ENDEAVOUR PROCESSING

In Orbiter Processing Bay 1, the Space Shuttle Endeavour is having its power reactant storage and distribution system tank installed. Other tasks currently underway include: rigging of the right hand external tank umbilical door; preparation for a complete end-to-end test of the hydraulics system; elevon cove seal installation; preparations for a leak and functional test of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 A.M., Oct. 30, 1991.]

EUTELSAT LAUNCH DELAYED

A potential problem with its rocket's guidance system has again delayed the launch of Eutelsat, a European communications satellite from Cape Canaveral. The launch was delayed at least seven days. General Dynamics spokesman **Jim Codd** said, "Right now we're looking at either the 13th or 14th of November. We're taking one more look at a little flaky data we've gotten from the [rocket's] navigation unit," which was manufactured by Honeywell, Inc. Company investigators suspect that the problem was caused by a glitch in ground support equipment; if that should prove true the navigation unit will not have to be replaced. [Halvorson, FLORIDA TODAY, p. 8A, Oct. 31, 1991.]

October 31:

NEW KSC DIRECTOR: CRIPPEN

NASA Administrator **Richard H. Truly** has named **Robert L. Crippen** to become the new Director of the John F. Kennedy Space Center, effective January 1, 1992. Crippen will replace **Forrest S. McCartney**, Lt. General, USAF, Retired, who will continue as Kennedy Director during a transition period until January 1, 1991. In announcing these moves, Truly said, "With 3 years of safe Shuttle flights behind us, Kennedy Space Center and the Shuttle program are moving into an era of new

challenges which will involve not only our continued commitment to safety, but also significant efforts to increase efficiencies and reduce operating costs. Bob Crippen has been a key leader over the years, and he will take the helm at Kennedy during the exciting years of continued Shuttle flights, leading to Space Station Freedom launch operations in the mid-1990's. Not only does Bob bring the personal experience of four space flights to the table, but his proven record of leadership in critical management assignments at both the Johnson and Kennedy centers, as well as his current job as Shuttle Program Director at NASA Headquarters, make him uniquely qualified at this critical time."

Truly also said, "The last several years, during which General McCartney has led Kennedy, have been genuinely remarkable ones for this vital launch center and for Forrest as well. In 1986, following the Challenger accident, I personally asked General McCartney, who at the time was nearing the conclusion of a long and distinguished career in the U. S. Air Force, to bring his experience to lead the safe return to flight at Kennedy. Since that first return flight in September 1988, the Kennedy team has launched 18 safe and successful flights in 3 years, with another on the pad at Launch Complex 39 for launch in just a few weeks. This is a remarkable record, achieved during the most challenging time in NASA's history, and the strength of Forrest's leadership in preparing the launch teams for the Shuttle's return to flight paved the way." [NASA/KSC NEWS RELEASE NO. 91-180, October 31, 1991, Halvorson, FLORIDA TODAY, p. 1A, Oct. 26, 1991, Banke, "KSC Chief: I Wanted to Stay Longer," FLORIDA TODAY, p. 1A, "KSC Director Expected to Be Replaced," THE ORLANDO SENTINEL, p. A16, Oct. 27, 1991, Nov. 2, 1991, Date, THE ORLANDO SENTINEL, p. A3, Oct. 30, 1991, Date, THE ORLANDO SENTINEL, p. A1 +, Nov. 1, 1991, Holton, THE ORLANDO SENTINEL, p. A4, Nov. 1, 1991.]

TCDT BEGINS AT LC 39A

At Launch Complex 39A, monomethylhdrazine has been loaded onto Atlantis' onboard storage tanks. Hydrazine was loaded into the Orbiter's auxiliary power units and the boosters' hydraulic power units. There was a successful hot firing of the right hand solid rocket booster (SRB) hydraulic power units. The STS 44 six-man crew has completed its M113 driver training. STS 44 managers are concerned that after the hot firing, hydraulic fluid was circulated in the hydraulic power unit to get any air out of the system prior to launch. The hydraulic power units are located in the aft skirt and generate power for the SRB hydraulic system. During the hot firing, a ground support pressure relief line was not hooked up to vent pressure and, consequently, it built up in the system causing a reservoir to rupture releasing some hydraulic fluid. Work is underway to replace the unit which is about two feet tall and a foot in diameter. Hydraulic fluid in the area is being cleaned up. The hydraulic pump, about the size of a lunch box and eight inches in diameter, also will be replaced. Spares for both parts are on site. An inspection is underway to determine whether any other components need to be replaced. Another hot firing is scheduled to retest the new components, but is not expected to impact the launch schedule. At the launch pad, technicians are installing the Defense Support Program satellite into the payload bay and have

begun the Terminal Countdown Demonstration Test. They are also expected to inspect the right hand solid rocket booster aft skirt. The flight crew will be briefed on the status of the vehicle and the payload and they will also receive training in the emergency egress procedures at LC 39A later today. The TCDT concludes November 1 at about 11 a.m.; a Flight Readiness Review is scheduled for November 7. [KSC SHUTTLE STATUS REPORT, 11 A.M., Oct. 31, 1991.]

DISCOVERY PROCESSING/OPF BAY 3

A number of tasks are underway in the Orbiter Processing Facility Bay 3 to ready the Space Shuttle Discovery for its STS 42 mission: brake anti-skid test; connections of fluid interfaces between the main propulsion system and main engines; checks of the hydraulic and flight control systems; servicing the Orbiter with potable water; installation of T-seals on the leading edges of the wings; servicing of the water spray boilers; a hot oil flush of the auxiliary power units; preparations to install the Spacelab tunnel adapter; inspections of the thermal control blankets in the payload bay. Next week, Discovery's external tank will be mated to its solid rocket boosters in the VAB. [KSC SHUTTLE STATUS REPORT, 11 A.M., Oct. 31, 1991.]

ENDEAVOUR PROCESSING/OPF BAY 1

Endeavour's payload bay doors have been closed for an end-to-end test in Orbiter Processing Facility Bay 1. The hydraulic system is undergoing an end-to-end test and the elevon cove seal is being installed. Scheduled work includes: further end-to-end testing through the weekend; checks of the orbital maneuvering system pods next week and leak and functional testing of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 11 A.M., Oct. 31, 1991.]

PAD ACCIDENT; NO DELAY

An accident at Launch Complex 39A "may eat two of the three days of slack time we have," said Kennedy Space Center spokesman **Mitch Varnes**. About 8 p.m. October 30, a hydraulic fluid storage tank in one of Atlantis' two solid rocket boosters ruptured, spilling about 2 1/2 gallons of hydraulic fluid. A new tank and hydraulic fluid pump will be installed this weekend at a cost of about $125,000. [Halvorson, FLORIDA TODAY, p. 4A, Nov. 1, 1991.]

NOVEMBER

November 1: **CRIPPEN REPLACES MCCARTNEY AT KSC**

Robert L. Crippen has been named the fifth Kennedy Space Center Director to succeed outgoing director **Forrest S. McCartney**, effective January 1, 1992. No replacement for Crippen as Shuttle Program Director has been announced by NASA; reportedly, NASA officials are considering combining the responsibilities of his job as program director with his new duties as head of KSC. This is seen as a first step in a major effort to consolidate Shuttle Program operations at the space center. Crippen is 54 years old and has been with NASA for 22 years; he piloted the first Shuttle mission, STS 1 and flew three other times aboard Space Shuttles before becoming Director of Space Shuttle Operations. [Banke and Halvorson, FLORIDA TODAY, pp. 1A-2A, Nov. 1, 1991; see entries for October 31, 1991, "McCartney Ends Years of Space Service," FLORIDA TODAY, p. 4A, Nov. 1, 1991, Banke, FLORIDA TODAY, Nov. 2, 1991, "Crippen Started Career As An Astronaut in 1969," FLORIDA TODAY, p. 4A, Nov. 1, 1991, Date, THE ORLANDO SENTINEL, Nov. 3, 1991, "McCartney Due Salute For His Service at KSC," FLORIDA TODAY, p. 8A, Nov. 4, 1991, "McCartney Due Salute for His Service at KSC," FLORIDA TODAY, Nov. 4, 1991.]

PRACTICE COUNTDOWN COMPLETED

"We had a real good [Terminal Countdown Demonstration Test]," said Kennedy Space Center spokeswoman **Lisa Malone** at the completion of the TCDT. "This is one of the major tests we do at the launch pad to get the Orbiter ready for launch." The six-member STS 44 crew of Commander **Frederick D. Gregory**, Pilot **Terence "Tom" Henricks**, Payload Specialist **Thomas Hennen** and Mission Specialists **F. Story Musgrave, Mario Runco** and **James Voss** participated in the closing hours of the test; they wore bright orange spacesuits and, except for Musgrave who is totally bald, all wore skull caps as a Halloween joke. At Launch Complex 39A, technicians completed the replacement of a tank and hydraulic fluid pump [see stories of late October] in Atlantis' right solid rocket booster. The unit will be tested tomorrow. Technicians also completed electrical connections between the vehicle and its Department of Defense cargo which was loaded October 31. [Halvorson, FLORIDA TODAY, p. 6A, Nov. 2, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 1, 1991.]

STS 42 PREPARATIONS: DISCOVERY

In the Orbiter Processing Facility Bay 3, technicians have completed the Space Shuttle Discovery's brake anti-skid test, a hot oil flush of the auxiliary power units; checks of the hydraulic and flight control systems; check out of the nose wheel steering system. Tasks currently underway include: connections of fluid interfaces between the main propulsion system and main engines; servicing of the Orbiter with potable water; installation of T-seals on the leading edges of the wings; servicing of the water spray boilers; preparations to install the Spacelab tunnel adapter; inspections of thermal control blankets in the payload bay. Next

week, the external tank will be mated to the solid rocket boosters inside the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 1, 1991.]

STS 49: ENDEAVOUR PROCESSING

The newest Space Shuttle, Endeavour, is presently in OPF Bay 1 undergoing early preparations for the Orbiter's initial mission, STS 49. Work in progress includes: end-to-end testing of the hydraulic system; elevon cove seal installation; connections of the orbital maneuvering system pods to the Orbiter. Scheduled work includes: more end-to-end testing of the configuration of the Orbiter and its software; checks of the orbital maneuvering pods next week; leak and functional testing of the auxiliary power units next week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 1, 1991.]

November 3:

FRR THIS WEEK AT KSC

NASA managers will hold its STS 44 Flight Readiness Review at Kennedy Space Center this week; a firm launch date will be set following the FRR. **Lisa Malone**, KSC spokeswoman, said "We'll be going over launch mission and landing details." If STS 44 launches on November 19, the landing at KSC should occur at 2 p.m. on November 29. At Launch Complex 39A this week, technicians will continue testing electrical connections between Atlantis and its cargo, a Defense Support Program satellite; two $10 million spacesuits will be packed in the Orbiter's airlock; ordnance devices will be installed. Managers are also meeting this week to decide when the newest Space Shuttle, Endeavour, will be ready to fly. "Like any crew that gets ready for a flight, we don't get particularly attached to any launch date," said **Dan Brandenstein**, Chief of NASA's Astronaut Corps. "And for a first flight of a vehicle, you're probably less attached." Endeavour is tentatively scheduled to launch on its STS 49 mission on April 9, 1992, but may be delayed from one to nine weeks. "Probably the answer is somewhere in the middle there," Brandenstein observed, "but generally everybody says it's too early to really pin down a good solid example of what the delay will be." The STS 49 mission will include the rescue of an Intelsat satellite. "We're still fine-tuning some of that, but the general concepts of everything we're planning to do are pretty well in place," continued Brandenstein. [Halvorson, FLORIDA TODAY, p. 1A, Nov. 3, 1991, Banke, FLORIDA TODAY, p. 10E, Nov. 3, 1991.]

ATLANTIS PASSES PUMP TEST

The Space Shuttle Atlantis passed a critical test today; the test involved running the hydraulic power unit of the Orbiter's right solid rocket booster to ensure that it is working properly. "The test gives us confidence that the equipment we've installed is going to work properly," said KSC spokeswoman **Lisa Malone**. The same test had been run earlier prior to a launch pad accident which necessitated a change-out of systems. Cost of the replaced components was placed at $125,000. [Halvorson, FLORIDA TODAY, p. 5A, Nov. 4, 1991.]

ATLANTIS: TCDT ENDED

At Launch Complex 39A, the Terminal Countdown Demonstration Test on the Space Shuttle Atlantis has been completed in anticipation of its STS 44 launch. Other completed activities include: hot fire and spin test of the newly installed hydraulic pump and reservoir on the right solid rocket booster; electrical connections of the right solid rocket booster reservoir and pump; calibration of the three inertial measurement units; purge tests of the main propulsion system; connections between the payload and the Orbiter and installation of the payload, the Defense Support Program satellite. Work in progress: tests of connections between the Orbiter and the payload bay began this morning; preparations are underway for the main engine flight readiness test for which sensors will be calibrated and valves will be cycled and tested. Scheduled work includes today's Launch Readiness Review; installation of the hypergolic propellant system for flight; Flight Readiness Review on November 7; installation of two contingency space suits into Atlantis' airlock. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 4, 1991.]

DISCOVERY: ET MATING TO SRBS

The Space Shuttle Discovery is undergoing a number of tasks in Orbiter Processing Facility Bay 3 in preparation for its STS 42 mission; these include: installation of auxiliary power unit No. 1; checks of the main engine electrical interfaces; servicing of the Orbiter with potable water; installation of T-seals on the leading edges of the wings; preparations to install the Spacelab tunnel adapter; inspections of thermal control blankets in the payload bay. In the VAB, mating is underway of the external tank to the solid rocket boosters. A functional test of Discovery's galley has been scheduled. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 4, 1991.]

ENDEAVOUR: END-TO-END TESTING COMPLETED

In Orbiter Processing Facility Bay 1, end-to-end testing of Endeavour's hydraulics systems has been completed and a leak and functional test of the auxiliary power units has been scheduled for this week. Currently, technicians are: testing the orbital maneuvering system pods; installing the elevon cove seal; opening the payload bay doors; installing an oxygen tank for the power reactant storage and distribution system; working on thermal protection system operations and thermal blanket work around the star tracker doors. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 4, 1991.]

November 4:

ATLANTIS: LRR COMPLETED

At the conclusion of today's Launch Readiness Review, NASA managers said that they saw no reason why Atlantis should not be launched November 19. "All KSC elements are ready to support the last flight of the year. We don't have any major concerns or issues at this time in the processing operation. We are in good shape, " said **Jay Honeycutt**, Director of Space Transportation System

Management and Operation at KSC. A firm launch date will not be set until the November 7 Flight Readiness Review. [Halvorson, FLORIDA TODAY, p. 7A, Nov. 5, 1991, "STS-44 Launch Readiness Review Statement," NASA/KSC Release, dated Nov. 4, 1991.]

November 5: **EUTELSAT LAUNCH DELAYS**

"I think it is reasonably safe to say we'll launch [the Eutelsat 2 spacecraft] late this year or early next year," said **Ben Wier**, Vice President and Director of General Dynamics Corp.'s Atlas Program today. That may not work out because the launch is being delayed for the fourth time to replace the navigation unit that guides the Atlas Launch Vehicle. The late launching of the Eutelsat 2 spacecraft, a communications satellite, may interfere with the broadcast in Europe of the 1992 Winter Olympics. Eutelsat 2 Program Manager **Jean-Jacques Dumesmil** said, "It's clear that it's getting pretty close." Recent tests by Honeywell Inc. revealed faulty transistors. The launch will now be delayed until late December or early 1992. [Halvorson, FLORIDA TODAY, p. 2A, Nov. 6, 1991.]

ATLANTIS ON SCHEDULE FOR LAUNCH

"We seem to be passing all of our milestones at the launch pad without problems. Things are looking good for maintaining our target launch date [Nov. 19]," according to Kennedy Space Center spokeswoman **Lisa Malone**. Tests of the electrical and mechanical connections between the Orbiter and the payload are complete, said Malone. Ordnance devices have not yet been installed. A main engine flight readiness test was completed this morning; the sensors were calibrated and valves were cycled and tested. No concerns or issues were raised at yesterday's Launch Readiness Review. The aerosurfaces of Atlantis are being cycled; technicians are closing out the solid rocket booster thermal curtains. Tomorrow [November 6] technicians will conduct payload end-to-end tests, install ordnance devices, pressurize the hypergolic propellant system for flight and install two contingency space suits in the airlock. A Flight Readiness Review is scheduled for November 7. [Halvorson, FLORIDA TODAY, p. 2A, Nov. 6, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 5, 1991.]

DISCOVERY PROCESSING FOR STS 42

Discovery's external tank was mated to the twin solid rocket boosters at 11:25 p.m. last night [November 4]. Workers in the Orbiter Processing Facility Bay 2 are preparing to install the Spacelab tunnel adapter and for functional testing of the orbital maneuvering system pods and forward reaction control system. Thermal protection system operations are underway on all areas of the vehicle. Workers are installing auxiliary power unit No. 1, checking the main engine electrical interfaces and servicing the Orbiter with potable water. A functional test of the vehicle's galley is scheduled. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 5, 1991.]

INTELSAT REBOOST MISSION: ENDEAVOUR

Workers in Orbiter Processing Facility Bay 1 have opened the payload bay doors of Endeavour. Leak and functional tests of the newest Orbiter's auxiliary power units are scheduled for this week. Work in progress: electrical testing of the orbital maneuvering system pods; elevon cove seal installation; installation of an oxygen tank for the power reactant storage and distribution system; thermal protection system operations; thermal blanket work around the star tracker doors; checkout of the main propulsion system; welding lines in the gaseous oxygen system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 5, 1991.]

November 6:

STS 44: AEROSURFACES CYCLED

Technicians at Launch Complex 39A have cycled the aerosurfaces of the Space Shuttle Atlantis in preparation for its STS 44 mission targeted for November 19. Pad workers are continuing payload end-to-end testing, preparations for ordnance operations, closing out of the solid rocket booster thermal curtains and aft closeouts. Work scheduled: installation of ordnance devices on the vehicle at midnight tonight, pressurization of the hypergolic propellant system for flight, flight readiness review and installation of two contingency space suits into the airlock on November 8. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 6, 1991.]

STS 42/IML-1: DISCOVERY

Workers in Orbiter Processing Facility Bay 3 are installing the Spacelab tunnel adapter in the Space Shuttle Discovery and testing the orbital maneuvering system pods and the forward reaction control system. They are also testing the power reactant storage and distribution system and conducting thermal protection system operations on all areas of the vehicle. Closeouts of auxiliary power unit No. 1, checks of the main engine electrical interfaces and servicing of the Orbiter with potable water are continuing as well. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 6, 1991.]

ENDEAVOUR PROCESSING FOR STS 49

In the Orbiter Processing Facility Bay 1, processing personnel have installed the oxygen tank for the power reaction storage and distribution system in the Space Shuttle Endeavour; they also deployed the Ku-band antenna. Work in progress: electrical testing of the orbital maneuvering system pods; elevon cove seal installation; thermal protection system operations; checkout of the main propulsion system; welding lines in the gaseous oxygen system; preparations for leak and functional tests of the auxiliary power units. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 6, 1991.]

November 7:

STS 44: NOVEMBER 19 LAUNCH

At the conclusion of today's Flight Readiness Review at NASA's Kennedy Space Center, FL, Shuttle and payload managers have targeted November 19 as the

official launch date for mission STS 44 aboard the Space Shuttle Atlantis. "Everything at the pad is fine. The managers feel comfortable that we can target the 19th for the launch and make that date," said KSC spokesman **Bruce Buckingham**. The 2 1/2-hour launch window for this ninth Department of Defense flight opens after dark at 6:51 p.m., EST, on the 19th; it will mark the seventh nighttime launch. A full load of military and scientific experiments will be carried out during the upcoming 10-day mission; of primary importance will be the deployment of the latest in a series of Defense Support Program reconnaissance satellites. Two of Atlantis' crew members are space veterans: Commander **Fred Gregory** will be making his third Shuttle flight; Mission Specialist **Story Musgrave** will be making his fourth. The four remaining crew members will be ventured into space for the first time: Pilot **Tom Henricks**, Mission Specialists **Jim Voss** and **Mario Runco**, and Payload Specialist **Tom Hennen**. STS 44 represents the 44th Space Shuttle mission and the tenth flight for Atlantis. A three-day countdown begins at 12:01 a.m. on November 17. Landing is scheduled for 2:27 p.m. on the Shuttle Landing Facility on November 29. Part one of ordnance installation has been completed. work in progress includes: aft compartment closeouts; auxiliary power unit #1 heater/thermostat tests; air vent cleaning and sampling; installation of contingency space suits into airlock; payload/IUS flight readiness checks; external tank purge preparations. Hypergolic fuel system pressurization and launch countdown preparations remain scheduled. [NASA/KSC Release, Nov. 7, 1991, Halvorson, FLORIDA TODAY, p. 1A, Nov. 8, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 8, 1991, Date, THE ORLANDO SENTINEL, Nov. 8, 1991.]

GRUMMAN/THIOKOL WIN LOW TROPHY

Grumman Technical Services Division (Titusville, FL) and Thiokol Corp., Space Operations (Brigham City, UT) have been named recipients of the 1991 George M. Low Trophy - NASA's Quality and Excellence Award. NASA Administrator **Richard H. Truly** announced the selection last night of the Eighth Annual NASA/Contractors Conference and Symposium (Houston, TX). "The George M. Low Trophy recognizes the best of the best of contractors who work on the space program. The management and employees of Grumman and Thiokol deserve this recognition. These firms have shown exceptional performance. Their achievements serve as examples which others can pattern themselves after," said Truly. Grumman Technical Services Division provides hardware and support services to the integrated launch team at the Kennedy Space Center, FL. Thiokol Corp., provides the redesigned solid rocket motor propulsion system which produces 80 percent of the thrust necessary for Space Shuttle liftoff. In addition, Thiokol provides engineering services for sounding rocket design for NASA's Goddard Space Flight Center (Greenbelt, MD). The Low Trophy recognizes NASA's prime contractors, subcontractors and suppliers for outstanding achievements in quality and productivity improvement and total quality management (TQM). Key goals of the award are to internalize quality and productivity practices and TQM processes throughout NASA and the agency's contractors.

The other finalists for the 1991 award were:

*EG&G Florida, Inc. (Kennedy Space Center, FL).

*Honeywell, Inc., Space and Strategic Systems Operations (Clearwater, FL).

*Computer Sciences Corp., Applied Technology Division (Falls, WI).

*Cray Research, Inc., Manufacturing Division (Chippewa Falls, WI).

*TRW Space and Technology Group (Redondo Beach, CA).

*Unisys Space Systems Division (Houston, TX).

Award criteria, developed by NASA in conjunction with the American Society for Quality Control (Milwaukee, WI) were used to judge nominees on performance achievements and improvements in customer satisfaction, quality and productivity levels. Emphasis was placed on management commitment, goals and measures, communication, health and safety, work force training, award recognition and subcontractor involvement. "These firms have demonstrated admirable performance and have earned the right to be considered among the very best in meeting the award criteria," said George A. Rodney, NASA Associate Administrator for Safety and Mission Quality. [NASA/KSC Release NO. 91-185, Nov. 7, 1991, Halvorson, FLORIDA TODAY, p. 9E, Nov. 10, 1991.]

DISCOVERY: TUNNEL ADAPTER INSTALLED

Workers in OPF Bay 3 have completed the installation of the Spacelab tunnel adapter in Discovery. Technicians are hooking up auxiliary power unit number 1 and conducting payload integrated verification tests. Scheduled work includes: cabin and tunnel adapter leak checks, external tank disconnect door functional tests and auxiliary power unit closeouts and retests. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 7, 1991.]

ENDEAVOUR'S PROCESSING PROGRESS

Technicians in OPF Bay 1 are conducting: thermal protection system operations; preparations for auxiliary power unit leak and functional tests; orbital maneuvering system pod electrical tests; auxiliary power unit lube oil servicing and main propulsion system leak checks. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 7, 1991.]

November 8: ENDEAVOUR WEEKS BEHIND SCHEDULE

"I don't think there's any need to change the schedule," said KSC Director **Forrest S. McCartney**, concerning the processing of the Space Shuttle Endeavour in OPF High Bay 1. "The situation remains one of lots of work, and we're a few weeks behind. We're going to keep working it the same way we treat the other birds.

I don't want Endeavour to be different." Officials confirmed that the newest Space Shuttle is as much as six weeks behind schedule. Endeavour's STS 49 mission is unofficially targeted for April 9, 1992; the target date remained unchanged following a three-hour briefing for Shuttle Program Director Robert L. Crippen. Today technicians loaded two spacesuits into Atlantis' airlock; they would be used if an emergency extravehicular activity (EVA) was needed. Launch of Atlantis is set for between 6:51 p.m. and 9:21 p.m. on November 19, with a landing at Kennedy Space Center ten days later. [Banke and Halvorson, FLORIDA TODAY, p. 6A, Nov. 9, 1991.]

[] **STS 42: DISCOVERY PROCESSING**

The Spacelab tunnel adapter having been installed in Discovery, cabin and tunnel adapter leak checks have been scheduled; also scheduled are external tank disconnect door functional tests and auxiliary power unit closeouts and retests. Work in progress includes: hooking up auxiliary power unit number one; payload integrated verification tests; potable water servicing. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 8, 1991.]

[] **ENDEAVOUR PROCESSING: STS 49**

Lagging some six weeks behind in its processing schedule, the technicians working on the Space Shuttle Endeavour are engaged in a number of activities: thermal protection system operations; removal of a main propulsion system helium tank and leak checks; preparations for auxiliary power unit leak and functional tests and APU servicing; orbital maneuvering system pod electrical tests. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 8, 1991.]

November 12: ATLANTIS: EXTERNAL TANK PURGED

Launch Complex 39A workers have completed a purge of Atlantis' external tank are now purging the power reactant storage and Distribution System. A simulated countdown test for the Inertial Upper Stage is underway as are preparations for final ordnance operations; closing out the solid rocket boosters and aft closeouts. Scheduled work includes: installation of flight doors on the aft compartment tomorrow; final ordnance operations November 13; closure of the payload bay doors for flight on November 16; arrival of the STS 44 flight crew at 6:30 p.m. EST November 16. The launch countdown begins at 12:01 a.m. EST November 17 and launch on November 19 at 6:51 p.m. EST. [KSC SHUTTLE STATUS REPORT, 11 A.M., Nov. 12, 1991.]

[] **DISCOVERY: ET DOORS TESTED**

Technicians in OPF Bay 3 have completed a functional test of the external tank doors on Discovery. Work in progress includes: testing of the orbital maneuvering system pods and the forward reaction control system; testing of the power reactant storage and distribution system; thermal protection system operations; testing of the auxiliary power units; checks of the main engine

electrical interfaces; servicing the Orbiter with potable water; installation of heat shields around the main engine. Workers are scheduled to service Discovery's ammonia boiler. [KSC SHUTTLE STATUS REPORT, 11 A.M., Nov. 12, 1991.]

ENDEAVOUR: OMS PODS TESTING

Work in progress in the processing of Endeavour includes: electrical testing of the orbital maneuvering system pods; elevon cove seal installation; thermal protection system operations; checkout of the main propulsion system; welding lines in the gaseous oxygen system; leak and functional tests of the auxiliary power units; testing of the electrical interfaces in the power reactant storage and distribution system; Ku-band systems test; environmental control system testing. [KSC SHUTTLE STATUS REPORT, 11 A.M., Nov. 12, 1991.]

November 12: ESMC NOW 45TH SPACE WING

The Eastern Space and Missile Center is now officially the 45th Space Wing and includes the following elements: 45th Operations Group, 45th Space Support Group, 45th Logistics Group and 45th Medical Group, which will operate the Patrick Air Force Base Hospital. "This is not just some new experiment," said Lt. Gen. **Thomas Moorman**, commander of the Air Force Space Command, who presided at the name change ceremony at Patrick AFB. "It's a proven organizational structure we're confident will be effective as the Air Force, by necessity, becomes leaner, more efficient and more focused on its operational mission." [Banke, FLORIDA TODAY, p. 1B, Nov. 13, 1991.]

November 13: AFT COMPARTMENT CLOSED OUT

Another technical milestone on the way to launching Atlantis was passed today when technicians closed the Shuttle's rear engine compartment. "We're all looking forward to launch next week," said Kennedy Space Center spokeswoman **Lisa Malone**. "The team is ready to go and we don't have any problems with the Shuttle." STS 44 is scheduled to launch at 6:51 p.m. November 19, 1991. [Banke, FLORIDA TODAY, p. 5A, Nov. 13, 1991.]

ATLANTIS: PRE-LAUNCH PROCESSING

Technicians readying Atlantis at LC 39A for the STS 44 mission have purged the power reactant storage and distribution system; simulated countdown test for the Inertial Upper Stage; closed out the solid rocket boosters; doors were installed on the aft compartment at 10 p.m. last night. "We're in good shape," said KSC spokeswoman **Lisa Malone**. "We're not tracking any problems that would prevent us from getting airborne next Tuesday." Work in progress includes: preparations for final ordnance operations, i.e., clearing the pad at midnight tonight through tomorrow afternoon for this hazardous activity; payload closeouts and evaluation of data from yesterday's Inertial Upper Stage simulated countdown; disconnecting ground support quick disconnects from the Orbiter's hypergolic propellant system; lowering booster service platforms from the launch platform; launch countdown

preparations; installation of the crew escape pole in the crew cabin. Scheduled work includes: closure of the payload bay doors for flight on Saturday (November 16); the flight crew arrives at KSC 6:30 p.m. EST November 16; the launch countdown begins at 12:01 a.m. EST, November 17; Launch is set for 6:51 p.m. EST, November 19. [KSC SHUTTLE STATUS REPORT, 11 A..M., Nov. 13, 1991, Banke, FLORIDA TODAY, p. 2A, Nov. 14, 1991.]

OPF BAY 3: DISCOVERY PROCESSING

In Orbiter Processing Facility Bay 3, technicians have installed the Spacelab tunnel extension and are slated to service the Orbiter's ammonia boiler. Work in progress on Discovery includes: preparations to install the payload laboratory; testing of the orbital maneuvering system pods and the forward reaction control system; testing of the power reactant storage and distribution system; thermal protection system operations; testing of the auxiliary power units; checks of the main engine electrical interfaces; servicing of the Orbiter with potable water; installation of heat shields around the main engines. [KSC SHUTTLE STATUS REPORT, 11 A..M., Nov. 13, 1991.]

ENDEAVOUR: OMS PODS TESTING

Technicians are currently testing the orbital maneuvering system pods of Endeavour in OPF Bay 1 in preparation for its STS 49 mission next April. Other current activities include: elevon cove seal installation; thermal protection system operations; checkout of the main propulsion system; leak and functional tests of the auxiliary power units; testing of the electrical interfaces in the power reactant storage and distribution system; Ku-band antennas; environmental control system testing. Scheduled work includes: installation of the robot arm this week and installation of the three Shuttle main engines next week. [KSC SHUTTLE STATUS REPORT, 11 A..M., Nov. 13, 1991.]

ATLAS-1 PAYLOAD

A major milestone in the pre-launch processing of NASA's Atmospheric Laboratory for Applications and Sciences (ATLAS-1) was achieved at the Kennedy Space Center this week when the future Space Shuttle payload passed its Spacelab systems test. The horizontal payload's passing of this thorough electrical, mechanical and fluid systems checkout is a crucial step in preparing ATLAS-1 for its flight aboard the Orbiter Atlantis on STS 45, now slated for launch next spring. ATLAS-1 is now in the midst of an interface verification test that checks the integrity and readiness of all the payload's flight experiments. ATLAS-1 is the second Shuttle payload dedicated to NASA's Mission to Planet Earth. The first such payload was the ozone-studying Upper Atmosphere Research Satellite (UARS), which was successfully deployed from the Orbiter Discovery this past September. However, unlike UARS, ATLAS-1 will remain inside Atlantis' payload bay throughout the mission. From an altitude of 300 kilometers (160 nautical miles) and with a 57 degree orbital inclination to the equator, ATLAS-1 will be in

an excellent vantage point to observe Earth's atmosphere, the sun and other astronomical targets.

The experiments aboard ATLAS-1 will specifically investigate how Earth's atmosphere and climate are affected by the sun and by the products of industrial facilities and agricultural activities occurring around our planet. The experiments will also study the chemical composition of the atmosphere between 15 and 600 kilometers (8 to 330 miles) above the Earth's surface and measure the energy contained in sunlight. Studies will also be undertaken to examine the universe's sources of ultraviolet light and to determine how the planet's electric and magnetic fields and atmosphere influence each other. "We just wrapped up one of the most intensive pre-flight tests that we put Spacelab payloads through," remarked **Mike Kinnan**, KSC's ATLAS-1 payload manager. "We had some minor problems at times, but the test is done to catch these problems prior to flight. We've got an aggressive and talented processing team working on ATLAS-1, and I don't see any concerns with meeting the remaining milestones in our pre-launch processing schedule." A seven-member astronaut crew is scheduled to fly aboard Atlantis on the STS 45/ATLAS-1 mission. The eleventh flight of Atlantis will consist of Commander **Charles F. Bolden**, Pilot **Brian Duffy**, Mission Specialists **Kathryn D. Sullivan, C. Michael Foale** and **David C. Leestma** and Payload Specialists **Byron K. Lichtenberg** and **Dirk D. Frimout**. ATLAS-1 is the first of ten planned ATLAS missions, which will gather data over an 11-year solar cycle. [NASA/KSC News Release No. 131-91, Nov. 13, 1991.]

PROCUREMENT BRIEFING PLANNED

Kennedy Space Center will host the 8th Annual Procurement Briefing to Industry beginning at 10:30 a.m. on Friday, November 15, 1991, at Spaceport USA's Galaxy Theater. Over the past several years, the annual procurement briefing has been a strong and effective part of KSC's aggressive outreach effort. It is one of the key components of the Space Center's commitment to continually increase competition and provide private industry with the maximum opportunity to do business at KSC. During past briefings, over 450 companies have been represented. This briefing, like those of past years, is a tool for business of all sizes to use to identify procurement opportunities at KSC. At 9:00 a.m. that morning prior to the briefing, KSC will host the Annual Small Business Awards Ceremony. During the ceremony small businesses in several categories will be recognized for their outstanding achievements at KSC during fiscal year 1991.
In addition to the briefing, the NASA-KSC Small and Small Disadvantaged Business Council will sponsor an expo for small businesses. "Small Business Expo '91" will be held at the U.S. Space Camp Facility (Titusville, FL) on Thursday, November 14, 1991, with events commencing at 9:00 a.m. KSC Center Director **Forrest S. McCartney** will take part in a ribbon cutting ceremony. Approximately 150 small and small disadvantaged businesses are expected to display their products and discuss their special capabilities. The expo is free and open to the public. Following the Small Business Expo will be a Small Business Opportunities Forum and Reception hosted by the Brevard Small Business Assistance Council; a reception will be held at the Cocoa Beach Hilton (November 14) at 6:00 p.m.

Featured speaker at the forum will be **Gayle Sayers**, former NFL football star and current President of Crest Computer Supply (Skokie, IL). Also, a panel of Small Business Specialists will be available late that evening to discuss procurement strategies for doing business with government agencies and large prime contractors. [NASA/KSC Release No. 129-91, Nov. 13, 1991, Grainick, FLORIDA TODAY, pp. 18C & 17C, Nov. 15, 1991.]

November 14: **LAUNCH COMPLEX 39A: ATLANTIS**

Pad workers at Launch Complex 39A have lowered booster service platforms from the launch platform where Atlantis awaits the start of its STS 44 mission. They have also installed the crew escape pole; successfully retested the Inertial Upper Stage's redundant inertial measurement unit. Final ordnance operations including checks of the firing circuits are underway; the pad is cleared until this afternoon for this hazardous activity. Launch countdown preparations continue as do payload closeouts. Work scheduled: payload flight readiness checks tomorrow; closure of the payload bay doors for flight on Saturday (November 16); the flight crew arrives at KSC at 6:30 p.m. EST on the 16th; the launch countdown begins at 12:01 a.m. EST November 17; launch is set for 6:51 p.m. EST November 19. Weather conditions expected for launch day: an upper level trough of low pressure in the western Gulf of Mexico will create some general instability. At the surface, a cold front will extend from the central Gulf through Western Florida. High pressure will be located in the Atlantic. Cloud thickness and possible ceilings below 8,000 feet are the concerns. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 14, 1991, L-5 Day Weather Outlook for STS 44, Nov. 14, 1991.]

DISCOVERY: ORBITER PROCESSING

In Orbiter Processing Facility Bay 3, technicians are engaged in a variety of processing activities: preparations to install the payload laboratory; cleaning of the payload bay; testing of the orbital maneuvering system pods and the forward reaction control system; thermal protection system operations; testing of the auxiliary power units; checks of the main engine systems; servicing of the Orbiter with potable water; installation of heat shields around the main engines. Work scheduled includes: servicing of the ammonia boiler; installation of the International Microgravity Laboratory-1 on November 17. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 14, 1991.]

ENDEAVOUR: ROBOT ARM INSTALLATION

The robot arm (or remote manipulator system) is being installed in the Space Shuttle Endeavour in OPF Bay 1. Technicians are also: testing the orbital maneuvering system pods; elevon cove seal installation; thermal protection system operations; checkout of the main propulsion system; leak and functional tests of the auxillary power units; testing of the electrical interfaces in the power reactant storage and distribution system; Ku-band systems test; environmental control system testing. Endeavour's three main engines will be installed next week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 14, 1991.]

TRULY RELEASES NASA STUDY

NASA Administrator **Richard H. Truly** today released an internal agency report on roles and responsibilities of NASA centers and Headquarters offices, fulfilling a pledge "to move out aggressively across the board" on the recommendations by the Advisory Committee on the Future of the U.S. Space Program. Truly directed former Deputy Administrator **James R. Thompson** to undertake this assessment in late 1990. It represents the first comprehensive look at NASA roles and responsibilities in over 10 years. "J. R. submitted his plan to me on Friday (November 8) and I think he deserves a lot of credit for the outstanding analysis of the agency he has performed," Truly said. "I intend to give these recommendations careful consideration as we continue to make NASA an even better agency." Thompson's report focuses on three main thrusts: building on NASA field organizations as Centers of Excellence in specific areas of science, technology and development; a reminder to "stick to basics" in engineering disciplines and program management and realignment of certain NASA Headquarters office responsibilities (within the context of recent organizational changes) to achieve more effective program execution. Truly has recently instituted aggressive changes in NASA's management and organization as the agency positions itself to most effectively execute America's space program in the coming decades.

The Thompson plan would have a dramatic effect upon Kennedy Space Center and Brevard County. The report calls for about 100 top Shuttle Program managers to relocate to KSC, which would become the lead NASA field center for the Shuttle Program, replacing Johnson Space Center in that position. "One hundred executive positions will have a very positive economic impact. It will stimulate the creation of an equal number of jobs in other areas, such as real estate and retail," said **Lawrence Wuensch**, President of the Brevard Economic Development Corp. "The economy needs some good news. It could use a boost." The plan also calls for the Shuttle Project Managers at JSC and Marshall Space Flight Center to be moved to KSC to consolidate Shuttle operations at the launch site. The first part of the move could take as much as a year to implement and more workers might follow the first 100. Thompson's recommendations will be discussed December 9-10 at a NASA meeting with Truly, headquarters officials, center directors and their deputies. [NASA/KSC News Release No. 91-190, Nov. 14, 1991.]

ELECTRONICS BOX PROBLEM: NO DELAY

A malfunctioning circuit in an electronics box will not delay the launch of Atlantis on its STS 44 mission November 19. The electronics box is used to relay information about the performance of a Shuttle rocket booster steering system to the Orbiter's computers and ground controllers. The circuit's faulty performance was detected in a test November 13. The Shuttle's computers get the same information from three other sources, so managers are not calling the problem a threat to launch. Workers are continuing with their usual prelaunch preparations at Launch Complex 39A; they are completing work on Atlantis' 15-story external

tank and its SRBs. No other technical problems exist to date; KSC Launch Director **Robert B. Sieck** said, "We still have a few days to go." Air Force meteorologists are predicting a 50% chance of favorable weather for launch November 19. They are primarily concerned about a chance of scattered showers and thunderstorms in the KSC area. [Banke, FLORIDA TODAY, p. 4A, Nov. 15, 1991.]

November 15: **ORDNANCE INSTALLED**

Final ordnance operations including checks of the firing circuits have been completed at Launch Complex 39A in preparation for launch of STS 44 on November 19. Technicians were also able to resolve a measurement for a hydraulic actuator on the right booster and closed out the booster forward skirts and the external tank intertank for launch. As launch countdown preparations continue at the pad, non-flight items such as protective covers from the reaction control system thrusters are being removed; flight crew equipment has been stowed in the crew cabin and platforms have been removed from the crew cabin; the hazardous gas detection system has been verified at the pad and payload closeouts are continuing. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 15, 1991.]

[] **DISCOVERY: PAYLOAD BAY CLEANING**

In Orbiter Processing Facility Bay 3, technicians are cleaning Discovery's payload bay in preparation for installing the payload laboratory (IML-1); leak and functional tests of the waste containment system are continuing and the ammonia boiler is being serviced. Other work in progress: testing of the orbital maneuvering system pods and the forward reaction control system; thermal protection system operations; checks of the main engine systems; installation of heat shields around the main engines. The International Microgravity Laboratory-1 will be installed on November 17. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 15, 1991.]

[] **ENDEAVOUR: ROBOT ARM INSTALLED**

Workers in Orbiter Processing Facility Bay 1 have installed a robot arm in Endeavour; they have also completed leak checks of the elevon cove seals. Work in progress: preparations to check out the robot arm; testing of the orbital maneuvering system pods; thermal protection system operations; checkout of the main propulsion system; leak and functional tests of the auxiliary power units; testing of the electrical interfaces in the power reactant storage and distribution system; Ku-band systems test; environmental control system testing. Workers will begin to install Endeavour's three main engines on November 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 15, 1991.]

[] **CONSOLIDATION MAY COST JOBS AT KSC**

"I think you'll see some people moving to KSC, and I also think it'll give us an opportunity for some overall reductions in what it takes [at KSC]" to prepare

Shuttles for launch, according to former Deputy Administrator **J. R. Thompson**. He declined to estimate the number of jobs that might be lost. "It depends on how it's done and how it's phased in." "After the Challenger accident," Thompson continued, "we put a lot of eyes on all the hardware. We tried to make everybody a part of it. At that time we just wanted to get back flying again. I think it was right at the time. But now, looking for the long haul, I think we can streamline the way we operate it and be safer, more efficient and less costly." NASA is considering Thompson's recommended plan to move some 100 engineers and program managers to KSC from centers in Texas and Alabama. The idea was first proposed by a presidential commission and is now suggested by Thompson. [Banke, FLORIDA TODAY, p. 7A, Nov. 16, 1991, "Bring Shuttle Bosses Home to Launch Site," editorial, FLORIDA TODAY, p. 12A, Nov. 21, 1991.]

STS 44 CREW ARRIVES TODAY

"The whole team is primed for launch and there are no big issues on the horizon," according to Kennedy Space Center spokeswoman **Lisa Malone**; the STS 44 crew is due to arrive today at 6:30 p.m. to begin three days of briefings and final mission preparations. **Gregory** and **Henricks** will practice landings in the Shuttle Training Aircraft on the Shuttle Landing Facility. Workers at LC 39A are filling propellant storage tanks, testing electrical and communications systems and watching the weather which offers a 60% chance of liftoff on November 19. [Banke, "Atlantis Crew Arrives Today," FLORIDA TODAY, p. 7A, Nov. 16, 1991.]

November 16:

STS 44 CREW ARRIVES

"It's good to come down here as the Cape is finishing up their work so we can start our work," said STS 44 Pilot **Tom Henricks** on arrival at Kennedy Space Center with his five crew mates: Commander **Fred Gregory**, Payload Specialist **Thomas Hennen** and Mission Specialists **James Voss**, **Mario Runco** and **Story Musgrave**. "We should have a great time up there," added Commander Gregory. "We have a great crew. We've been training for about a year and I think at this point we're fully prepared to go and not only accomplish all the mission, but enjoy ourselves at the same time." Musgrave will be making his fourth Shuttle flight. He said, "I'm the chief cook and bottle-washer on this flight, which is one of the more rewarding tasks." The payload doors were closed on Atlantis for the final time before launch. Lt. Col. **John Traxler**, the Air Force manager in charge of preparing the Defense Support Program satellite for launch, said, "It was really a joy to watch the doors close. There was an enthusiastic payload launch team out there." **Al Sofge**, NASA Shuttle Test Director, said that everything was on schedule and that there were no major technical problems. [Banke, FLORIDA TODAY, p. 5A, Nov. 17, 1991.]

STS 44 WILL LAND AT KSC

"I'm sure you've heard that there are hazards associated with landing in Florida versus California, but we think we can control those by taking a close look at the weather forecast," said Atlantis Pilot **Tom Henricks** after his arrival at KSC. He

noted one benefit of landing in Florida over California: "If we do land in Florida it reduces the risk associated with transporting the vehicle across the country." [Halvorson, FLORIDA TODAY, p. 10E, Nov. 17, 1991.]

November 17: **STS 44: L-2 DAYS**

"At this point everything looks squeaky clean, and we hope it continues that way," according to **Eric Redding**, a NASA Test Director. **Ed Priselac**, Shuttle Weather Officer at Cape Canaveral Air Force Station, said "If we were to get showers in the area, they would probably be relatively short-lived, so even if we get some weather in here we should be able to work around it." The STS 44 mission marked the first time that the Department of Defense had provided some mission details, though the Defense Support Program satellite's destination remained secret. "It's just made for a better camaraderie between us and NASA, and among the payload team, because we're able now to talk about it in the open," said Air Force Test Director Lt. Col. John Traxler. The STS 44 launch countdown began on time last night at 12 midnight EST at the T-43 hour mark. Managers have no issues or concerns about the vehicle at this time. Launch of Atlantis remains scheduled for the opening of a two and a half hour window at 6:51 p.m. EST. Today, the launch team is preparing for loading the fuel cell storage tanks, activating the navigation aids, and preparing the main engines for launch. At 4:00 p.m. today, the countdown will enter the first planned built-in hold at the T-27 hour mark. The hold will last four hours. Later tonight the launch team will load liquid oxygen and liquid hydrogen reactants into the Orbiter's onboard fuel cell storage tanks. This operation is scheduled from 10 p.m. tonight to 4 a.m. tomorrow. The countdown will enter a second four-hour planned hold at the T-19 hour mark which will extend from 4 - 8 a.m. Monday (November 18). Monday, the Orbiter's communications systems will be activated and the navigation aids will be tested. The Rotating Service Structure will be moved away from the vehicle at 5 p.m. Monday night. Loading the external tank will half a million gallons of liquid oxygen and liquid hydrogen propellants is scheduled to begin at 10:31 a.m. Tuesday. STS 44 crew members arrived at KSC's Shuttle Landing Facility yesterday (November 16) afternoon. Today, the crew will receive a brief medical exam, perform fit checks of equipment they will take onboard with them and review flight data files. Commander **Fred Gregory**, Pilot **Tom Henricks** and Mission Specialist **Story Musgrave** will fly in the Shuttle Training Aircraft later today. Weather forecasts for the time of launch are favorable with a 50 percent chance of having acceptable conditions at the opening of the launch window. There is a 60 percent chance of acceptable weather for the duration of the launch window. Scattered showers, the cloud thickness, and some limited possibility for ceilings below 8,000 feet are the concerns. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 17, 1991, Halvorson, FLORIDA TODAY, p. 9E, Nov. 17, 1991, L-1 Day Weather Forecast for STS 44, Nov. 18, 1991, Banke, FLORIDA TODAY, p. 1A, Nov. 18, 1991, KSC SHUTTLE STATUS REPORT, 11 A.M., Nov. 18, 1991, "Launching of Space Shuttle Set for Tuesday Night," NEW YORK TIMES, p. A6, Nov. 18, 1991, Hoversten, USA TODAY, p. 3A, Nov. 18, 1991, Leary, THE NEW YORK TIMES, p. B9, Nov. 19, 1991.]

November 18: **ATLANTIS READY TO FLY**

"The bottom line is that the satellite is in good shape and we're ready to launch," said Air Force Col. **John Kidd**, Mission Director for the Department of Defense. Shuttle Program Director **Robert L. Crippen** said, "We promised the Air Force we'd launch the satellite before the year was out and actually we're well ahead of the schedule." Shuttle weather watcher Air Force Capt. **Mike Adams** said, "The primary threat will be rain showers within 20 miles of the launch complex." [Halvorson, FLORIDA TODAY, p. 2A, Nov. 19, 1991, Leary, THE NEW YORK TIMES, p. B9, Nov. 19, 1991.]

November 19: **STS 44 POSTPONED**

Space Shuttle Program officials have worked out a schedule to remove and replace an Inertial Upper Stage (IUS) guidance and navigation component which could lead to a launch of the postponed STS 44 mission as early as Sunday, November 24. "That's the day we're going to shoot for," said KSC spokesman **Bruce Buckingham**. "We looked at all the work we need to do, laid it all side by side on paper, and it all pointed to Sunday." Launch had been scheduled for this evening during a window opening at 6:51 p.m. EST. The launch was postponed in midmorning due to a malfunctioning Redundant Inertial Measurement Unit (RIMU) aboard the IUS which would place a military satellite in a higher orbit after deployment from the Orbiter Atlantis. **Robert B. Sieck**, Shuttle Launch Director, said that the RIMU aboard the Inertial Upper Stage would have to be replaced with a spare and the replacement unit would have to be tested; the process was expected to take from five to seven days. "Our approach is to be ready to go when we get all the work done," Sieck said. "This will take us into next week." Lt. Col. **Ernie Jaskolski** said that the IUS could operate with only three pairs of navigational instruments, but that flight rules require that all such units be operational at liftoff.

"Think of it as a little light switch going on, telling you something went wrong. Well, this light went on 24 times in thee hours," said Air Force Major **Bob Thunker**, Chief of Launch Vehicle Engineering for the 6555th Aerospace Test Group at Cape Canaveral Air Force Station. "It would appear there was no way we could have known this was coming," said NASA Spaceflight Chief **William Lenoir**. Work underway at Complex 39's Pad A now includes work platform extension and offloading of fuel cell cryogenics. Pad workers should have access to the Orbiter's payload bay by Wednesday (November 20) morning, allowing removal and replacement of the malfunctioning Inertial Measurement Unit aboard the IUS. If removal, replacement and retest work goes as planned, and the new RIMU is cleared for flight, the countdown could be picked up at the T-43 hour mark at midnight on Thursday (November 21) leading to launch on November 24 at 6:31 p.m. EST. A crew statement issued through Commander **Frederick Gregory** said: "While we're anxious to begin our mission as soon as possible, we also recognize the importance of making sure that our flight is both safe and successful in completing its prime objective - the deployment of the DSP satellite. We look forward to launching as soon as we are given the go ahead." Payload Specialist

Thomas Hennen and Mission Specialist **Mario Runco** will remain at Kennedy Space Center until the launch. Commander **Frederick Gregory**, Pilot **Tom Henricks**, Mission Specialist **Story Musgrave** and, perhaps, **James Voss** will return to Johnson Space Center to practice launches in NASA's Shuttle Mission Simulator. [KSC SHUTTLE STATUS REPORT, 4:30 p.m., Tuesday, November 19, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, Nov. 20, 1991, Leary, THE NEW YORK TIMES, p. A13, Nov. 20, 1991.]

ENDEAVOUR GETS SSME'S

"It's pretty significant for us...and it makes the vehicle look a lot more like a rocket ship," said **Eric Clanton**, Lockheed Space Operations Co. Manager in Charge of Endeavour; he referred to the installation in the newest Orbiter's of its three main engines. Clanton's NASA counterpart **John "Tip" Talone** said, "It's all starting to come together. We've got plenty of work in front of us, but we're starting to feel a lot more encouraged." [Banke, FLORIDA TODAY, p. 2A, Nov. 20, 1991.]

November 20:

STS 44: WAITING, AGAIN

Workers at Launch Complex 39A have offloaded reactants from the fuel cell storage tanks and opened payload bay doors early this morning. Yesterday's postponement because of a faulty RIMU came before tanking operations for the launch began. Currently operations are underway to replace the defective Redundant Inertial Measurement Unit on the Inertial Upper Stage (IUS). The RIMU, built by Hamilton Standard, is the major navigation component of the upper stage. "We're in good shape as far as the change-out operation," said KSC spokeswoman **Lisa Malone**. If the new RIMU passes all its tests, countdown to launch begins, again, at 12:01 a.m. EST Friday, November 22; the payload bay doors will be closed for flight at 2:00 p.m. with a predicted launch at 6:31 p.m. EST on Sunday, November 24. Some of the STS 44 flight crew members will fly in to Kennedy Space Center this afternoon in their T-38 training aircraft. Tomorrow, November 21, Commander **Fred Gregory**, Pilot **Tom Henricks** and Mission Specialists **Story Musgrave** and **Jim Voss** are planning a brief trip to Johnson Space Center (Houston, TX) to practice in the Shuttle simulator; they will return to KSC late Friday, November 22. Crew members **Mario Runco** and **Thomas Hennen** will remain at KSC. The weather outlook for November 24 includes a 60 percent chance of acceptable weather at the opening of the launch window at 6:31 p.m. and a 70 percent chance of good weather for the duration of the launch window. [KSC SHUTTLE STATUS REPORT, 12 Noon, Nov. 20, 1991, Banke, FLORIDA TODAY, p. 1A, Nov. 21, 1991.]

IML-1 INSTALLED ON DISCOVERY

In Orbiter Processing Facility Bay 3, technicians have installed in Discovery the International Microgravity Laboratory-1 which is the centerpiece of the STS 42 mission. Leak and functional testing of the waste containment system has also been completed. Preparations have begun for the interface verification test between the payload laboratory and the Orbiter. The orbital maneuvering system

pods and the forward reaction control system are being tested; thermal protection system (tiles) operations have also begun along with checks of the main engine system. [KSC SHUTTLE STATUS REPORT, 12 Noon, Nov. 20, 1991.]

ENGINES 1 & 2 INSTALLED: ENDEAVOUR

Technicians in OPF Bay 1 have installed all three main engines in Endeavour. The third main engine was being installed today when technicians detected a problem with a liquid oxygen line which forced installation work to be halted temporarily. The line was thought to have a bad weld and was checked by X-ray; no such faulty weld was found and installation work resumed, according to KSC spokeswoman **Lisa Malone**. Work in progress: checkout of the robot arm; preparations for tests of the fuel cells; evaluation of a weld in the propellant feedline for the No. 3 main engine; testing of the orbital maneuvering system pods; thermal protection system operations; checkout of the main propulsion system; leak and functional tests of the auxiliary power units; testing of the electrical interfaces in the power reactant storage and distribution system; Ku-band systems test; environmental control system testing. Endeavour's maiden flight - STS 49 - is tentatively scheduled for April 9, 1992; preparations, however, are presently six weeks behind schedule. [KSC SHUTTLE STATUS REPORT, 12 Noon, Nov. 20, 1991, "Endeavour Gets Engine," FLORIDA TODAY, p. 4A, Nov. 21, 1991.]

November 21: **ATLANTIS: RIMU RETESTED**

"It looks like all of the problems are being fixed," said STS 44 crew member F. **Story Musgrave** before departing for Johnson Space Center for further training today. Atlantis has received a new Redundant Inertial Measurement Unit; it was installed at 4 p.m. yesterday. A retest of the unit is in progress today at Launch Complex 39A; the RIMU is the major navigational component of the inertial upper stage which will boost the Defense Support Program satellite into orbit. Purges of the power reactant storage and distribution system are also underway. The launch countdown for STS 44 resumed at 12:01 a.m. today. The payload bay doors of the Orbiter will be closed by noon today. Launch is now targeted for 6:31 p.m. EST on Sunday, November 24. Weather conditions are improving the day of launch. Forecasters are predicting a 70 percent chance of acceptable weather at the opening of the window and an 80 percent chance of good weather for the duration of the launch period. Commander **Fred Gregory**, Pilot **Tom Henricks** and Mission Specialists Story Musgrave, **Jim Voss**, **Mario Runco** and Payload Specialist **Tom Hennen** are planning a brief trip to Houston, TX, to practice ascents in the Shuttle simulator. They plan to depart the Shuttle Landing Facility in a Shuttle Training Aircraft at about 2 p.m. this afternoon and return to KSC early on November 22. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 21, 1991, Banke, FLORIDA TODAY, p. 1A, Nov. 22, 1991, "Shuttle Preparations," USA TODAY, p. 3A, Nov. 22, 1991.]

DISCOVERY: GALLEY TESTS DONE

Functional tests of Discovery's galley have been completed in OPF Bay 3. Work in progress: interface verification testing between the payload laboratory and the Orbiter; checks of the pressure in the main landing gear tires; testing of the orbital maneuvering system pods and the forward reaction control system; thermal protection system operations; installation of heat shields around the main engines; retest of APU No. 1. The Spacelab tunnel will be installed before Thanksgiving. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 21, 1991.]

ENDEAVOUR: SSME 3 INSTALLED

Technicians installed Endeavour's number 3 main engine today in Orbiter Processing Facility Bay 1. Work in progress: checkout of the robot arm; preparations for tests of the fuel cells; closeouts of the midbody of the Orbiter; evaluation of the water coolant loop No. 1 line; thermal protection system operations; leak and functional tests of the auxiliary power units; environmental control system testing. Scheduled work: electrical redundancy test of the orbital maneuvering system and reaction control system; tests of the Ku-band system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 21, 1991.]

November 22: WEATHER A LAUNCH DAY CONCERN

A cold front headed east from Texas is bringing a threat of thunderstorms and high winds to the Space Coast. Forecasters are presently predicting a 70 percent chance for launch of STS 44 at 6:31 p.m. November 24. The countdown began on schedule this morning. **Al Sofge**, Shuttle Test Director, said that the count was running smoothly except for a few "nickel and dime problems that you have when you have a complicated rocket ship." Air Force Lt. Col. **Ernie Jaskolski** said the problem with the navigation unit which had to be replaced had been traced to one of five sets of instruments in the unit's power supply. The replacement unit showed no problems of any sort during testing. [Halvorson, FLORIDA TODAY, p. 1A, Nov. 23, 1991.]

November 23: PAYLOAD CLEARED FOR LAUNCH

Air Force officials have tentatively cleared Atlantis' prime cargo, a Defense Support Program satellite, for launch November 24; the payload must pass a critical test of its replacement navigation unit. Officials expressed confidence that the replacement unit will operate properly despite the fact that workers have been unable to recreate the malfunction and explain its cause. A final decision from the Air Force will come about 9 a.m. tomorrow. Meanwhile, meteorologists are watching an approaching cold front but still predict a 70 percent chance of favorable weather tomorrow evening for the 6:31 p.m. EST launch. [Banke, FLORIDA TODAY, p. 1A, Nov. 24, 1991.]

November 24: ATLANTIS LIGHTS THE SKY

Atlantis roared off its launch pad a mere thirteen minutes late - at 6:44 p.m. EST; it rolled over onto its back and headed for orbit in an 8 1/2 flight. The Orbiter could still be seen seven minutes into its flight. Six hours after liftoff the crew deployed the Defense Support Program satellite and settled down to spend the next nine days making observations in support of the DOD program. "We had a great day," said Shuttle Launch Director **Robert B. Sieck** after liftoff. "We have a lot to be proud of, and as we look forward to Thanksgiving, we have a lot to be thankful for." The launch was delayed thirteen minutes to allow liquid oxygen propellant time to chill to a temperature of minus 323 degrees Fahrenheit. During loading, a liquid oxygen leak was discovered in the mobile launcher platform; work to fix the leak delayed the propellant's reaching the proper pre-launch temperature. STS 44 represented the last Shuttle launch under the administration of **Forrest S. McCartney**. After the successful liftoff, the launch team in Firing Room 1 gave the retired Air Force Lieut. General a standing ovation. "I've been here for all the launches, and that was a first," said Sieck. Atlantis is scheduled to land Kennedy Space Center's Shuttle Landing Facility at 2:20 p.m., December 4. On hand in the VIP Shuttle Viewing Area for the seventh night launch of the Shuttle Era were former KSC Director **Richard Smith** and actors **Dennis Quaid** and **Debra Winger**. [Broad, THE NEW YORK TIMES, p. A7, Nov. 25, 1991, Halvorson, FLORIDA TODAY, pp. 1A-2A, Nov. 25, 1991, "Hot Celebrities, Cool Weather, Big Crowds Give Atlantis A Sendoff," FLORIDA TODAY, p. 2A, Nov. 25, 1991, "Atlantis Lifts Off, Deploys Satellite," USA TODAY, p. 3A, Nov. 25, 1991.]

November 25: PICARD GREETS ATLANTIS CREW

The crew of the Space Shuttle Atlantis got a wake-up call this morning from science fiction's future as the theme song from "Star Trek: The Next Generation" was heard in the crew cabin followed by the voice of **Patrick Stewart**: "Space, the final frontier. This is the voyage of the Space Shuttle Atlantis. It's 10-day mission: to explore new methods of remote sensing and observation of the planet Earth; to seek out new data on radiation in space, and a new understanding of the effects of microgravity on the human body; to boldly go where 255 men and women have gone before. This is Patrick Stewart choosing not to outrank you as Capt. Jean-Luc Picard, saying that we are confident of a productive and successful mission. Make it so." At Port Canaveral, the two solid rocket boosters which helped propel Atlantis into space were expected to arrive this afternoon. Preliminary inspection showed some damage to the left booster, perhaps caused when it hit the water of the Atlantic Ocean. A detailed inspection will be performed once the boosters are on the stands at Hangar AF to determine the cause of damage. Sea state conditions that night were 6-8 feet. Booster performance in flight was nominal.[Banke, FLORIDA TODAY, p. 1A, Nov. 26, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 26, 1991.]

DISCOVERY: TPS OPERATIONS

Processing operations continue in the OPF Bay 3 on the Space Shuttle Discovery.

Activities include: installation of the Spacelab tunnel; testing of the orbital maneuvering system pods; cleaning of the payload bay; installation of sleep stations in the crew module; closing out the midbody of the orbiter; thermal protection system operations; installation of heat shields around the main engines. Scheduled work: leak check of the Spacelab tunnel on November 29 and aft closeouts next week. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 26, 1991.]

ENDEAVOUR: SYSTEM TESTS

An electrical redundancy test of the orbital maneuvering system and reaction control system is underway upon Endeavour in the Orbiter Processing Facility Bay 1. Other work in progress includes: tests of the Ku-band antenna; functional test of the freon coolant loop; closeouts of the orbiter's midbody; installation of struts; tests of the fuel cells; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Nov. 26, 1991.]

November 27:

ATLANTIS BOOSTERS

The STS 44 solid rocket boosters, which arrived at Hangar AF yesterday, are being inspected today. The exact cause of damage to the forward skirt has not yet been determined. There is a buckled area half way around the forward skirt and a torn section. There are some creases in the left forward motor case. Sea state conditions on the night of the launch were 6-8 feet. Booster performance in flight was nominal. SRB cases have been creased in the past due to high sea state conditions at the time the booster impacted the ocean. The damaged cases can not be reused. Booster employees are scheduled to have a four-day holiday weekend and will resume disassembly operations next week. It takes about 10 days to ready the segments for shipment back to the vendors for refurbishment. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Nov. 27, 1991.]

SPACELAB INSTALLED: DISCOVERY

In OPF Bay 3, processing workers completed the installation of the Spacelab tunnel in Discovery. Work in progress: testing of the orbital maneuvering system pods; cleaning of the payload bay; closing out the midbody of the Orbiter; thermal protection system operations; installation of heat shields around the main engines. Work scheduled includes: the installation of check valves in the main propulsion system and a leak check of the Spacelab tunnel on November 29; aft closeouts begin next week. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Nov. 27, 1991.]

ENDEAVOUR: ELECTRICAL REDUNDANCY TEST

In Orbiter Processing Bay 1, a number of processing activities are underway upon Endeavour: electrical redundancy test of the orbital maneuvering system and reaction control system; tests of the Ku-band antenna; functional tests of the freon coolant loop; closeouts of the Orbiter's midbody; installation of struts; tests of the fuel cells; thermal protection system operations; environmental control system

testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Nov. 27, 1991.]

BOC: EG&G STARTS TENTH YEAR

NASA's John F. Kennedy Space Center, FL, has awarded EG&G Florida, Inc., a government services division of EG&G, Inc. (Wellesley, MA), a 1-year extension of its existing contract for base operations services valued at approximately $197.1 million. The extension, effective January 1 through December 31, 1992, brings the cumulative value of the contract to $1.46 billion. This is the ninth extension to the base operations contract awarded to EG&G in January 1983. Under the cost-plus-award-fee extension, EG&G will continue to provide institutional and technical support services for utilities, grounds and facilities, administrative requirements, technical operations and health and protective services at the Kennedy Space Center. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Nov. 27, 1991.]

November 30:

KSC AWARDS

Kennedy Space Center has awarded 44 civil service and contractor employees with Manned Space Flight Awareness Program Honoree Awards. "These individuals were selected for their professional dedication to and outstanding achievement in support of the manned space flight program," said **Raymond Corey**, KSC Public Affairs Office. Nine civil service employees were honored: **Joseph Lacher, Thomas Schehl, Oscar Gamboa, Gertrude McClintock, Thomas Swanson, Larry Sloan, Retha Hart, Roger Liang** and **John Manning.** There were thirteen Lockheed Space Operations Co. employees given Honoree Awards: **Sandra Bronga, Craig Clokey, Edward Duben II, Marjorie Edwards, Denny Exley, Rebecca Ferguson, Ronald Gooden, Donna Herring, Dano LoPresti, Marilee Maddin, Claude Rhodes, David Sheriff, Wilson Williams.** Other contractor employees honored were: Val Miller and James Rymkos (Bionetics Corp.); Neil Rever (Honeywell Federal Systems Inc.); P. T. Swartley (IBM Corp.); Timothy Knowles (Martin Marietta Manned Space Systems); James Jones and Robert Rios (Rockwell International Corp.'s Rocketdyne Division); Nancy Burgess (Rockwell International Corp.'s Space Systems Division); Dennis Salmon (Michelin Aircraft Tire Corp.); Joseph Glover (Wiltech Corp.); Lisa Delaney (Grumman Technical Services Inc.); David Aungst and Michael Jacobson (Thiokol Corp.); David Allen (Johnson Controls World Services Inc.); Denise DeVito, Dennis Gardner, Lou Ann Janes and Michele Robertson (McDonnell Douglas Space Systems Co.); Patricia McDaniels (Bamsi Inc.); Albert Wallace and Lee Zook (United Technologies USBI) and **Joseph Jonakin** (Sunstrand Aerospace Mechanical Division). ["Space Center Workers' Contributions Honored," FLORIDA TODAY, p. 9E, Dec. 1, 1991.]

SNOOPY AWARDS PRESENTED

Astronauts **David Wolf** and **Rick Searfoss** presented Silver Snoopy Awards to the following EG&G Florida employees recently: **Paul Hise, Judith Hugoboom, William Parlon, Tony Peckich, Barbara Wilder** and **Lillian Barton.** The Manned Space Flight Awareness Program sponsors the Silver Snoopys; it is the second most

prestigious of the Program's awards. EG&G Florida Inc. is Kennedy Space Center's base operations contractor. ["Astronauts Present Silver Snoopy Awards," FLORIDA TODAY, p. 9E, Dec. 1, 1991.]

ATLANTIS HOME EARLY: IMU FAILURE

The Space Shuttle Atlantis will end its mission three days early because one of three navigational devices - an Inertial Measurement Unit (IMU) - has failed. "In this case, the risk of losing another IMU is low, but the gain of continued operations over the rest of the flight is probably also low," said **Gary Coen**, Mission Operations Director. "When we're in that low-risk/low-gain probability, our flight rules rationale says to be conservative and end the mission." Flight safety rules also mandate a landing at Edwards Air Force Base, CA, where the lakebed runway is longer than the Shuttle Landing Facility at Kennedy Space Center. There have been three other Shuttle missions cut short: Columbia in December 1990; Discovery in August 1985; Columbia in November 1981. [Brown, FLORIDA TODAY, pp. 1A-2A, Dec. 1, 1991.]

DECEMBER

December 1: **ATLANTIS LANDS AT EDWARDS AFB**

"Welcome home, Atlantis, and congratulations on a great flight," said astronaut **Robert Cabana** from JSC's Mission Control (Houston, TX). Cabana spoke to the six-member crew of Atlantis after it touched down on the lakebed runway of Edwards Air Force Base, CA, three days earlier and a continent away from its primary landing site, Kennedy Space Center. Touchdown came at 5:34 p.m. EST., six days, 22 hours, 50 minutes and 42 seconds after launch. Landing occurred at the conclusion of orbit 109. Preliminary inspections in California showed that Atlantis returned from space in good condition with little apparent damage to the thermal protection system. "It was an unfortunate circumstance that we had to bring the crew home early, and I'm sure they felt a little bit bad about that," said astronaut **Steve Nagel**, acting chief of the astronaut office, in a press conference held after the successful landing. "But, all in all it was a very good day for us, and we're happy to have the crew back. They're all in excellent health and good spirits and glad to be home, albeit a couple days early," he added. KSC recovery teams are at Dryden Flight Research Facility in California. It is estimated that Atlantis could depart for Florida on December 7 to begin a two-day ferry flight back to KSC. Pending the completion of planned work and good weather, the vehicle could arrive at Kennedy Space Center on Sunday, December 8. [Brown, FLORIDA TODAY, p. 1A-2A, Dec. 2, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 2, 1991, Date, THE ORLANDO SENTINEL, Dec. 3, 1991.]

DISCOVERY: TUNNEL LEAK CHECKS

Following the installation of the Spacelab tunnel in Discovery, technicians in OPF Bay 3 conducted leak tests of the tunnel and installed check valves in the main propulsion system. Work in progress: start of aft compartment closeouts; testing of the orbital maneuvering system pods; cleaning of the payload bay; closing out the midbody of the Orbiter; thermal protection system operations. A crew equipment interface test is planned for December 4 with the STS 42 flight crew. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 2, 1991.]

ENDEAVOUR: FUEL CELL TESTS

Endeavour's fuel cells have been tested in OPF Bay 1; the payload bay doors have been closed for tile work and functional tests of the crew hatch have been completed. An anti-skid test of the Orbiter's brakes has been scheduled. Work in progress: flight readiness test of the three main engines; tests of the main engine regulators; leak and functional tests of the auxiliary power units; electrical redundancy test of the orbital maneuvering system and reaction control system; functional test of the freon coolant loop; closeouts of the Orbiter's midbody; installation of struts; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 2, 1991.]

December 2: **ATLANTIS: FERRY FLIGHT PLANS**

"Right now the plan is for us to ferry out Saturday morning [December 7]," said Atlantis Vehicle Manager **Bob Hill**. "If we get a few good breaks and the weather cooperates, there's a possibility we may get out Friday afternoon." An initial look at the Orbiter's brakes and tiles shows that there was very little damage to the vehicle. "What that adds up to in my book is a very clean vehicle that's not going to cause us any undue perturbations when we get back to the Cape to turn it around for the next flight," Hill added. [Banke, FLORIDA TODAY, p. 1A, Dec. 3, 1991.]

December 3: **ATLANTIS: DRYDEN FERRY OPERATIONS**

Kennedy Space Center recovery teams are preparing Atlantis for its return trip to Florida scheduled to begin later this week. If work continues to go well, there is a possibility that the ferry flight could begin Friday. A nominal two-day ferry flight is planned with a refueling and overnight stopover in Texas. Weather conditions will dictate the flight path and duration of the cross-country piggyback flight. Hydrolasing operations are underway on the STS 44 solid rocket boosters at Hangar AF to strip the cork and foam from the lower segments. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 3, 1991, Banke, FLORIDA TODAY, p. 8A, Dec. 4, 1991,KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 4, 1991.]

STS 42 CREW ARRIVAL EXPECTED

A crew equipment interface test is planned for today with the STS 42 Discovery crew on hand for the test. Sleep stations for the crew have been installed. The STS 42 includes: Commander **Ronald J. Grabe**, Pilot **Stephen S. Oswald**, Mission Specialists **Norman E. Thagard, William F. Readdy, David C. Hilmers** and Payload Specialists **Roberta L. Bondar** and **Ulf D. Merbold**. The crew is expected to remain here through Thursday (December 5). KSC spokesman **Mitch Varnes** said, "The crew is coming to inspect the interior of the module and assure themselves that everything is just as they wish."Work in progress: aft compartment closeout; test and verification of connections between the laboratory tunnel and the Orbiter and IML payload; leak checks of the main propulsion system; testing of the orbital maneuvering system pods and forward reaction control system; closing out the midbody of the Orbiter; thermal protection system operations. Current planning has Discovery being moved from OPF Bay 3 to the Vehicle Assembly Building by December 13 and to Launch Complex 39A about five days later, i.e., December 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 3, 1991, Banke, FLORIDA TODAY, p. 8A, Dec. 4, 1991, KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 4, 1991.]

ENDEAVOUR: PROCESSING PROGRESS

Processing activities in OPF Bay 1 on the Space Shuttle Endeavour include: Flight readiness testing of the three main engines; tests of the main engine regulators; leak and functional tests of the auxiliary power units; electrical

redundancy test of the orbital maneuvering system and reaction control system; functional test of the freon coolant loop; closeouts of the Orbiter's midbody; installation of struts; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system; anti-skid test of the Orbiter's brakes. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 3, 1991, KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 4, 1991.]

December 4: **ITALY'S MALERBA TOURS KSC**

Italy's first astronaut, **Franco Malerba**, toured Kennedy Space Center today with other Italian representatives; the group stopped to have a look at the Tethered Satellite System (TSS-1) that Malerba will help launch July 2, 1992. "I think it's an extraordinary adventure for me and the Italian aerospace industry. It's a great honor to have this responsibility," Malerba said. The Italian astronaut was accompanied by a member of the TSS-1 crew, astronaut **Jeffrey Hoffman**, who said, "Getting (the tether) back is the hardest part. I think we have a very good chance of getting the satellite out and of getting some real good science out of it. Then we're going to do our darndest to try and get it back." His concern was about the possibility that the tether might become wrapped around the Orbiter and lead to the loss of the satellite. In California, workers continued to prepare Atlantis for its return trip to Florida. [Banke, FLORIDA TODAY, p. 5A (Photo, p. 1A), Dec. 5, 1991.]

December 5: **ATLANTIS: TAIL CONE INSTALLATION**

Work continues to prepare the Orbiter Atlantis for the ferry flight which is scheduled to depart Edwards at sunrise on Saturday [December 7] for what is nominally a two-day flight to Florida. The tail cone is scheduled to be installed tonight and the Orbiter will be powered down and mated to the 747 Shuttle Carrier Aircraft tomorrow. Robotic hydrolasing operations are complete at Hangar AF and preparations are underway to remove the aft skirts. A cold front is approaching California from the northwest and a low is approaching from the southwest. It is too early at this time to determine what effect, if any, these weather systems will have on departure and the ferry flight activities. A ferry flight review is scheduled to be held at 11:30 A.M. December 6. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 5, 1991, OV-104/ATLANTIS STATUS REPORT, NASA Dryden Flight Research Facility-Edwards, CA, Dec. 5, 1991, OV-104/ATLANTIS STATUS REPORT, Dec. 6, 1991, "Atlantis Begins Trip Home Today," FLORIDA TODAY, p. 4A, Dec. 7, 1991.]

CEI TEST SUCCESSFUL

Both Discovery and its STS 42 crew have successfully passed a crew equipment interface test in Orbiter Processing Facility Bay 3. Rollover of Discovery to the Vehicle Assembly Building is planned for the end of next week. Work in progress: functional test of the landing gear; aft compartment closeout; leak checks of the main propulsion system; testing of the forward reaction control system; thermal

protection system operations. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 5, 1991.]

ENDEAVOUR: TESTING UNDERWAY IN OPF BAY 1

Installation of Endeavour's forward reaction control system is scheduled for next week in OPF Bay 1. Meanwhile, processing activities continue: brake anti-skid and nose wheel steering tests; leak and functional tests of the auxiliary power units; electrical redundancy testing of the orbital maneuvering system and reaction control system; closeouts of the Orbiter's midbody; functional test of the freon coolant loop; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 5, 1991.]

December 6:

DISCOVERY: SPACELAB READY FOR PAD

Thoroughly checked out and firmly tucked into the Orbiter Discovery's payload bay, the International Microgravity Laboratory-1 (IML-1) Spacelab module is now ready to be transferred to Launch Complex 39A. IML-1 is the prime payload of STS 42, the first Space Shuttle flight of 1992. Discovery is now inside Orbiter Processing Facility Bay 3 and is scheduled to be moved to the Vehicle Assembly Building (VAB) next week. Inside the VAB, Discovery will be mated with its external tank and twin solid rocket boosters. The STS 42 launch vehicle is slated to be transported to the launch pad during the third week of December. More than two years of planning and pre-mission processing by the KSC payloads community were essentially completed this week when the STS 42 astronauts inspected the Spacelab module for the last time before their planned late January liftoff. Routine system checks through launch and stowage of some flight experiments are the only requirements left for the IML-1 processing team. "It (IML-1) has been a very clean and smooth-flowing payload," remarked **Glenn Snyder**, KSC's STS 42 Payload Processing Manager. "The contractor and NASA teams have worked hand-in-hand on IML-1, and we're now at a point where we're just about ready to fly."

IML-1 is the first of a series of IML missions planned to fly aboard the Space Shuttle this decade. All of these missions are dedicated to the study of life and materials sciences in microgravity. The missions will specifically concentrate on the intricate effects of weightlessness on living organisms and how materials react in space. The IML program is a continuation of NASA's successful multi-national space efforts. The venture is a combined partnership of NASA, the European Space Agency (ESA), the Canadian Space Agency (CSA), the French National Center for Space Studies (CNES), the German Space Agency (DARA), and the National Space Development Agency of Japan (NASDA). A seven member astronaut flight crew is scheduled to fly aboard Discovery on the IML-1 Space Shuttle mission. The crew of the fourteenth flight of the Orbiter Discovery will consist of Commander **Ron Grabe**, Pilot **Steve Oswald**, Mission Specialists **Norman Thagard, David Hilmers**, and **Bill Readdy** and Payload Specialists **Roberta Bondar** and **Ulf Merbold**. Bondar is a Canadian astronaut representing the

Canadian Space Agency; Merbold, a German citizen, will represent the European Space Agency on the IML-1 mission. [Varnes, NASA/KSC RELEASE NO. 138-91, Dec. 6, 1991.]

ATLANTIS: FERRY FLIGHT READY

Work on the Orbiter Atlantis continued on schedule today for an early December 7 morning departure from Edwards Air Force Base (CA). If weather conditions permit, Atlantis will be ferried to Kelly Air Force Base (San Antonio, TX) for refueling. If possible, Atlantis may continue on its first leg either to Columbus Air Force Base (Columbus, MS) or Eglin Air Force Base (FL). A two-day ferry flight is planned with the earliest possible arrival back at KSC judged to be mid-day Sunday. Last night, the main engine tail cone was installed on Atlantis. Hydraulic operations to position the aerosurfaces and raise the landing gear is in work. Mating to the 747 Shuttle Carrier Aircraft is scheduled for tonight with back out of the Mate-Demate Device targeted for midnight, PST. Arrival in Florida at Kennedy Space Center is expected to be about noon on December 8. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 6, 1991, OV-104, ATLANTIS STATUS REPORT, Dec. 6, 1991.]

DISCOVERY: LANDING GEAR TESTS

Technicians in OPF Bay 3 have completed landing gear functional tests on Discovery; they have also completed integrated hydraulic operations and final aerosurface cycling. Work in progress: orbital maneuvering system functional tests and checkouts; reaction control systems electrical redundancy tests; thermal protection system operations (only six tile cavities remain). Scheduled work: payload bay door cycle and towing to the Vehicle Assembly Building, now set for December 13. Launch of the STS 42 mission is scheduled tentatively for January 22, 1992. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 6, 1991, Brown, FLORIDA TODAY, p. 4A, Dec. 8, 1991.]

ENDEAVOUR: TIPS OPERATIONS

Thermal protection system operations are underway on Endeavour in OPF Bay 1. Other processing activities include: power reactant storage and distribution system tests and operations; auxiliary power unit leak and functional tests; brake anti-skid checks; main propulsion system leak checks and testing. Scheduled: Endeavour will receive its forward reaction control system from the Hypergolic Maintenance Facility. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 6, 1991.]

December 7: ATLAS LAUNCH SET FOR TODAY

"We're proceeding right ahead on schedule," said General Dynamics spokesman **Jack Isabel** concerning today's evening launch of an Atlas rocket from Launch Complex 36B at Cape Canaveral Air Force Station. An earlier Atlas rocket, carrying a Japanese communications satellite, had to be destroyed when one of its two upper-stage engines shut down. That failure was caused by debris in an

engine turbopump. The launch today will be of an upgraded Atlas Centaur called an Atlas 2; the 156-foot rocket is twenty feet taller than its predecessor and capable of lifting a 5,900 pound satellite into geosynchronous orbit. The Atlas 2 will lift about 1,000 pounds more than its predecessor. [Brown, FLORIDA TODAY, p. 4A, Dec. 7, 1991, Date, THE ORLANDO SENTINEL, Dec. 7, 1991.]

ATLANTIS RETURNS

The Space Shuttle Atlantis, atop its Shuttle Carrier Aircraft, landed today at the SLF at 12:27 p.m. Before landing at KSC, the SCA pilot flew along Brevard County's coast to give local residents and tourists a look at the returning Shuttle. Atlantis will be rolled into an OPF hangar tomorrow to undergo post-flight inspections. The return to KSC was four days later than planned. [Brown, FLORIDA TODAY, p. 4A, Dec. 8, 1991.]

ATLAS-2 LAUNCHED FROM CCAFS

The first Atlas-2 rocket launched successfully from Cape Canaveral Air Force Station's Launch Complex 36A at 5:47 p.m. The launch was delayed for 11 minutes due to the presence of aircraft in the launch area. There was also a brief delay in confirming that the $85 million Eutelsat had separated from its booster. "A few anxious moments, but the first Atlas-2 with the Eutelsat spacecraft was a success," said Air Force launch commentator **Jim Codd**. "I can't tell you how important this launch is to our future commercial business," said **Charlie Lloyd**, General Dynamics Vice President and Managing Director of the Commercial Launch Division. [Brown, FLORIDA TODAY, p. 1A, Dec. 8, 1991, Date, THE ORLANDO SENTINEL, Dec. 8, 1991.]

NASA EXTENDS EG&G CONTRACT

EG&G Florida, Inc.'s Base Operations Contract at Kennedy Space Center was extended for another year today by NASA. The extension is valued at about $197.1 million, raising the value of the overall BOC to $1.46 billion, according to NASA officials. EG&G has held the BOC at KSC since January 1983. ["NASA Extends EG&G Pact at KSC," FLORIDA TODAY, p. 10E, Dec. 8, 1991.

SPACE STATION BUILDING CONSTRUCTION

Officials at Kennedy Space Center are confident that the new Space Station Processing Facility now under construction at KSC will be ready to receive flight hardware on schedule. The facility's completion date is August 1994. "We're moving along very well on this project. As early as October of 1993, we'll have enough of the facility finished - the high bay will be completed - where we can start installing some of the cables and ground support equipment," said **Dick Lyon**, Space Station Manager at KSC. "It's the last place on Earth where you'll be able to touch the flight hardware and run a final test. And that's exactly what our job is. We expect the first flight hardware in less than four years, so we are truly excited. Kennedy Space Center is the home of excitement. That's where you're

just a few weeks ahead of the fire and smoke and going into orbit." [Banke, FLORIDA TODAY, p. 10E, Dec. 8, 1991.]

DUFFY AWARDED SILVER SNOOPY

Phillip Duffy, an employee at Kennedy Space Center with McDonnell Douglas Space Systems Co., has been awarded a Silver Snoopy by astronaut **Dave Wolf**. Duffy was recognized for his work on the Spacelab Intercom system used during Columbia's June mission. ["Coveted Award Doled Out by NASA Astronaut," FLORIDA TODAY, p. 9E, Dec. 8, 1991.]

December 8:

DISCOVERY: IML-1 CLOSED FOR FLIGHT

The International Microgravity Laboratory-1, primary payload of the STS 42 mission aboard Discovery, has been closed out for flight. Discovery has had its final payload bay cleaning; its Ku-band antenna has been stowed for flight; the aft engine compartment has been closed and orbital maneuvering system tests have been completed. Work in progress: closing the payload bay doors for flight; functional testing of the landing gear; leak checks of the main propulsion system; testing of the forward reaction control system; thermal protection system operations. Rollover of Discovery from OPF Bay 3 to the Vehicle Assembly Building is scheduled for December 13. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 9, 1991, Brown, FLORIDA TODAY, p. 7A, Dec. 10, 1991.]

ATLANTIS TOWED TO OPF BAY 2

The Space Shuttle Atlantis, which returned to Kennedy Space Center yesterday afternoon by Shuttle Carrier Aircraft, was towed to OPF Bay 2 at 6 a.m. this morning. Atlantis and its SCA left Dryden Flight Research Facility December 7 and spent the night at Shepard Air Force Base (Wichita Falls, TX) before completing its ferry flight to KSC. Workers are presently jacking and leveling the Orbiter and gaining access to various areas of the vehicle such as the crew cabin and aft compartment. Scheduled work includes: opening the payload bay doors; removing the tail cone and ferry flight fittings; detailed inspections of the vehicle and removal of the wheels and tires. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 9, 1991.]

ENDEAVOUR: FRCS INSTALLATION SCHEDULED

The Space Shuttle Endeavour will have its forward reaction control system installed tomorrow in OPF Bay 1. Current work in progress: preparations to install the FRCS; installation of heat shields around the three main engines; leak and functional tests of the auxiliary power units; functional tests of the freon coolant loop; closeouts of the Orbiter's midbody; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 9, 1991.]

December 10: **DISCOVERY: PAYLOAD DOORS CLOSED**

The payload bay doors of the Space Shuttle Discovery have been closed by technicians processing the Orbiter for its STS 42 flight in OPF Bay 3. Work in progress includes: cycles of the nose landing gear door to check the fit of the tile and thermal barriers; closing out the crew module; testing of the forward reaction control system; thermal protection system operations. Scheduled work: determination of the Orbiter's weight and center of gravity on December 11 and the rollover to the VAB targeted for the morning of December 13. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 10, 1991.]

[] **ATLANTIS: POST-FLIGHT INSPECTIONS**

Preparations are underway in OPF Bay 2 to open the newly returned Atlantis' payload bay doors and to remove the tail cone and ferry flight fittings. Technicians are also working to gain access to various areas of the vehicle such as the crew cabin and aft compartment. Detailed post-flight inspections of the Orbiter are scheduled along with removal of the vehicle's wheels and tires. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 10, 1991.]

[] **ENDEAVOUR PROCESSING PROGRESS**

Work in progress in OPF Bay 1 on the Space Shuttle Endeavour includes: preparations to install the forward reaction control system; installation of heat shields around the three main engines; leak and functional tests of the auxiliary power units; functional tests of the freon coolant loop; closeouts of the Orbiter's midbody; thermal protection system operations; environmental control system testing; testing of the main propulsion system; leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 10, 1991.]

December 11: **DISCOVERY: CREW HATCH CLOSED**

Technicians in OPF Bay 2 have closed Discovery's crew module hatch as part of the processing effort for the Orbiter's STS 42 mission; the vehicle's final power down has been completed, too. Determination of Discovery's weight and center of gravity continues as do thermal protection system operations. Scheduled work: attaching the Orbiter to the Orbiter transport tonight; retracting the landing gear tomorrow and rollover to the VAB is scheduled for tomorrow afternoon. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 11, 1991.]

[] **ATLANTIS: WHEELS AND TIRES REMOVED**

The wheels and tires have been removed from Atlantis in OPF Bay 2. Work in progress: preparations to open the payload bay doors; preparations to remove the tail cone and ferry flight fittings ; post-flight tile inspections and stacking of the right aft booster in the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 11, 1991, "NASA May Move Discovery Early," FLORIDA TODAY, p. 5A, Dec. 11, 1991.]

ENDEAVOUR: FRCS INSTALLED

Endeavour's forward reaction control system has been installed. Work in progress: connections of the forward reaction control system; installation of heat shields around the three main engines; tests of the power reactant storage and distribution system; leak and functional tests of the auxiliary power units; functional tests of the freon coolant loop; closeouts of the Orbiter's midbody; thermal protection system operations; environmental control system testing; testing of the main propulsion system and leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10:30 A.M., Dec. 11, 1991.]

December 12: **DISCOVERY: MEASUREMENTS COMPLETE**

Technicians in Orbiter Processing Facility Bay 3 have determined the weight and center of gravity of Discovery and have attached the Orbiter to its transporter. Workers are currently retracting Discovery's landing gear and preparing to transfer the vehicle to the Vehicle Assembly Building at about 4 p.m. this afternoon. Scheduled work includes: mating Discovery to its external tank and solid rocket boosters; the Shuttle Interface Test (set for Dec. 16), to verify connections between the vehicle elements and the launch platform; rollout to Launch Complex 39A is planned for December 18. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 12, 1991, Banke, FLORIDA TODAY, p. 3A, Dec. 13, 1991.]

ATLANTIS: TAIL CONE REMOVED

The tail cone has been removed from the Space Shuttle Atlantis in OPF Bay 2 and the vehicle's payload bay doors have been opened. Workers are offloading STS 44 payload hardware from the payload bay; removing ferry flight fittings; inspecting the thermal protection system for flight damage and stacking the right aft booster in the VAB. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 12, 1991.]

ENDEAVOUR: HEAT SHIELDS INSTALLED

Technicians in Orbiter Processing Facility Bay 1 have installed heat shields around the Endeavour's three main engines. Endeavour is scheduled to make its maiden voyage - STS 49 - in April of next year. Work in progress: electrical connections of the forward reaction control system; functional tests of the star tracker door; leak and functional tests of the water spray boilers; tests of the power reactant storage and distribution system; leak and functional tests of the auxiliary power units; thermal protection system operations; environmental control system testing; main propulsion system testing; and leak checks of the potable water system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 12, 1991.]

CHALLENGER TAPES: NO RELEASE

U. S. District Judge **Norma Holloway Johnson** ruled today that NASA will not have to release sound recordings of the last moments in the lives of the Challenger 7

astronauts; the space agency had already released transcripts. The suit had been brought by The New York Times which argued that the recording might help show what caused the accident in which the crew was killed on January 28, 1986. Judge Johnson said, "Even assuming...there is some voice inflection or background noise on the tape which indicates that the astronauts knew they were going to die, this court cannot see how that information contributes to the public's knowledge of how NASA operates." The judge noted that NASA had released a complete transcript and said that a release of the tape could lead to "a disruption of [the surviving families] peace of mind every time a portion of the tape is played within their hearing." ["Challenger Tapes To Remain Secret," FLORIDA TODAY, p. 1A, Dec. 13, 1991, "Challenger Tapes," USA TODAY, p. 3A, Dec. 13, 1991, Lewis, THE NEW YORK TIMES, p. A20, Dec. 13, 1991.]

BIONETICS GETS KSC CONTRACT

Bionetics Corp. (Hampton, VA) has won the photographic services contract at Cape Canaveral Air Force Station and Kennedy Space Center. TGS Technology Inc., a subsidiary of Johnson Controls World Services, Inc., had held the contract for the past 26 years. All existing collective bargaining agreements for the 147 TGS employees will be honored, according to union business manager **Andrew Younger**. "That doesn't necessarily mean they'll all be picked up," Younger added. Bionetics already employees 150 people under a life sciences contract and a Shuttle instrumentation contract. The photographic services contract: photographs launches and other activities at KSC and the 45th Space Wing located at Patrick Air Force Base; operates tracking stations and maintains KSC's photo library. [Brown, FLORIDA TODAY, p. 20C, Dec. 13, 1991.]

SHUTTLE PROGRAM CONSOLIDATION

Reorganization of the Shuttle Program should be complete by late 1993, according to NASA Space Flight Chief **William Lenoir**. "We are in the process of eliminating a whole layer of management in the Space Shuttle," said Lenoir. He and his staff are working "to determine what functions in each of those [Space Shuttle] offices should stay where they are and what functions should go to the Cape," according to Lenoir. He said the main shift in personnel would be evidenced in the relocation of about 50 managers from NASA's Headquarters to Kennedy Space Center. Moves from the other centers, Lenoir indicated, would be less "profound." [Eisler, FLORIDA TODAY, p. 1A, Dec. 13, 1991.]

PAD REPAIR DELAYS LAUNCH: CCAFS

NASA and the Air Force have decided to proceed with needed repairs of Launch Complex 17A at Cape Canaveral Air Force Station even though the repairs will delay the launch of a $110 million NASA science satellite, officials said today. **Jim Barrowman**, NASA Project Manager, said that an April launch is still in the planning stages. "It's really going to depend on the Air Force's ability to get all the pad modifications done. I know they are going to do their damndest to get

that done as soon as possible," Barrowman said. [Banke, FLORIDA TODAY, p. 3A, Dec. 13, 1991.]

December 13: **STS 42: DISCOVERY TO VAB**

Discovery's rollout to Launch Complex 39A on December 18 will be its first step toward the first launch of 1992. Yesterday, at 4:32 p.m., Discovery was moved from Orbiter Processing Facility Bay 3 to the nearby Vehicle Assembly Building where it is being mated with the external tank and solid rocket boosters. Discovery is being prepared for its STS 42 International Microgravity Laboratory-1 (IML) mission currently planned for the third week of January 1992. The Orbiter's 14th flight is a seven-day mission and carries a seven-member crew. Flight preparations on Discovery for the STS 42 mission began September 27, following its last mission, STS 48, which ended with a landing at Edwards Air Force Base, CA. Discovery was the first Orbiter prepared for flight in Orbiter Processing Bay 3 which was equipped in September 1991 to support full-scale Shuttle processing, testing and checkout. All of the vehicle's systems were fully tested during its 10-week stay in the OPF.

Space Shuttle main engine locations for STS 42 are as follows: engine 2026 in the No. 1 position, engine 2022 in the No. 2 position, and engine 2027 in the No. 3 position. These engines were installed October 24-25, 1991. The Crew Equipment Interface Test with the STS 42 flight crew was conducted December 4 in the OPF; the test provides an opportunity for the crew to become familiar with the configuration of the Orbiter and anything that is unique to the STS 42 mission. Technicians installed the International Microgravity Laboratory payload into Discovery's payload bay on November 17 while the vehicle was in the Orbiter Processing Facility; the payload bay doors were closed for flight in the OPF December 9. Booster stacking operations on mobile launcher platform 3 began October 1, and were completed by October 21; the external tank was mated to the boosters on November 4. After the vehicle is secured to the pad (hard down) next week, technicians will hook up ground power supplies, ground cooling and conditioned air to the vehicle elements. STS 42 processing teams will be off the Christmas and New Year's Day holiday period. The Terminal Countdown Demonstration Test, a full rehearsal of launch day activities with the STS 42 flight crew in attendance, is planned to occur January 6-7. While the crew is at Kennedy Space Center, they will be trained in emergency escape procedures at the launch pad, and will practice driving in the armored personnel carriers. The mock countdown is scheduled to begin at 8 a.m. on January 6, and will culminate with a simulated engine cutoff shortly after 11 a.m. EST on January 7.

A standard 43-hour launch countdown is scheduled to begin three days prior to launch; during the countdown, the Orbiter's onboard fuel and oxidizer storage tanks will be loaded and all Orbiter systems will be prepared for flight. About nine hours before launch, the external tank will be filled with its flight load of 500,000 gallons of liquid oxygen and liquid hydrogen propellants. About two and one-half hours before liftoff, the flight crew will begin taking their assigned seats in the crew cabin. Landing is planned at Edwards Air Force Base (CA) because of the heavier

weight of the vehicle returning to Earth with the IML tucked inside its payload bay. KSC's landing convoy teams will be on station in California to safe the vehicle on the runway and prepare it for the cross-country ferry flight back to Florida. Five days are needed at Dryden Flight Research Facility to prepare the Orbiter for the ferry flight and bolt it to the 747 Shuttle Carrier Aircraft. A two-day ferry flight is scheduled. On its return to Florida, Discovery will be taken out of flight status for the next eight and one-half months while undergoing major modifications, upgrades and required inspections. The shuttle processing team will perform this work on Discovery in the Orbiter Processing Facility. Discovery's 15th space flight, planned for the fall of 1992, is designated STS 53, a Department of Defense flight. [NASA/KSC Release No. 139-91, Dec. 13, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 13, 1991.]

[] **STS 45: MAIN ENGINES POSITIONED**

The main engines of Atlantis have been repositioned along with its orbital maneuvering system engines in preparation for its STS 45 mission next year. Work in progress: tests of the fuel cells; deconfiguring the aft flight deck from the STS 44 mission; offloading STS 44 payload hardware from the payload bay; removal of ferry flight fittings; post-flight tile inspections; tensioning the hold down posts for the aft boosters in the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 13, 1991.]

[] **ENDEAVOUR: INTERFACE VERIFICATION TESTS**

Technicians in OPF Bay 1 are progressing on a number of tasks in the processing of Endeavour for its maiden STS 49 flight: interface verification tests of the forward reaction control system; functional tests of the star tracker door; leak and functional tests of the water spray boilers and auxiliary power units; tests of the power reactant storage and distribution system; leak checks of the potable water system; thermal protection system operations; environmental control system testing; testing of the main propulsion system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 13, 1991.]

December 14: **NASA: LOCKHEED "EXCELLENT"**

NASA has awarded Lockheed Space Operations Co. a rating of "excellent" for its work in processing Space Shuttles for launch during the period of April 1 through September 30. Lockheed President Gerry Oppliger said, "We have an excellent, highly efficient processing system in place and it's staffed by the world's finest space professionals. This super recognition of their performance is a great way to end an outstanding year." [Halvorson, FLORIDA TODAY, p. 10E, Dec. 15, 1991.]

December 16: **SHUTTLE INTERFACE TEST**

Technicians will conduct a Shuttle Interface Test on Discovery today (12:01 a.m.) in the Vehicle Assembly Building, according to Kennedy Space Center

spokeswoman **Lisa Malone**. Prior to the test, electrical connections between Discovery and its external tank and solid rocket boosters must be made and a test will be done to verify that the connections were made properly. Rollout is now expected to come early on December 18, beginning at 8 a.m. "Basically, we're going to get out there to the pad, secure the Shuttle and button it up for the holidays," said **Lisa Malone**. [Halvorson, FLORIDA TODAY, p. 1A, Dec. 15, 1991, Halvorson, FLORIDA TODAY, p. 1A, Dec. 16, 1991.]

NICHOLSON NAMED SHUTTLE CHIEF

Leonard Nicholson has been named to succeed **Robert L. Crippen** as Director of the Space Shuttle Program. Nicholson had served the program as its Deputy Director; Crippen succeeds **Forrest S. McCartney** as Kennedy Space Center Director on January 1, 1992. NASA spokesman **James Hartsfield** said Nicholson was "the logical choice. The position he has held since 1989 has been the second highest in the Shuttle Program." Part of Nicholson's job will involve the consolidation of the Shuttle Program under his direction at Kennedy Space Center. In 1992, NASA plans to transfer up to 100 top Shuttle Program Managers to KSC from their current locations at NASA Headquarters, Johnson Space Center and Marshall Space Flight Center. The restructured Space Shuttle organization reflects recommendations made to NASA by former Deputy Administrator James R. Thompson to streamline Shuttle management by dissolving the Shuttle Program Office at NASA Headquarters and locating the core of the Shuttle Program Management Team at KSC.Effective January 1, 1992, the Program Director function will reside at KSC. Functions formerly conducted at Headquarters, such as systems engineering and analysis, program control and development of the Shuttle manifest, will be consolidated under the program director at the field offices. A small Space Shuttle Program staff will remain at NASA Headquarters to support necessary external activities and to provide a continuous linkage between Headquarters and the program in the field. Civil service personnel who served in the Shuttle Program Office at NASA Headquarters are being relocated into other divisions at Headquarters. Nicholson, who is 53, joined NASA in 1963 as an engineer located at Johnson; he held a number of senior positions at JSC, including technical assistant to the Apollo Program Manager, technical assistant to the JSC Director and Payload Manager for Shuttle Operations at KSC. A 1963 graduate of West Virginia University with a M.S. in mechanical engineering, Nicholson has received a number of NASA awards, including the Exceptional Service Medal and two NASA Outstanding Leadership Medals. Born in Atlanta, GA, Nicholson is married to the former **Linda Fogarty** of New Orleans, LA. [Halvorson, FLORIDA TODAY, p. 5A, Dec. 17, 1991, NASA/KSC News Release No. 91-208, Dec. 16, 1991, "Shuttle Chief," USA TODAY, p. 3A, Dec. 17, 1991, "NASA Appoints Nicholson As Head of Shuttle Program," THE ORLANDO SENTINEL, Dec. 17, 1991.]

DISCOVERY'S ROLLOUT DELAYED

The rollout of Discovery to Launch Complex 39A is being delayed one day because of problems that arose while technicians were aligning a seal around an

umbilical that routes electrical lines between the Orbiter and its fuel tank. KSC spokesman **Bruce Buckingham** said, "The seal slipped slightly, went a bit askew, and they had to go back and readjust it." A two-day test was delayed by the problem; the test will now be completed today. Buckingham said the delay in rolling out Discovery to the launch pad will not affect plans to launch on January 22 though a firm date will be announced after the Flight Readiness Review which culminates January 9, 1992. [Halvorson, FLORIDA TODAY, p. 5A, Dec. 17, 1991.]

December 17: **DISCOVERY: SIT UNDERWAY**

Technicians in the Vehicle Assembly Building have closed out connections of the electrical monoball area on the liquid hydrogen and liquid oxygen 17-inch umbilicals and the external tank and Discovery in preparation for its January 1992 STS 42 mission. A Shuttle Interface Test is underway to verify connections between the vehicle elements and launch platform. Scheduled work includes: rollout to Launch Complex 39A at 12:01 a.m., December 19; a Terminal Countdown Demonstration Test is set for January 6-7; the STS 42 Flight Readiness Review is planned for January 9 with launch targeted, tentatively, for January 22. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 17, 1991.]

STS 45: ATLANTIS' APU'S DESERVICED

Orbiter Processing Facility Bay 2 technicians have deserviced lube oil from Atlantis' auxiliary power units as part of the processing effort for STS 45. Work in progress: post-flight checks of the main engines; tests of the Orbiter's fuel cells; preparations to deservice the reaction control and orbital maneuvering systems; inspections of the 17-inch disconnects; stacking the right aft center segment in the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 17, 1991.]

ENDEAVOUR: MAIN LANDING GEAR CYCLED

Endeavour's main landing gear has been cycled in OPF Bay 1 and a functional test of the Orbiter's freon coolant loop has been completed as well. Work in progress: functional tests of the crew hatch; functional test of the star tracker door; adjustments of the brake pedal transducer; leak and functional tests of the water spray boilers and the auxiliary power units; thermal protection system operations and leak checks of the main propulsion system and the potable water system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 17, 1991.]

December 18: **HFS INC. AWARDED KSC CONTRACT**

HFS, Inc. (McLean, Virginia) has won a contract from NASA's John F. Kennedy Space Center to create a prototype of a computer system which will store and access information for the Launch Processing System (LPS). The firm fixed price contract is valued at $169, 412 and covers seven pieces of computer hardware that comprise this mini-storage system. The system is being developed to replace existing 15-inch reel tapes which must be hand-loaded with smaller cartridge-type

tapes. Successful application of this system could lead to a computer tape library for the LPS. The LPS is a highly automated, computer-controlled system that oversees the entire checkout and launch process. The system continually monitors the Space Shuttle and its ground components and automatically alerts the system operator of any deviations. Delivery of the prototype system is tentatively scheduled for the end of January. [NASA/KSC News Release No: 141-91, Dec. 18, 1991.]

DISCOVERY: ROLLOUT PREPARATIONS

In the Vehicle Assembly Building, the Space Shuttle Discovery is being readied for rollout - 2 a.m., December 19 - to Launch Complex 39A for its STS 42 mission. Also in progress: the Shuttle Interface Test to (see story above) and leak checks of the connecting interfaces (17-inch disconnect) between the external tank and the Orbiter. **Lisa Malone**, KSC spokeswoman said, "Our plan is to get to the launch pad and have the Orbiter secured by the holidays." [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 18, 1991, Brown, FLORIDA TODAY, p. 4A, Dec. 18, 1991, "Shuttle Discovery Ready for Rollout," FLORIDA TODAY, p. 2A, Dec. 19, 1991.]

STS 45: BOOSTER STACKING IN VAB

In preparation for Atlantis' STS 45 mission, the right aft center segment to the right booster has been stacked in the Vehicle Assembly Building. Work in progress: inspections of several of the reinforced carbon carbon T-seals and panels on the leading edges of the wings; post-flight checks of the main engines; tests of the fuel cells; preparations to deservice the reaction control and orbital maneuvering systems; inspections of the 17-inch disconnects; preparations to stack the right forward center segment in the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 18, 1991.]

STS 49: STAR TRACKER DOOR TESTS

Functional tests of the star tracker door for Endeavour have been completed; the external tank umbilical doors for tile work has been cycled. Work in progress: functional tests of the crew compartment hatches; adjustments of the brake pedal transducer; leak and functional tests of the water spray boilers and auxiliary power units; thermal protection system operations and leak checks of the potable water system and main propulsion system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 18, 1991.]

COLUMBIA UPDATE: PALMDALE, CA

Columbia was powered up early this morning for systems testing. The Orbiter is undergoing major modifications while at the Rockwell manufacturing plant (Palmdale, CA). The vehicle will remain powered up for the next two weeks for verification testing. Structural inspections and X-rays of critical areas will follow power up tests. Columbia is scheduled for return to Florida at the end of next

month. Its next flight, the first extended duration mission in the Shuttle Program, is STS-50 with the United States International Microgravity Laboratory payload. STS 50 is planned for launch next summer on a 13-day flight with a crew of seven. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 18, 1991.]

December 18: **TSS MILESTONE REACHED AT KSC**

A milestone in processing the Tethered Satellite was achieved today at Kennedy Space Center when the spacecraft was mated to the satellite support assembly (SSA). The Tethered Satellite System (TSS), one of the two primary payloads of Mission STS 46, is an international cooperative mission between NASA and Italy. The SSA, a cone-shaped structure in which the satellite rests, contains a deployer boom. The SSA is mounted on an experiment pallet together with the associated reel assembly. The associated reel assembly was attached to the pallet earlier this year and the tether was wound in September. The tether is a dielectric Kevlar cord which has a diameter roughly equivalent to that of pencil lead. Three principal experiments are contained within the satellite which will be deployed to a distance of 12 and a half miles from Atlantis during the one-week STS 46 mission next summer. The recent turnover of the satellite from the Italian Space Agency (ASI) to the Nova-KSC experiment integration team for today's mating also integrated testing with the other TSS hardware elements can begin on schedule next month. The next event, attaching the satellite to the deployer boom, is scheduled immediately after the Christmas holidays. A team of approximately 25 Italians have been at KSC the last several months performing experiment testing in the Operations and Checkout Building to prepare the satellite for its mission. Following the completion of integrated testing in March, the pallet with TSS will be moved into a test stand to begin tests with the Cargo Integrated Test Equipment (CITE). This test verifies the payload's compatibility and readiness to be integrated with the Space Shuttle. The payload is scheduled to be transferred to the launch pad in early June for installation in Atlantis' payload bay. [NASA/KSC News Release No. 142-91, Dec. 18, 1991.]

December 19: **DISCOVERY ROLLS TO LC 39A**

The Space Shuttle Discovery rolled out of the Vehicle Assembly Building at Kennedy Space Center this morning at 1:39 a.m. on the first leg of its STS 42 journey. The trip to the pad took about seven hours, according to NASA spokeswoman **Lisa Malone**; Discovery was hard down on the pad's pedestals at 8:40 a.m. A key test of electrical and mechanical connections between the Orbiter, its solid rocket boosters and its external tank was successfully completed yesterday; leak checks of the connecting interfaces (17-inch disconnects) between the external tank and the Orbiter were also completed. The pad's protective service structure was moved to surround the Shuttle after an APU test. Work in progress: making connections between the launch pad and the STS 42 vehicle elements and preparations to hot fire auxiliary power unit number 1 tonight. Scheduled work includes: tests of the solid rocket boosters' hydraulic system early December 20; buttoning up the vehicle and powering down for the holiday period; Terminal Countdown Demonstration Test set for January 6-7; Flight

Readiness Review planned for January 9. Most KSC workers will begin a two-week holiday vacation once Discovery is hard down at the pad. ["Shuttle Discovery Ready for Rollout," FLORIDA TODAY, p. 2A, Dec. 19, 1991, "Rolling Out New Year's First Orbiter," picture, FLORIDA TODAY, p. 1B, Dec. 20, 1991, KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 19, 1991, "Shuttle On Launch Pad for Spacelab Mission," THE WASHINGTON TIMES, Dec. 20, 1991, "Shuttle Preparation," USA TODAY, Dec. 20, 1991.]

ATLANTIS: OMS DESERVICED

The orbital maneuvering system and reaction control system of Atlantis have both been deserviced in OPF Bay 1. Technicians are also working on other tasks: inspections of several of the reinforced carbon-carbon T-seals and panels on the leading edges of the wings; post-flight checks of the main engines; tests of the fuel cells; inspections of the 17-inch disconnects; stacking of the right forward center segment in the Vehicle Assembly Building. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 19, 1991.]

ENDEAVOUR: PROCESSING FOR STS 49

Work in progress for Endeavour's STS 49 mission includes: a brake anti-skid test; functional tests of the crew compartment hatches; adjustments of the brake pedal pressure; leak and functional tests of the water spray boilers and auxiliary power units; thermal protection system operations; leak checks of the potable water system and main propulsion system. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 19, 1991.]

COLUMBIA: MODIFICATION UPDATE

Columbia was fully powered up yesterday for systems testing. The Orbiter was undergoing major modifications while at the Rockwell manufacturing plant (Palmdale, CA). The vehicle will remain powered up for the next two weeks for verification testing. Structural inspections and X-rays of critical areas will follow power up tests. Columbia is scheduled for return to Florida at the end of next month. Its next flight, the first extended duration mission in the Shuttle Program, is STS 50 with the United States International Microgravity Laboratory payload. STS 50 is planned for launch next summer on a 13-day flight with a crew of seven. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 19, 1991.]

December 20; **STS 42: APU 1 HOT FIRED**

At Launch Complex 39A, Discovery's Auxiliary Power Unit #1 has been hot fired and the SRB flight readiness hydraulic tests have been completed. The rotating service structure is in place around the Orbiter. Work in progress: launch pad validations following APU hot fire; preparations for loading of hypergolic fuels next year; space vehicle holiday securing and power down operations. Work scheduled: the vehicle will be powered down for the holidays during the second shift tonight with power on operations resuming after the first of the year. [KSC

SHUTTLE STATUS REPORT, 10 A.M., Dec. 20, 1991, Brown, FLORIDA TODAY, p. 5A, Dec. 21, 1991.]

STS 45: OMS DESERVICED

The orbital maneuvering system of Atlantis has been deserviced in OPF Bay 2; APU deservicing operations and main propulsion system helium leak and functional tests have also been completed. Work in progress: fuel cell inspections and tests; preparations for removal of APU 1 and 2; closeouts of solid rocket booster joints in VAB and preparations for holiday power down. Atlantis is scheduled to be powered down at the end of today's first shift. The International Microgravity Laboratory is in the Orbiter payload bay and it has been closed out for flight. The payload bay doors are not scheduled to be opened prior to flight. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 20, 1991.]

ENDEAVOUR: WORKING THRU THE HOLIDAYS

In OPF High Bay 1, Endeavour's water spray boiler leak and functional tests have been completed. Potable water leak checks have been done and tests have also been completed on the Orbiter's Ku-band power amplifier and anti-skid brakes. Work in progress: thermal protection system operations; APU leak and functional tests; main propulsion system leak checks and testing. Work is scheduled to continue on Endeavour through the holiday period with the exception of the holidays themselves. Much of the work will center on closeouts of the mid-body. "It's an opportunity to catch up on some work that needs to be done with the power off," according to KSC spokesman **Bruce Buckingham**. "Given the option to work, there was no shortage of volunteers" to work during the holiday period, he said. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 20, 1991, Brown, FLORIDA TODAY, p. 5A, Dec. 21, 1991.]

COLUMBIA: PALMDALE MODIFICATIONS

The Space Shuttle Columbia will remain powered up through the holidays as work on the vehicle continues. Structural inspections and tests in critical areas are part of the remaining modifications and refurbishments scheduled for the next two weeks. Columbia is targeted for its ferry flight return to KSC around the end of January. Processing will then begin for its next mission, STS 50, the first extended duration Orbiter mission scheduled to last 13 days. [KSC SHUTTLE STATUS REPORT, 10 A.M., Dec. 20, 1991.]

December 22: ADMINISTRATOR FLETCHER DIES

Two-time NASA Administrator Dr. **James C. Fletcher** died of cancer today, his family said. He was 72. Fletcher was first NASA Administrator from April 1971 through May 1977 and again accepted the position after the Challenger explosion, holding the post from May 1986 through April 8, 1989. In his second term as head of NASA, he put a greater emphasis on quality control and safety in the Shuttle Program. ["Former NASA Chief Fletcher Dies of Cancer," FLORIDA

TODAY, p. 1A, Dec. 22, 1991, "2-Time NASA Chief James Fletcher Dies of Cancer," THE ORLANDO SENTINEL, p. A-5, Dec. 24, 1991, Brown, FLORIDA TODAY, p. 2A, Dec. 24, 1991.]

December 28: GIFT GANTRY REMODELED

The facilities at Spaceport USA, just west of Kennedy Space Center, have been remodeled, according to **Tom Blair**, Marketing Supervisor for TW Inc. which operates the attraction. Areas remodeled include the Gift Gantry, the Lunch Pad Restaurant and the Flight Crew Training Building. Blair said, "We're expanding in the belief that long-term, the visitors will be there, and we'll be ready." Attendance is down 16.7 percent from 1990 for an estimated 2.6 million by year's end. Spaceport USA still ranks as the fourth most popular attraction in Florida after Disney World, Sea World and Busch Gardens. [Reid, FLORIDA TODAY, p. 12C, Dec. 28, 1991.]

SHUTTLE PUMPS PASS TEST

The lack of money in NASA's budget will force a two-year delay in certifying a newly designed turbopump for the Space Shuttle. Boyce Mix, Acting Manager of the Main Engine Project Office at MFSC, said, "We're disappointed. As a result, Pratt & Whitney is going to have to lay off some people and we've scoped down our test program to concentrate on the liquid oxygen pump." The new liquid and hydrogen pumps are designed to be safer and cheaper to operate than the current pumps which are Rocketdyne products. The liquid hydrogen pump's development will be retarded by the lack of money. [Banke, FLORIDA TODAY, Dec. 29, 1991.]

December 29: CONTRACTOR AWARD WINNERS

NASA Manned Flight Awareness awards have b3een given to ten Kennedy Space Center Shuttle workers from USBI and EG&G Florida: **Randy Smith**, **Bill McAninch**, **Louis Conner**, and **Larry Wray** (all from USBI) and **John Jernoske**, **Frank Jackson**, **Charles "Charlie" O'Connor**, **Mitchell Becker**, **Immanuel Bartolo** and **Robert Ouellette** (all from EG&G Florida). The Manned Flight Awareness award is "given to government and industry workers for dedication to ensuring astronaut safety and Shuttle mission success." ["10 KSC Workers Honored by NASA," FLORIDA TODAY, p. 9E, Dec. 29, 1991.]

KSC AWARDS RESEARCH GRANTS

Kennedy Space Center has awarded four Small Business Innovation Research grants totaling $1.73 million. The winners are: Biotronics Technologies, Inc. (Waukesha, WI), for an online microbiological analyzer to support the firm's work on a KSC life sciences program; Hughes Associates (Wheaton, MD) for development of an ozone-friendly fire suppressant; Stottler Henke Associates (Belmont, CA) for a computerized technique for scheduling and Shuttle processing; Symbiotics Inc. (Cambridge, MA) for integrating and coordinating

intelligent planning and scheduling tools. Another $65 million worth of grants will be awarded in February 1992. ["NASA Awards Research Grants," FLORIDA TODAY, p. 10E, Dec. 29, 1991.]

APPENDIX A

SHUTTLE ERA FIRSTS

February 1964 - NASA engineers conduct several studies of an Integral Launch and Re-entry Vehicle.

February 1970 - NASA opens Space Shuttle Office.

January 1972 - President Nixon announces intention to proceed with Shuttle.

June 1974 - Rockwell International begins building Shuttle Enterprise for use in approach and landing tests.

September 1976 - Enterprise rolls out.

August 1977 - First of five approach, landing tests. Enterprise is dropped from a Boeing 747 at 22,000 feet.

April 1981 - Shuttle Era begins with launch of Columbia and STS 1, first of four orbital test flights.

November 1982 - Columbia flies first mission in which two commercial satellites are deployed.

April 1983 - First flight of Shuttle Challenger; first made-in-space product - microscopic latex spheres, for use in scientific calibration.

June 1983 - **Sally Ride** becomes first U. S. woman in space. Challenger's five-member crew was largest ever.

August 1983 - **Guion Bluford Jr.** becomes first U. S. Black in space; first night launch and landing.

February 1984 - **Bruce McCandless** makes first untethered spacewalk using Manned Maneuvering Unit.

April 1984 - Challenger crew makes first repair and redeployment of a satellite, the Solar Maximum spacecraft.

August 1984 - First deployment and testing of huge solar array panel by **Judith Resnik**, first commercial payload specialist, and **Charles Walker**.

October 1984 - **Kathryn Sullivan** becomes first U. S. woman to walk in space; first seven-member crew.

November 1984 - First retrieval of satellite in orbit.

June 1985 - First deployment of four satellites.

August 1985 - James "Ox" van Hoften logs record 7-hour spacewalk to repair Leasat (Syncom IV-3).

November 1985 - First assembly of structure in space, a 45-foot beam tower, to test building techniques.

January 1986 - Challenger destroyed 73 seconds after liftoff when hot gases burned through O-ring in solid rocket booster; seven astronauts killed; fleet grounded.

June 1986 - Presidential commission recommends nine safety measures that NASA implements.

September 1988 - Discovery returns USA to space.

May 1989 - First planetary probe - Magellan - deployed from Shuttle, launches toward Venus.

April 1990 - Hubble Space Telescope deployed.

["Space Shuttle Era A Legacy of 'Firsts'," USA TODAY, p. 8A, April 12, 1991.]

APPENDIX B

SHUTTLE LANDINGS AT KSC

Mission	Orbiter	Landing Date
STS 41-B	Challenger	February 11, 1984
STS 41-G	Challenger	October 13, 1984
STS 51-A	Discovery	November 16, 1991
STS 51-C	Discovery	January 27, 1985
STS 51-D	Discovery	April 19, 1985
STS 38	Atlantis	November 20, 1990
STS 39	Discovery	May 6, 1991
STS 43	Atlantis	August 11, 1991

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16. Abstract
The document is intended to serve as a record of KSC events and as a reference source for historians and other researchers. Arrangement is by day and month and individual articles are attributed to published sources. This edition has two appendices: (A) Shuttle Era Firsts (p. 261) and (B) Shuttle Landings at KSC (p. 263) and two indexes: General Index (p. 273) and Company Index (p. 274).

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