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ON THE COVER:

Front: ***KSC workers processed the Unity node in preparation for its mating in space with the Zarya module, the first two pieces of the International Space Station. An artist's rendering shows the Station as it will appear in its completed form.***

Back: ***Discover launches on STS-91, the final docking mission to the Russian space station Mir. ... An employee in the Payload Hazardous Servicing Facility sews thermal insulation material on the back cover and heat shield of the Huygens probe in preparation for the Cassini mission. ... A Titan IVB/Centaur carrying the Cassini spacecraft and its attached Huygens probe is ready to launch on a six-year flight to Saturn.***

Message to the Stakeholders

Roy D. Bridges, Jr.
Kennedy Space Center Director

During each of its 40 years of existence, **Kennedy Space Center has unfailingly generated significant achievements. The period of Fiscal Year 1998 produced notable accomplishments in a wide range of areas — operations, research and development, partnership with business, academia and government, and relationships with the community. Among the year's highlights:**

- **Demonstration of our top priority with the first Center-wide Super Safety Day, in which all activities at the Center focused on promoting safe and healthy habits.**
- **The successful launch of four Space Shuttle missions, including the final docking with the Russian space station Mir.**
- **The successful launch of five Expendable Launch Vehicle (ELV) missions, including the flawless preparation and launch of the Cassini space probe, a cooperative effort among the National Aeronautics and Space Administration (NASA), two foreign space agencies, the U.S. Air Force, industry and academia.**
- **Substantive progress on the International Space Station, with the processing and preparation for flight of Unity, the first U.S. made component.**
- **The seamless consolidation of the Agency's $500 million ELV Launch Services Program.**
- **The revolutionary merger between NASA and the Air Force to consolidate and streamline base operations at KSC, Cape Canaveral Air Station and Patrick Air Force Base.**
- **Agency assignment as lead or co-lead center for the Office of Space Flight desktop and communications services for the Outsourcing Desktop Initiative for NASA contract, drug testing, pollution prevention and recycling.**
- **Certification for International Organization Standardization for 9001, an international quality management standard.**

We also have made substantial progress in many other areas. Through partnerships with business, government and academia, KSC is exerting leadership in the pursuit of spaceport technologies. The Center works to improve its current vehicle fleet with the development of Space Shuttle health monitoring technology. At the same time, the Center readies itself to assist in the creation of and to accommodate the next generation of space flight vehicles by participating in the design, development and testing of the X-33 and X-34, as well as other new technology vehicles.

KSC also has increased its prominence in technology development for commercial applications, such as state-of-the-art cryogenic testing.

During FY 98, the Center's leaders improved strategies for making full use of our technological, human and physical resources for the exploration and development of space.

I am extremely proud of the accomplishments we made during FY 98. They represent a few of the early but significant steps in our evolution from an operations-oriented organization to an agile, customer-driven, spaceport technology development team.

Center Director

Mission

The activities of FY 98 reflected the mission of NASA; the Core Business, Guiding Principles, and Strategic Goals of the Kennedy Space Center; the Implementation Plan for NASA's Strategic Plan; and the Road Map for the Center's future through 2025.

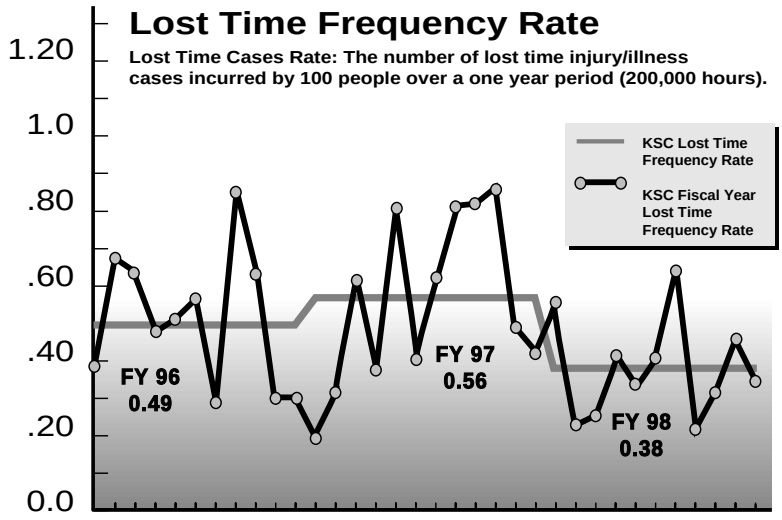
Core Business: ***Kennedy Space Center's Core Business is to provide space systems processes and test and launch techniques and to develop associated technologies.***

Guiding Principles:
KSC's Guiding Principles provide the foundation for all of our actions and assure that the means we use to reach our goals are most supportive of our customers and in harmony with the needs of our stakeholders.

Safety and Health First

During FY 98, the Center reinforced safety as its highest priority, a principle that was continuously on display.

The center held its first Super Safety Day on July 16, with the theme, "Safety on the Line." All normal work activities, with the exception of mandatory services, were suspended as about 14,000 employees — both NASA civil service and contractors — trained on safety-related issues and participated in a panel discussion that was broadcast throughout the center. The goal, as Center Director Bridges reminded employees, is zero mishaps and zero injuries. The day produced tangible results in the form of the "Safety on the Line" newsletter, which began monthly distribution.



In the months preceding that event, senior NASA and contractor managers took part in safety training presented at KSC by DuPont, regarded as one of the world's safest companies. That training led to the establishment of the University of Safety and Mission Assurance, a team of employees that acts as an information clearinghouse and consulting group for the Center.

The summer presented employees with formidable safety challenges as wildfires ravaged Central Florida, eventually burning 71,000 acres in Brevard County. A brush fire started by lightning on June 21 engaged the Center's Fire Department, but that was only the beginning of their work, as the department contributed personnel and equipment to Florida's Division of Forestry and local authorities in combating other Central Florida fires. KSC also provided the use of a helicopter, an infrared camera, a global positioning system, a fire engine, a rail car tanker, five sludge tankers and two aircraft rescue trucks.

When the threat of fires had passed, the Center braced in September for the possible arrival of Hurricane Georges from the Atlantic Ocean. While workers protected ground equipment from the threat of heavy winds, KSC prepared for the return of the orbiter Atlantis aboard a Boeing 747 carrier aircraft following an Orbiter Maintenance Down Period.

Concern with safety was not limited to ground operations. KSC initiated a comprehensive long-term program to develop fire protection options for advanced space flight vehicles and orbiting bases. This program will involve new technology research and development.

Two projects begun in FY 98 explore the hazards of the Martian environment. One set of experiments involves flammability and safety concerns when dealing with inflatable planetary habitats using an oxygen atmosphere, while another will simulate electrostatic conditions on Mars.

Finally, a cardiovascular health screening program was instituted for employees who require medical evaluation for job certification. An intervention program was also developed to target those assessed to be at higher risk.

Build Reliance and Teamwork Everywhere

At the Kennedy Space Center, teaming activities and partnerships are of paramount importance as we lay the foundation for our Spaceport Technology Center. By using the various strengths of each partner, the entire space industry reaps the greatest benefit through improved technology for future pioneering endeavors, the sharing of expertise and the building of better tools and capabilities.

We are targeting partnerships in three major areas: industry, academia and other state and federal agencies. We are heavily involved in the Space Commerce Partnership, which was established to expand and diversify Florida's space industry and which encompasses over 25 industry, government and academic organizations. Through KSC's innovation in management development programs, we are collaborating with various companies on quick payback projects for mutual benefit. We team with our local universities to bring creativity and the latest research to the Center, while providing an avenue for their application of knowledge and theory.

We have three established liaison offices at other NASA centers to enhance the design process with KSC's operational knowledge and expertise. The Center has been intimately involved with our Space Station hardware manufacturing team members to ensure smooth integration at the launch site. We are also working in concert with the state and the Air Force as a single Florida launch site to attract new business and enhance our current operations and capabilities.

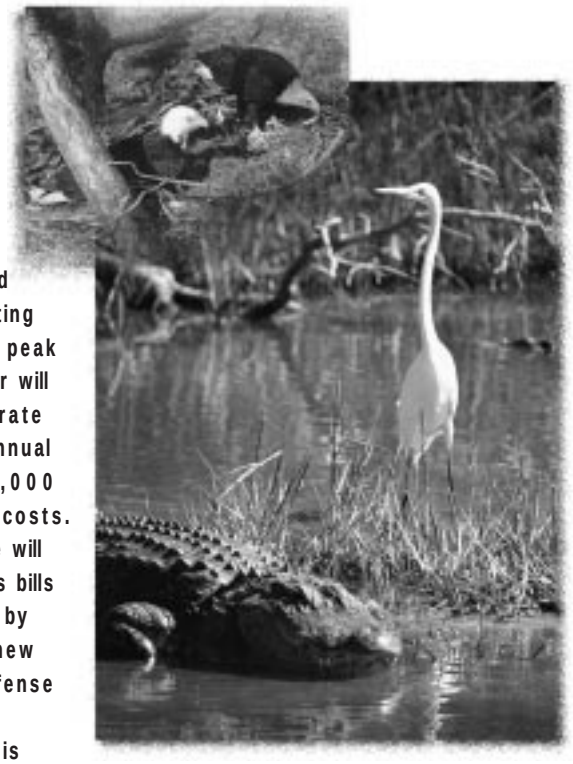
Satisfy Our Customers' Needs Anytime, Anywhere

The Center as a whole has made a concerted effort to better understand and address the needs of our customers. With the objective of creating satisfied and loyal customers, we have established a customer advocacy group to bring the voice of the customer into our strategic planning as well as to all employees at KSC. By developing a customer-focused organization through customer knowledge, feedback, leadership, relationship management and, ultimately, results, we will be better prepared to anticipate and fulfill the needs of our current, long-time customers, as well as our new Spaceport Technology Center customers.

Environmental Leadership

KSC sponsored and managed the NASA Environmental Conference for NASA Headquarters. Environment and Energy Awareness Week exhibits at the Visitor Complex and major facilities encouraged thousands of employees and visitors to improve energy efficiency and reduce environmental waste.

Emphasis on energy conservation has been intensive as well as innovative. KSC began upgrading the LC-39 Emergency Power Plant using private-sector capital for the initial costs. Because Florida Power and Light will use the expanded plant for generating electricity during peak loads, the Center will enjoy a reduced rate and estimated annual savings of $770,000 to repay project costs. Another initiative will lower natural gas bills beginning FY 99 by converting to a new supplier. The Defense Energy Support Center contract is expected to bring annual savings of 30 percent — or $660,000 — to the Center's programs.



In other environmental areas, KSC is working in concert with industry and academia to pursue research and technology to remove pollutants emitted by stationary combustion sources. A patent is pending, and a major power plant plans to use the technology in 1999.

The Center also has developed techniques that are being used in contamination cleanup programs and that have potential for wide-scale commercial use. KSC has submitted applications for two patents for this technology.

Strategic Goals

The Center's goals help implement the NASA Strategic Plan and its four strategic enterprises: Human Exploration and Development of Space, Aeronautics and Space Transportation Technology, Space Science and Earth Science.

The Center's Strategic Goals:

- Assure that safe, sound and efficient practices and processes are in place for private/commercialized launch site processing.
- Increase the use of operational expertise to contribute to the design and development of new payloads and launch vehicles.
- Utilize operational expertise in partnership with other entities (NASA centers, industry, academia) to develop new technologies for future space initiatives.
- Continually enhance core capabilities (people, facilities, equipment and systems) to meet NASA objectives and customer needs for safer, better, faster, cheaper development and operation of space systems.

KSC is well on its way to developing a "dashboard" of measures by which we can gauge our progress against our stated goals.

Strategic Goal 1: Assure that safe, sound and efficient practices and processes are in place for private/commercialized launch site processing.

The Center's reputation rests on its record as the world leader in the space launch industry. Even as KSC becomes more diversified in anticipation of new needs and demands, success hinges upon our expertise and experience as *NASA's Center of Excellence in Launch and Payload Processing Systems.*

Space Shuttle

During FY 98, four Space Shuttles lifted off, carrying 26 crew members into space, traveling more than 20.3 million miles and taking several crucial payloads into orbit. The Space Shuttle orbiters on all four missions returned home safely to KSC's Shuttle Landing Facility, the preferred Shuttle landing site.

Columbia, the oldest member of the four-vehicle fleet, made two of those flights and surpassed 86 million miles traveled in space.

The orbiter Endeavour in January made its first flight since returning from a 10-month Orbiter Maintenance Down Period (OMDP) in Palmdale, Calif. During that scheduled servicing, an external air lock was installed on the orbiter, making Endeavour capable of docking with the International Space Station.

STS-87 carried the United States Microgravity Payload (USMP-4), one in a series of Spacelab projects. Free from the restrictions of the earth's gravity, the scientific specialists conducted important research that yielded new understanding of the composition of different kinds of matter. STS-87 also deployed the Spartan 201-04, a craft designed to study the outer layers of the sun.

STS-89 continued NASA's involvement with the Russian Mir space station. The orbiter Endeavour delivered Mission Specialist Andrew S.W. Thomas to the Russian craft in relief of astronaut David A. Wolf, who had been aboard Mir for approximately four months. The flight also carried a wide array of scientific experiments.

The program made further contributions to science with STS-90, which carried the Neurolab payload. The 42nd and final flight involving Spacelab hardware, Neurolab studied the effects of microgravity on the nervous system. Its subjects included rodents, fish, crickets and snails.

STS-91 marked the final Shuttle-Mir docking mission. The mission also included the Alpha Magnetic Spectrometer Investigation, an astrophysics payload.

Space Shuttle Highlights

- ***The Neurolab mission on STS-90 was a joint venture of six space agencies and seven U.S. research agencies, and it involved investigator teams from nine countries.***
- ***The Neurolab experiments involved 9,000 rodents, 68,000 freshwater sword-tail fish, 5,000 freshwater snails, 2,000 goldfish, 1,000 crickets and 125 saltwater toadfish.***
- ***Andrew Thomas's return from Mir on STS-91 culminated 977 total days spent in orbit by seven U.S. astronauts aboard the station and ended an 812-day continuous U.S. presence in space.***

Mission: ***STS-87***
Payloads: ***United States Microgravity Payload (USMP-4), a Spacelab project; and Spartan 201-04, a spacecraft designed to perform remote sensing of the sun's outer atmosphere***
Orbiter: ***Columbia (24th flight)***
Launch Date: ***Nov. 19, 1997***
Duration: ***15 days, 16 hours, 35 minutes, 01 seconds***
Landing site: ***KSC***

Mission: ***STS-89***
Payloads: ***Crew member and more than 7,000 pounds of experiments, supplies and hardware exchanged with Mir***
Orbiter: ***Endeavor (12th flight)***
Launch Date: ***Jan. 22, 1998***
Duration: ***8 days, 19 hours, 48 minutes, 4 seconds***
Landing site: ***KSC***

Mission: ***STS-90***
Payloads: ***Neurolab, the final Spacelab mission, containing biological experiments***
Orbiter: ***Columbia (25th flight)***
Launch Date: ***April 17, 1998***
Duration: ***15 days, 21 hours, 50 minutes, 58 seconds***
Landing site: ***KSC***

Mission: ***STS-91***
Payloads: ***Final docking to Mir, downloading astronaut Andrew Thomas; also, Alpha Magnetic Spectrometer Investigation (AMS)***
Orbiter: ***Discovery (24th flight)***
Landing site: ***KSC***

In March, NASA announced the selection of Eileen M. Collins as the first female commander of a Space Shuttle mission. Collins, who had become the first female pilot in 1995, will lead the crew of STS-93, scheduled for launch in 1999.

Payload Customers

In support of our Space Shuttle customers, the KSC payloads team processed and integrated six primary payloads and 21 secondary payloads to fly in the Shuttle cargo bay, as well as 17 middeck payloads during FY 98. The team conducted three Hitchhiker missions with 14 Get Away Special payloads and two Space Experiment Module payloads in support of the Shuttle Small Payloads Project.

The KSC processing teams successfully completed the closing of all Spacelab activities following STS-90. All Spacelab assets were distributed, and concluding activities were handled on schedule and within budget. This phase-out resulted in the transfer of more than 2 million items, worth more than $450 million, to other NASA programs for support of Hubble Space Telescope, Space Station logistics and assembly flights and other uses. The modules and requested hardware have been shipped to the National Air and Space Museum in Washington, D.C., to the European Space Agency and to other NASA centers.

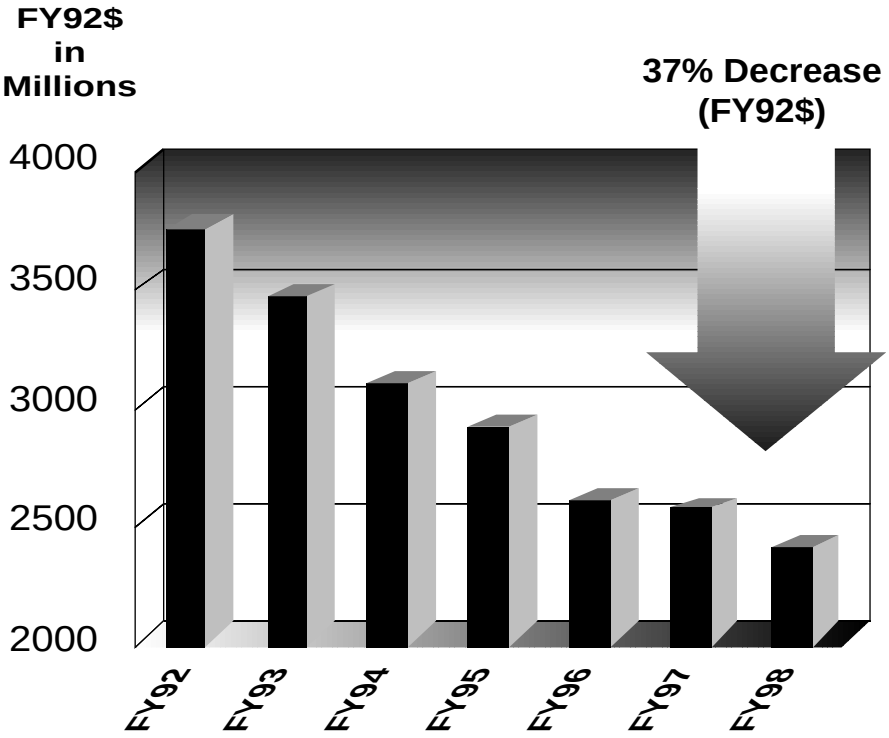
Processing and Integration

In addition to the missions that were launched in FY 98, the Shuttle processing team prepared for back-to-back missions of great significance to NASA and the world: Discovery returning pioneering astronaut John Glenn to space on STS-95, and Endeavour transporting the first U.S.-built elements to the International Space Station on STS-88. As always, safety remained the number one priority for Space Shuttle processing teams, and product quality was stronger than ever.

A significant indicator of operational performance at Kennedy Space Center is the cost of the Space Shuttle program, as indicated in the chart on page 7. The Center has contributed to a substantial reduction in costs over the past seven years through a variety of processing improvements.

At the beginning of FY 98, the Orbiter Atlantis was ferried to California for its second scheduled OMDP. Atlantis returned to the Center 10 months later as the first member of the four-vehicle Space Shuttle fleet to receive a new state-of-the art cockpit display system. The Multifunction Electronic Display Subsystem, built by Honeywell Space Systems/ Satellite Systems Operation, is patterned after liquid-crystal

SSP Total Program



Contributing factors in decreasing the cost of the Shuttle Program are:

- *External Tank weld improvements and cycle time reduction*
- *consolidated and/or restructured prime contracts*
- *payload safety process*
- *Shuttle Logistics Depot repair certifications*
- *Main Engine sensor improvements (cost avoidance)*
- *workforce reduction:*
  civil service down 50%
  contractor down 31%
- *environmental compliance*
- *recycle of Solid Rocket Booster hardware*

display technology on the Boeing 777. The new displays, which replaced models designed for the Shuttle in the 1970s, offer enhanced color and clarity, weigh less and use less energy.

Discovery's 24th flight on STS-91 saw the first use of the Super Light Weight Tank, which added 7,000 pounds to the orbiter's cargo capacity. Processing efforts included the addition of a highly specialized "tanking test" to the launch pad flow in order to verify the structural integrity of the new tank composition in the presence of cryogenic (super-cold) fuels.

The orbiter Columbia, shown in preparation for mating to its solid rocket boosters and external tank, flew twice during FY 98.

Space Shuttle Upgrades

Though not yet fully operational, the Checkout and Launch Control System (CLCS) began making real contributions to the Space Shuttle program in FY 98. The CLCS, which replaces the 1970s-era Launch Processing System, will offer such advancements as the capacity to monitor more than one orbiter from the same firing room.

In March 1998, the first installation and use of the newly selected production hardware took place in the new CLCS Hypergolic Maintenance Facility (HMF).

ELV Highlights
Payloads: ***Cassini***
A NASA-JPL spacecraft with international partners, on a four-year exploratory mission to Saturn
Vehicle: ***Titan IV/Centaur***
Launch Date: ***Oct. 15, 1997***

Payloads: ***Lunar Prospector***
Lunar Prospector, a NASA-Ames Research Center spacecraft, on a mapping mission of the Earth's moon
Vehicle: ***Athena***
Launch Date: ***Jan. 6, 1998***

Payloads: ***SNOE***
Student Nitric Oxide Explorer, NASA-sponsored and built by students, designed to measure effects of the sun's X-ray radiation and magnetic field for possible links to climate change on Earth
Vehicle: ***Pegasus XL***
Launch Date: ***Feb. 15, 1998***

Payloads: ***TRACE***
Transition Region and Coronal Explorer, a NASA payload to improve understanding of events in the sun's atmosphere
Vehicle: ***Pegasus XL***
Launch Date: ***April 1, 1998***

Payloads: ***NOAA-K***
National Oceanic and Atmospheric Administration-K, a weather satellite to provide high resolution pictures together with land and sea temperatures and other data
Vehicle: ***Titan II***
Launch Date: ***May 13, 1998***

This testing of the system software marked a significant milestone in preparations for the December 1999 HMF operational date. In addition, a new control room was built in the HMF to house the development of the new system. The modification of Launch Control Center Firing Room 4 into the first Operations Control Room (OCR-1) was completed late in FY 98.

KSC teamed with Goddard Space Flight Center to develop the Fiber Optic Flight Experiment (FOFE), which was prepared to fly on the STS-95 mission. The experiment was designed to test the durability and on-orbit performance of fiber optics in the Shuttle environment. The development team worked toward its long-term objective of using fiber optics to standardize connections in the payload bay, thus reducing orbiter processing time.

KSC also concluded a study on the viability of using uniform mechanical connections to reduce payload launch site processing time. The team, comprising members from Johnson Space Center and from contractors Boeing and United Space Alliance (USA), analyzed future payloads – some destined for the International Space Station and some for commercial activities. The final report offered a preliminary design for a standard interface that is being evaluated by USA for potential use.

During FY 98, the KSC team prepared the orbiter Discovery to use the first Space Shuttle flight system developed on site: the Integrated Vehicle Health Management (IVHM) Human Exploration and Development of Space (HEDS) Technology Demonstration. A total of 30 sensors were installed on Discovery, including Center-developed smart sensor technology for hydrogen and oxygen detection. The system performance during launch was superb.

Expendable Launch Vehicles

Program Consolidation

In late 1997, Kennedy Space Center was assigned lead center responsibility for NASA's acquisition and management of Expendable Launch Vehicle (ELV) launch services, building upon the previous experience of Goddard Space Flight Center (GSFC) and Lewis Research Center. KSC worked throughout FY 98 to prepare for the transition of multi-million dollar launch service contracts.

As a result of the transition, KSC sustains a new budget of approximately $500 million. The Center coordinates requirements for all of the Agency's ELV customers, a task that encompasses multiple projects from the offices of Space Science, Earth Science and Space Flight, as well as requirements for National Oceanic and Atmospheric Administration (NOAA) programs. KSC now offers the technical expertise to match spacecraft with the Agency's mixed fleet of ELV launch services, providing launch vehicle insight, mission design and analysis, and mating of spacecraft to launch vehicle.

As part of the effort to consolidate management of the ELV program, a source evaluation board conducted a careful review in preparation for the eventual awarding of the Small Expendable Launch Vehicle Services II (SELVS-II) Contract. It was KSC's first major procurement under its lead center designation, and the process established new Agency policy. Since that time, KSC has begun procurement activity for classes of launch services larger than those covered under SELVS-II.

Customers

The KSC team supported five Agency ELV missions during FY 98, including the launch of the Cassini mission to Saturn on a Titan IV launch vehicle. Cassini, a joint NASA-European Space Agency (ESA) mission, is scheduled to arrive at the ringed planet in 2004 after more than six years of interplanetary travel. It was among the most scrutinized unmanned launches ever accomplished at KSC. The Center also supported preparations for such highly visible missions as Deep Space 1, Submillimeter Wave Astronomy Satellite (SWAS) and Mars Observer 98, scheduled for early in FY 99.

KSC also supported the first launch of a Lockheed Martin Athena rocket from the commercialized Launch Complex 46, following an extensive risk review of the launch vehicle. Three Pegasus missions (SNOE, TRACE and SEASTAR) were completed, along with the launch of the NOAA-K satellite on a Titan II launch vehicle. Six additional commercial Delta launches were supported from NASA's launch pad at Vandenberg AFB in California.

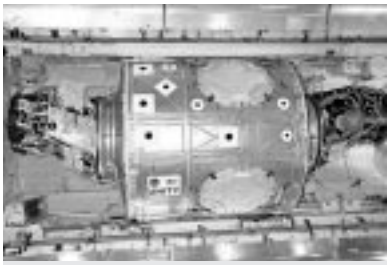
The successful processing of the Cassini mission took place amid KSC's transition to lead responsibility for NASA Expendable Launch Vehicle launch services.

International Space Station

KSC team members were involved, both on site and at the primary manufacturing locations, in the ongoing preparations for the International Space Station. Significant hardware was delivered to the Center's Space Station Processing Facility (SSPF) for final assembly, test and launch preparation.

The most notable of these elements is the Unity Node, the first Shuttle-launched hardware destined for use in the International Space Station. Unity will serve as a passageway to the U.S. laboratory module, the U.S. habitation module and an airlock. It has six hatches that serve as docking ports for the other modules and contains more than 50,000 mechanical items, 216 lines to carry fluids and gases and 121 internal and external electrical cables using six miles of wire.

Meanwhile, KSC teams continued to monitor the manufacturing of the Lab Module "Destiny" and the Flight 7A Airlock in Huntsville, Ala., and the manufacturing and testing of the Integrated Truss Structure S0 for Flight 8A in Huntington Beach, Calif. Other team members traveled to Canada and Italy to participate in the manufacture and test of the station mechanical arm and the Multi-Purpose Logistics Module, respectively.



Space Station Processing Facility (SSPF) Achievements

- *Unity Node and its Pressurized Mating Adapters (PMA1 and PMA2)*
- *Z1 truss and PMA3 for STS-92*
- *P6 truss for STS-97*
- *Multi-Purpose Logistics Module (MPLM) for STS-100*

Unity has six hatches that serve as docking ports for the other modules and contains more than 50,000 mechanical items, 216 lines to carry fluids and gases and 121 internal and external electrical cables using six miles of wire.

Notable efforts continued in preparation for the Multi-Element Integrated Test (MEIT), which will provide unique compatibility testing between actual flight elements here on the ground before they meet on orbit. Another notable accomplishment was the establishment of the first KSC Engineering Support Room, which will provide on-orbit ISS technical support to the JSC Mission Control Center. This project required the expedited procurement and installation of computer, communication and video data resources.

Strategic Goal 2: Increase the use of operational expertise to contribute to the design and development of new payloads and launch vehicles.

The concept of Kennedy Space Center as a mere handler of pre-packaged technology no longer applies. Our 40 years of intense involvement with space flight equips the Center to play a crucial part in all stages of the creation of future flight equipment.

Next Generation Vehicles

X-34

Global Positioning System Base Stations were designed and built for use as flight support equipment for landings of the X-34 vehicle. KSC and the 45th Space Wing prepared a joint Statement of Capabilities to support X-34 flights on the East coast beginning in 2000.

KSC is also supporting X-34 flight hardware development through MSFC in the areas of main propulsion system, Fastrac engine, mission planning, experiment development, thermal protection systems and guidance and navigation.

KSC Project Teams will:

- *perform East coast X-34 environment assessment;*
- *ensure the capability of maintaining facilities, ground support equipment and propellant requirements;*
- *provide a study of mobile tracking and flight control functions as well as work agreements with various landing sites along the nation's East coast;*
- *provide range flight and ground safety approval for X-34 East coast operations and flights;*
- *develop a joint NASA/Air Force communications plan.*

X-33

KSC also provided hardware, testing and engineering expertise to the X-33 program, while working to prepare the Center as a home for the reusable launch vehicle (RLV). Lockheed Martin Skunk Works hopes to develop VentureStar™ in the next century as a full-scale, commercial, single-stage-to-orbit vehicle.

Under the leadership of the Spaceport Florida Authority, NASA and KSC formed a team with state officials to develop and submit to Lockheed Martin Corporation a site qualification proposal to compete with other states and NASA centers for the right to host the VentureStar™ program.

KSC led the way as the next-generation crewed launch vehicle program continued its transition from concept to reality. KSC teams worked in partnership with Spaceport Florida Authority to develop a multi-use flight vehicle hangar and support facilities at the Shuttle Landing Facility tow-way. Also, in a spur toward further technological pursuits, KSC was awarded $1.4 million for development and demonstration of Integrated Vehicle Health Management technologies for the Future-X advanced technology vehicle, scheduled to fly as either an expendable vehicle or a Space Shuttle payload in 2002.

KSC contributions to the VentureStar™

- *designed significant portions of X-33 ground support equipment, including Umbilical Subsystems, a Vehicle Positioning System and a Weight and Center of Gravity Simulator;*
- *fabricated various portions of the X-33 Umbilical System;*
- *tested the X-33 Holddown Posts at the Launch Equipment Test Facility;*
- *furnished instruments and analytical support in the testing of the linear aerospike engine (LASRE) at White Sands, N.M., and Dryden Flight Research Center, Calif.;*
- *provided cost estimates, operational planning and facility comparisons for the Reusable First Stage Program.*

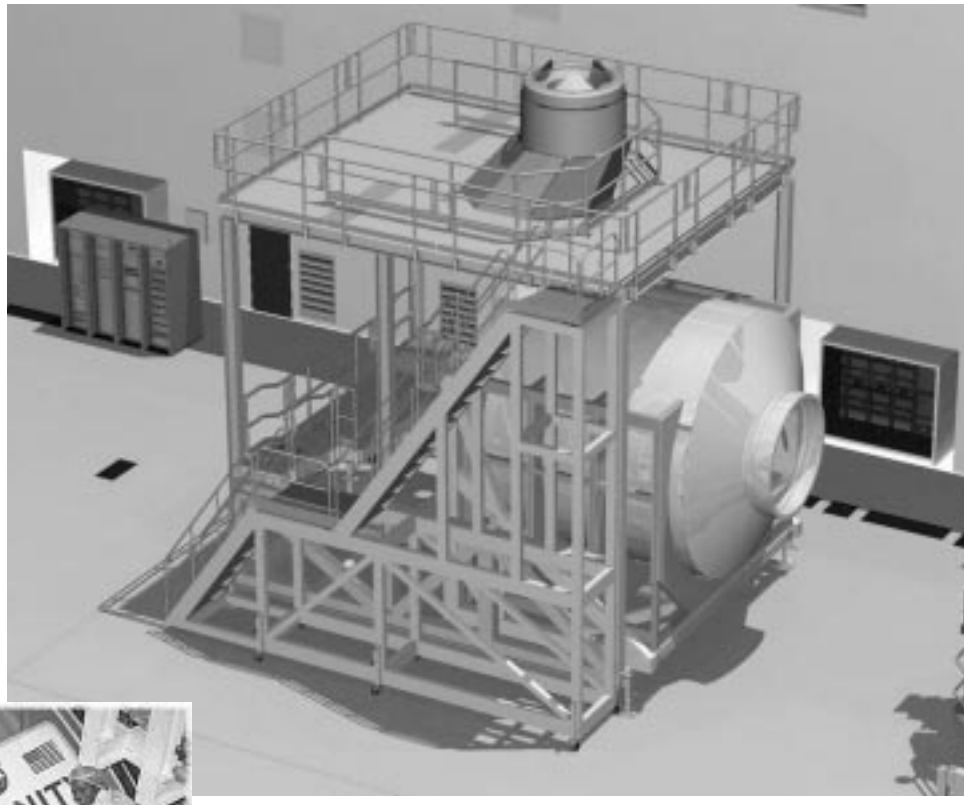
Payload Capability Development

The Multi-Payload Logistics Module Access Certification Equipment (MACE) was developed to test ground support equipment and to train personnel on mock-ups prior to their performing work on Space Station flight hardware. The MACE, which offers a simulation of Space Station elements, will enhance safety, improve efficiency and reduce costs in the processing of Space Station hardware.

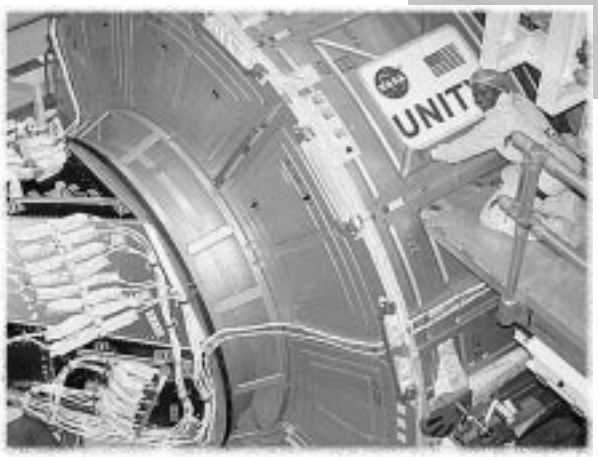
A Payload Carrier Utilization Agreement was developed to define the engineering analysis that must be performed in preparation for the use of a Spacehab pallet on the Ranger Telerobotic Shuttle Experiment. KSC also undertook supervision of a design study for converting an Engineering Model pallet into a flight-worthy half pallet for transporting Space Station equipment.

Top: ***As is the case with all missions, the astronaut crew members of STS-87 participated in integration testing of the Spartan-201 payload during its processing at KSC.***

Above: ***The Neurolab payload on STS-90 included 125 oyster toadfish, with experiments targeting the effect of microgravity on the fish's nervous system.***



Above: ***MACE, shown in an artist's rendering, improves the Center's efficiency by giving processing teams a simulation of International Space Station elements.***



Left: ***KSC workers processed the Unity node for its flight on STS-88.***

Strategic Goal 3: Utilize operational expertise in partnership with other entities (NASA centers, agencies, industry, academia) to develop new technologies for future space initiatives.

Kennedy Space Center continues to expand its involvement with outside companies and agencies in making full use of its highly trained workforce and world-class facilities to focus on mission-enabling research and technology. The Center laid the foundation for its future in NASA's exploration planning efforts during FY 98.

Exploration Initiatives

KSC, recognized for its invaluable space systems knowledge and expertise, has been tapped to fulfill an increasing role in NASA's Human Exploration and Development of Space Enterprise (HEDS). The goals of HEDS include the development of space and the expansion of human experiences into the far reaches of space.

The HEDS Enterprise has requested that the Center, along with the Jet Propulsion Laboratory, lead the efforts for Advanced Sensors and Instruments in support of human exploration. This task, anticipated to be an international collaboration, includes defining what sensors and instruments would be required for human exploration, preparing technology plans, determining technology gaps and developing solutions to fill those gaps.

KSC, in partnership with Ames Research Center and Johnson Space Center, is developing an independent control system for In-Situ Propellant Production (ISPP). Through the application of artificial intelligence, ISPP will allow for the production of propellants on the surface of Mars using the resources of the planet.

Research is under way to analyze the electrostatic makeup of Mars dust and common space materials, giving the Center the opportunity to work with JPL on the Mars Environmental Compatibility Assessment Experiment. This experiment will fly on the Mars 2001 Surveyor Lander.

A rocket concept, which uses In-Situ derived propellants, has been under study with numerous motor firings taking place to validate hybrid rocket motor designs. This concept could be used in a demonstration of ISPP on a future robotic mission.

KSC has completed a major ground operations assessment of the Mars Design Reference Mission (DRM) 3.0 including the processing of a new heavy launch vehicle and the cargo and the transportation stages to place humans on Mars. The Center also finished a framework of a logistics strategy for Mars surface operations and participated in the Agency-wide Logistics Use Study for the Mars DRM, as well as co-authored the Mars Surface Reference Mission.

A Mars Environmental chamber is well into production at KSC to allow the demonstration and assessment of technology in a simulated Mars environment.

Above and Below: ***The world-class equipment of KSC's cryogenics testbed facility allows the Center to form cooperative endeavors with businesses, universities and government agencies.***

Technology Development

KSC accounted for one-fourth of the total NASA licenses issued during FY 98 and ranked second among the centers in the number of Space Act Awards, with $96,850 awarded to individual employees and partners. Additionally, two chemists were honored as recipients of the 1998 Distinguished Patent Award for work in the development of electrically conducting polymers.

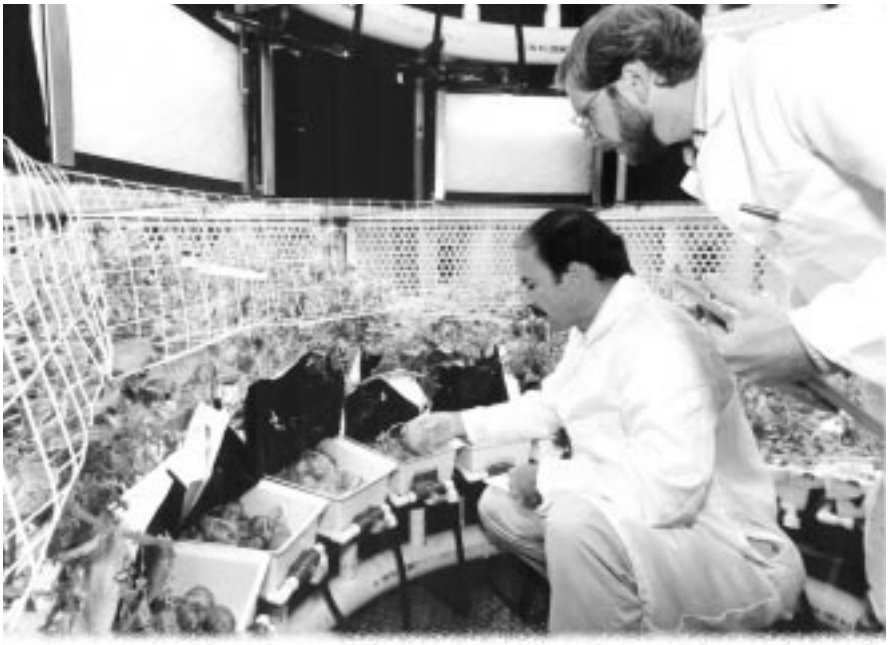
As a further acknowledgment of the Center's expertise, the Associate Administrator for the Office of Space Flight named KSC as the focal point for operational development and engineering testbeds for the HEDS Enterprise. A "best practices" study conducted by the Research Triangle Institute prior to this designation not only brought strong endorsements for KSC from other centers, other government agencies and industry, but also led to specific partnership projects.

The Center, through a collaborative effort with the University of Florida, Dynacs Engineering Co., Inc., and Air Products and Chemicals Inc., won funding from Florida's Technological Research and Development Authority (TRDA) to develop a state-of-the-art Cryogenics Testbed facility. Through this innovative partnership with government, academia, and industry, KSC will use this Cryogenics Testbed to provide leading-edge development services, thereby advancing applications for this technology and spurring local economic growth.

Langley Research Center (LaRC) sought KSC to perform testing of mechanical and physical properties on various types of advanced materials that are developed by LaRC. Through this agreement, KSC will conduct tests to help determine whether or not a new material is suitable for its intended application.

Further good news came with the allocation of $432,000 over the next two years to augment the existing Florida/NASA Business Incubation Center through the TRDA. The money is part of a $5 million line item in NASA's 1998 budget for support of technology-based, small business incubators.

In support of long-duration space flight, KSC completed a series of integrated studies involving plant, microbial, chemistry and engineering processes, in which it successfully demonstrated the feasibility of recycling "gray water" for

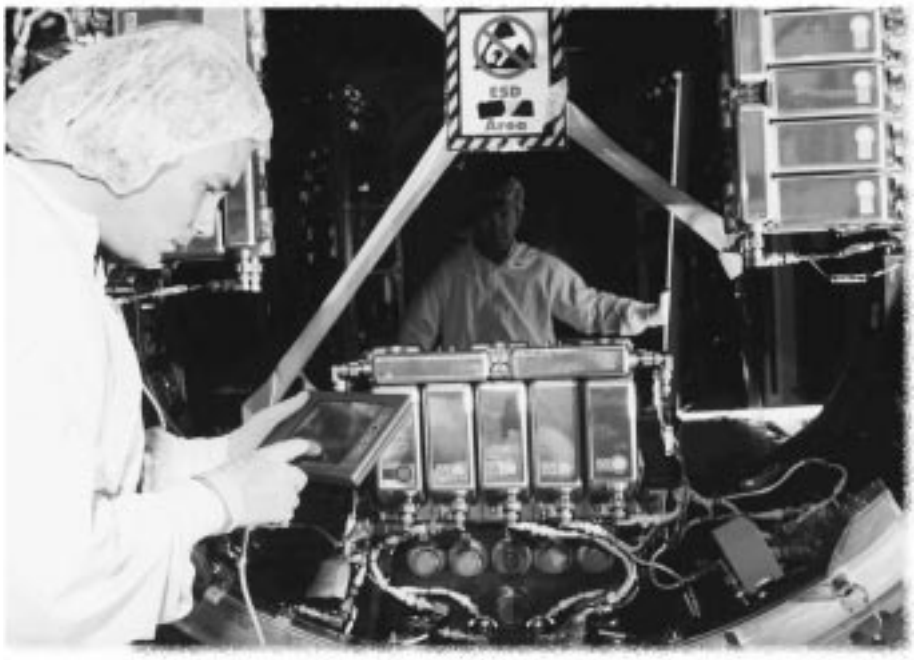


KSC performed research geared toward the production of plant growth chambers for life support, targeting such areas as high-efficiency microwave lamps, solar collectors, LED lamps, light pipes, fiber optics and light delivery systems.

human use. The Center also has continued research in two related areas: systems that would allow for the ongoing production of food and oxygen and the purification of water in space through biological rather than chemical processes; and the effect of microgravity on plant processes.

The Center, in partnership with the University of Virginia, researched monitoring in real time of plant processes at the microbial level. These technologies will assist long-duration space travel by lowering the energy and mass of the overall transportation system.

Research in the ecological systems that surround the Center culminated in more than 29 peer-reviewed technical publications.



The development of paperless work documents not only will benefit the Center's employees but also has potential for many commercial applications.

Work on the Electronic Portable Information Collection system, a Small Business Innovative Research project, completed its third phase of activities. KSC, in conjunction with a small business, Sentel, Inc., developed and implemented a system for using paperless work documents in a space flight hardware environment. The concept, which uses an encoded electronic stamping system in computer

applications, has been extended to wearable computers as well. The end result is a product being marketed and sold by Sentel, Inc. to customers in the space, aircraft, utilities and garment industries.

Other recent technological innovations and technology transfer activities at the Center include:

- the development of computer programs to improve the analysis of stresses in straight pipes;
- the development by AZ Technology, Inc., in partnership with NASA and the Center, of a portable instrument for surface optical measurement;
- in another partnership with AZ Technology, the development of a more manageable and reliable device for measuring the properties of Multi-Layer Insulation on spacecraft;
- the development of a portable system for extremely precise voltage measurements;
- the licensing and use of NASA software by Command and Control Technologies, a NASA/Florida Business Incubation Center tenant that received a $1 million contract from the Alaskan Aerospace Development Corp. and the State of Florida;
- the development of an improved ultrasonic leak detector, now being used commercially by UE Systems, Inc.;
- the contribution of four international standards involving fluid purity and testing, surface cleanliness and vehicle connections.

Strategic Goal 4: Continually enhance core capabilities (people, facilities, equipment and systems) to meet NASA objectives and customer needs for better, faster, cheaper development and operation of space systems.

At Kennedy Space Center, self-improvement is a never-ending quest. The Center pursued the strategic imperative for ongoing improvement in many ways during FY 98.

Maximize Customer Satisfaction

Center Director Roy Bridges and 45th Space Wing Commander Brigadier General F. Randall Starbuck unveiled a revolutionary merger in August that establishes a partnership between NASA and the Air Force. A complete restructuring of the base support operations between KSC and the 45th Space Wing resulted in a $2 billion Joint Base Operations and Support Contract (J-BOSC) which services KSC, Cape Canaveral Air Station and Patrick Air Force Base. The contract was awarded to Space Gateway Support, a joint venture among Northrop Grumman, ICF Kaiser and Wackenhut, and took effect on October 1, 1998. The overall objective is to provide safe access to space into the 21st century through premier base support for the entire space launch community.

Not only does this contract streamline 18 base services contracts into one, it also consolidates approximately 85 government contract administration personnel into a streamlined joint management team of 40 Air Force and NASA personnel. KSC also collaborated with the Air Force on the use of Launch Complex 41 for the Experimental Expendable Launch Vehicle Program, with final permit execution expected in FY 99.

Lunar Prospector & Launch Complex 46

The successful launch of Lunar Prospector aboard an Athena II rocket marked the inaugural use of Launch Complex 46, operated by Spaceport Florida Authority.

Lunar Prospector will provide NASA with the first global maps of the moon's surface and its gravitational magnetic fields. It also will look for the possible presence of ice near the lunar poles.

Facilities

The 34,600-square-foot Space Shuttle Main Engine Processing Facility was completed, contributing to improved efficiency of engine operations. By streamlining this process, KSC adds a greater degree of flexibility to accommodate future flight vehicle manifests. In addition, the moving of main engine processing out of the Vehicle Assembly Building significantly reduces the safety risk.

The hardware installation and setup of three Test, Control and Monitor System (TCMS) checkout systems greatly enhanced the capabilities of the Space Station processing team. TCMS is used as the primary Space Station checkout system for supporting prelaunch testing at the launch site and post-landing support at the landing sites for resupply and return missions. In addition, TCMS supports compatibility testing for International Space Station experiment equipment.

In an innovative example of facility recycling, an altitude chamber in the Operations and Checkout Building Highbay — previously used by the Apollo program — was refurbished and reactivated to perform leak testing of ISS pressurized modules.

ISS Leak Test Chamber

- *Use of two altitude chambers in the Operations and Checkout Building began in 1965 to test the Apollo command service modules and lunar service modules.*
- *The chambers were last used in 1975 in support of the Apollo-Soyuz Test Project missions.*
- *In 1985 the pumping equipment and control room were removed and scrapped and the chambers went into disuse.*
- *In 1997, NASA decided to perform leak tests on International Space Station pressurized modules at KSC. Reactivation of the "west" altitude chamber in the Operations and Checkout Building high bay was deemed the best option.*
- *The chamber is 33 feet in diameter and 50 feet tall and is constructed of stainless steel.*

The Vehicle Assembly Building (VAB), the Center's largest and most visible icon, sustained a makeover. KSC workers used 700 gallons of paint to refurbish one of the world's largest structures in preparation for the center's 40th anniversary, replacing a bicentennial symbol with the round, blue NASA insignia affectionately known as the "meatball."

Inside the VAB, new 325-ton bridge cranes were activated, giving the Shuttle Processing team improved tools for future Shuttle stacking operations. The remaining 250-ton cranes will be kept ready in case they are needed.

At the Shuttle Landing Facility, an improved Visual Landing Aid System was added to complement the centerline lights installed in FY 97.

KSC continued to implement projects designed to meet energy efficiency requirements. In buildings subject to Executive Order 12759, the Center surpassed the FY 2000 goal.

In order to speed the beginning of work on infrastructure projects, the Center has implemented "indefinite delivery task order" contracts. These flexible and efficient contract vehicles provide KSC with a proven pool of contractors who compete to meet construction and modification requirements within the scope of the contracts.

As a result of the shutdown of the Bureau of Mines, (which had been responsible for the production and distribution of helium), KSC designed and completed the Liquid Helium Conversion System at the Converter Compressor Facility. KSC now procures commercial bulk liquid helium in trailers, a change from the government high-pressure gas rail cars.

To address the "Y2K" computer challenge, the Center has compiled comprehensive hardware and software inventory lists, has begun assessing those items for compliance and has certified critical systems.

The effort to provide access to people with disabilities continued with seven facilities receiving such modifications as accessible bathrooms, parking spaces and automatic doors.

KSC took several steps to support the guiding principle of "Safety and Health First." Foremost among them, the Center completed the design, fabrication and installation of a new Medevac Helicopter Communications System that substantially improves communication among the flight crew, onboard medical personnel and destination medical facilities. KSC also began expansion of the Exercise Facility in the Operations and Checkout Building. The result will be a much-improved facility providing larger exercise areas and new equipment for employees.

Projects earned nearly $75,000 in utility rebates from Florida Power and Light Company, bringing the total amount to more than $960,000 since the Center's first rebate in FY 1994.

Enabling Processes

KSC is working diligently to refocus its resources for maximum productivity and to provide the most effective business solutions for our customers.

Teams of employees worked during FY 98 to lay the groundwork for deployment of the Integrated Financial Management Project (IFMP), a software system scheduled to take effect on March 1, 2000. In preparation for the IFMP, the Center supported Agency Process Team activities that included revising business processes, eliminating unnecessary work steps and writing test scenarios and scripts for validation testing. KSC also identified potential risks to the implementation of the system, and prepared mitigation strategies for these risks. The IFMP results from a contract awarded late in FY 97 to KPMG Peat Marwick LLP to implement an Agency-wide business management system.

As part of NASA's Outsourcing Desktop Initiative (ODIN), the Agency chose OAO Corporation of Greenbelt, Md., to provide information technology services for the four Office of Space Flight centers. Six other firms are part of the pool of information technology contractors, which are available for selection under the ODIN master contract. KSC was selected as the lead service center for the Office of Space Flight ODIN delivery orders, a contract that also covers Johnson Space Center, Marshall Space Flight Center and Stennis Space Center. The services under this contract include comprehensive desktop computer, server, local area network, telephone, local video, administrative radio, remote communication and public address services.

Along with the continuation of an undergraduate studies program, two newly created programs — the Kennedy Graduate Fellowships Program and the Leadership Excellence Achievement Program — provide support for individual employees to further their education in areas considered critical to the Center's mission. The programs enable KSC's leaders to create an environment that supports and nurtures a transition to the future.

FY 98 Achievements

- *KSC has met all requirements for ISO 9001 certification by the international organization Det Norske Veritas, Inc. Other NASA centers and the Jet Propulsion Laboratory have consulted with KSC for our knowledge and lessons learned during the certification efforts.*
- *KSC implemented the "TechDoc" system to make more than 50,000 electronic technical documents available to any NASA or contractor user. "TechDoc" provides almost instantaneous access to documentation, resulting in significant savings of cost and time.*
- *The Center established the Business Management System on-line at KSC Business World, including the Implementation Plan, Performance Indicators and Continual Improvement listings. The on-line system, initiated with more than 700 document procedures, was enhanced to include Center agreements with our customers.*
- *KSC initiated development of a Project and Resource Management System to consolidate data for online project and mission reviews and to aid in the planning of future projects.*
- *The Center developed and implemented the Goal Performance Evaluation System (GPES). GPES links individual efforts to KSC's Implementation Plan as well as to Agency strategic plans. This novel system is being implemented at other NASA centers and has received attention from industry as an innovative tool to link employees' efforts to strategic initiatives.*
- *KSC performed an automated skills and competencies assessment to establish baseline core competencies and assess gaps with future needs.*

Outreach To The World

The Visitor Complex welcomed an estimated 2.75 million guests from around the world in FY 98, making it the fifth best-attended tourist attraction among the many in Florida. A newly finished observation gantry at the center of Launch Complex 39 (LC 39) and an International Space Station exhibit facility brought public visitors into closer contact with the actual workings of the space program.

To give visitors sufficient access to the new attractions, the Visitor Complex began a program of individualized tours.

The Center received a high volume of mail from the nation's school system and the general public, including those outside the United States. The "Fanmail" office handled the majority of the written and electronic inquiries and requests, responding by mail with informational packets whenever possible.

The Fanmail and Education Offices together answered a total of 34,128 inquiries during FY 98 and mailed out 1,517,889 separate items.

KSC projected high visibility in other ways as well. As always, the Center's activities drew the attention of the media, with approximately 1,600 accredited press members from 33 countries providing coverage to millions of readers, viewers and listeners. Anticipation over John Glenn's return to space resulted in a record of approximately 3,750 requests for press accreditation.

Original Mercury astronaut John Glenn, left, toured KSC during FY 98 in preparation for his return to space as a mission specialist on STS-95.

Exposure also flourished through entertainment outlets. "From the Earth to the Moon," a historical television series with Tom Hanks as executive producer, aired on Home Box Office in April after a debut screening at KSC. The Center also played a prominent role in "Armageddon," the top-grossing movie of 1998. The film's director and several of its actors, including Bruce Willis, attended a world premiere showing in June at the Apollo/Saturn V facility.

"Armageddon," the top-grossing movie of 1998, made its world premiere at the Center's Saturn V Facility.

Outreach To Businesses

Kennedy Space Center's eighth annual Business Opportunities Expo took place at Port Canaveral in November 1997, drawing more than 100 exhibitors. Sponsored by KSC, the 45th Space Wing, and the Canaveral Port Authority, the Expo has become one of the premier business opportunity events in the Southeast.

The Central Industry Assistance Office made it easier for small firms to do business with KSC. The office coordinated joint counseling by NASA and prime contractors to 184 small businesses during FY 98. The Center spent 17.2 percent of its contract dollars with small business during 1998, with small, disadvantaged businesses making up 8.4 percent and women-owned businesses 4 percent of the 17.2 percent total. Those percentages exceeded the Center's small business goals for the year.

The Combined Federal Campaign
With more than 80 percent of employees involved, KSC donated $225,817. That total greatly surpassed the goal of $210,000 and reflected a 5 percent increase per employee over the previous year's contributions.

Outreach To The Community

KSC provided a direct economic impact of $966 million to Florida's economy during FY 98, and approximately 83 percent of that money was expended within Brevard County. Of the total figure, $762 million went to contractors operating at the Center and $49 million went to off-site businesses in the county.

The Center's employees established a new standard by giving $225,817 during the Combined Federal Campaign, a program that gives federal employees the chance to contribute to charitable organizations through direct payments or payroll deductions. The figure marked a 5 percent increase per employee over the previous year.

A total of 170 employees also took part in the annual Days of Caring project, fulfilling "wish lists" from disadvantaged Brevard County residents by performing such tasks as cleaning, painting, waxing floors, vacuuming and cooking. Another 68 NASA and contractor employees lent support to various other United Way projects, including Meals on Wheels and the Central Brevard Sharing Center.

The Community Relations Council, in its first full year of existence, grew in strength. The CRC organized the Center's response to the summer's wildfires, as employees donated about 2,500 pounds of snack foods, sports drinks, water and coolers to weary firefighters.

KSC's Open House put family members of employees in touch with the wonders of space.

KSC held an employee open house in November 1997, with more than 33,000 workers and their family members taking advantage of the opportunity to explore the Center. The Launch Control Center proved to be among the most popular sites, drawing more than 17,000 visitors.

Outreach To Students and Teachers

The University Services and K-12 Education Services offices supported multiple programs during FY 98. Among the most notable:

- KSC hosted the first annual "Partners in Education and Research Conference." This conference brought more than 200 university faculty and industry representatives together to discuss technical areas of interest to the Kennedy Space Center and partnership ideas involving government, industry and academia.
- The Space Life Sciences Training Program provided an opportunity for 40 college students from across the United States to work and study at the Center during the summer with KSC researchers serving as mentors. The Program has been conducted each summer at KSC since 1984 in conjunction with Florida A&M University, which provides five college credits upon completion. The students spent six weeks working in KSC's life sciences laboratory and field research, attended lectures by experts from government, industry, and academia, and participated in several field trips.
- For the fifth consecutive year, the Center donated and loaned excess computer hardware and software to schools for educational purposes. The hardware alone was worth more than $7 million.
- NASA's Unique Resident Tutoring for Up-and-Coming Replacement Engineers (NURTURE) introduced high school students to mathematics, science and engineering. The program, sponsored jointly by KSC and the Brevard and Orange County School Districts, is available to selected ninth-grade students, who remain in NURTURE until their graduation.
- The Virtual Science Mentor Program gave middle school science students from southwest Florida access to the expertise of KSC's scientists and engineers. The program, a cooperative effort among NASA, the state of Florida, the Technological Research and Development Authority and Florida Gulf Coast University, matched approximately 60 teachers with mentors from the Center. Using a desktop video system, the mentors provided the classes with mission-related material and other relevant information.

The Center expanded its summer outreach efforts with the addition of ACCESS (Achieving Competence in Computing, Engineering, and Space Science). This internship program benefits students with disabilities who have a strong background in science and a desire to pursue technical careers.

In addition, nine students were employed with the Space Coast Center for Independent Living in a high school/high tech program co-sponsored by NASA. The program, based in Cocoa Beach, involves students, parents and employers and is intended to encourage students with physical, sensory or learning disabilities to pursue interests in science, engineering and technology.

Educational Support

- *The Center's "Spacemobile" lecturers, each driving a van filled with NASA and space-oriented equipment and materials, made 221 presentations to students, teachers and the general public totaling 20,904 people in Florida and elsewhere. In addition, the two lecturers conducted or supported 110 teacher workshops.*
- *The Educators Resource Center (ERC) maintained its function of encouraging teachers to add science and aerospace-oriented subjects to their curricula and providing materials to bolster that curricula. Now in its 17th year, the ERC served 10,347 professional educators and helped distribute a total of 543,210 printed publications to teachers.*
- *The Summer High School Apprenticeship Research Program (SHARP) offered eight weeks of employment and study at KSC in particular fields of interest for 26 students selected from Brevard, Orange, Volusia and Osceola counties.*

People

While KSC benefited from stability in its upper management during FY 98, some notable personnel changes did occur.

Jim Harrington, who had overseen 22 launches during his tenure as Space Shuttle Launch Director, announced his retirement from that position in December. He was succeeded by David King, the Shuttle Processing Deputy Director.

Harrington was not alone in the timing of his retirement. He was joined during FY 98 by Jimmy J. Akin, Chief Information Officer; J. Albert Diggs Jr., Equal Opportunity Program Office Director; Hugh W. Harris, Public Affairs Director; A. David Flowers, Chief Financial Officer; Sal Cristofano, Payload Carriers Program Manager; and Floyd Curington, acting director of Expendable Launch Vehicles.

Napoleon A. Carroll was named to succeed Flowers as Chief Financial Officer, and Barbara Brown took the helm as Chief Information Officer. In other changes, Bruce Anderson was named Chief Counsel and Kenneth Payne was named director of Logistics Operations at KSC.

As a result of increased center responsibilities, the Payload Processing Directorate was reorganized into two directorates. Bobby Bruckner, director of the original office, was given the role of leading the newly established Expendable Launch Vehicle and Payload Carriers Program office. Steve Francois was named to lead the Space Station and Shuttle Payloads Directorate.

Meanwhile, employees were saddened by the passing of Alan Shepard Jr., one of the seven original Mercury astronauts and the first American in space. Mr. Shepard died in July at the age of 74. Shepard, who became the fifth human to walk on the moon as commander of Apollo 14, served for many years as the chairman of the Mercury 7 Foundation, now the Astronaut Scholarship Foundation.

David King
Space Shuttle Launch Director

Napoleon Carroll
Chief Financial Officer

Barbara Brown
Chief Information Officer

Kenneth Payne
Director of Logistics Operations

Bruce Anderson
Chief Counsel

Steve Francois
Director of Space Station and Shuttle Payloads

Bobby Bruckner
Manager of ELV and Payload Carriers Program

NASA/KENNEDY SPACE CENTER

Looking Toward The Future...

KSC continues to move its focus from its traditional role as a launch service provider to one incorporating space launch technology research and development in support of the Center's customers. We embrace a leadership position in anticipation of the changing forms of space flight, taking early steps toward a transition to a national spaceport and eventually to many spaceports on Earth and other solar system bodies.

In collaboration with NASA, industry and academia, we have joined forces to create the tools needed for developing advanced spaceport architecture and space launch operations capabilities. In support of our Spaceport Technology Center concept, KSC identified technology growth areas and future technology opportunities.

With a structured foundation already in place and the experience gained from the ISO 9001 implementation, KSC is enhancing its management system. The Center's Integrated Management System will be based upon a customer-focused strategy and continual improvement. The assessment of processes certified to ISO 9001 standards will rely on a set of measures tied to customer needs and organizational performance. This performance review will align all activities with the Center's long-term objectives for systematic, prevention-based and continually improved processes.

This management framework will enable KSC to focus on the activities most critical for our missions and to meet customer needs so that we play a major role in achieving the NASA vision and goals for the future.

Roy D. Bridges, Jr., ***Center Director***

James Jennings, ***Deputy Director for Business Operations***

Loren J. Shriver, ***Deputy Director for Launch & Payload Processing***

JoAnn H. Morgan, ***Associate Director for Advanced Development & Shuttle Upgrades***


NASA
SPACE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN F. KENNEDY SPACE CENTER
KENNEDY SPACE CENTER, FL 32899

Statement of the Chief Financial Officer

The FIscal Year (FY) 1998 financial statements (unaudited) have been prepared to report the financial position and results of NASA's Kennedy Space Center operation, pursuant to the requirements of the Chief Financial Officers (CFOs) Act of 1990 and the Government Management Reform Act of 1994 (GMRA). The statements include the Statement of Financial Position and the Statement of Operations and Changes in Net Position.

The statements have been prepared from the books and records of NASA, in accordance with the comprehensive basis of accounting prescribed by the Office of Management and Budget (OMB) Bulletin 94-01, "Form and Content of Agency Financial Statements." The statements are different from financial reports used to monitor and control budgetary resources, which are prepared from the same books and records.

The statements should be read with the realization that they are for an agency of the U.S. Government, a sovereign entity. Liabilities not covered by budgetary resources cannot be liquidated without the enactment of an appropriation, and payment of all liabilities, other than for contracts, can be abrogated by the sovereign entity.

These financial statements were prepared in accordance with Federal accounting standards. These standards are evolving through the efforts of the Federal Accounting Standards Advisory Board (FASAB). This board includes members from the Office of Management and Budget (OMB), the General Accounting Office (GAO), and the Department of Treasury (Treasury). Currently, NASA observes the following heirarchy of accounting standards as required by OMB;

- Individual FASAB standards published by OMB, GAO, and Treasury;
- OMB guidance on the form and content of financial statements;
- Agency accounting guidance, which represents prevalent practice; and
- Accounting principles published by other authoritative sources.

NASA Headquarters, which receives its funding through annual Congressional appropriations, authorizes and funds KSC operations. KSC's total operational expenses for FY 1998 by appropriation were:

Appropriation	Amount (in thousands)
Mission Support	259,353
Human Space Flight	104,531
Science, Aeronautics, and Technology	34,108
Construction of Facilities	12,387
Research and Development	196
Research and Program Management	2
Space Flight Control and Data Communications	(82)
Total Expenses	$ 410,495

The 1998 Annual Report and Financial Statements were the result of the work of a dedicated team of professionals at KSC.

N.A. Carroll
Chief Financial Officer

FINANCIAL STATEMENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN F. KENNEDY SPACE CENTER

ANNUAL REPORT FY1998

Statement of Financial Position

As of September 30, 1998 (In Thousands)

See Financial Notes 1 through 8 on the following pages

	1998	1997
Assets:		
Intragovernmental Assets:		
Fund Balance With Treasury *(See Note 2)*	$ 257,696	$ 257,903
Accounts Receivable, Net *(See Note 3)*	7,168	6,238
Governmental Assets:		
Accounts Receivable, Net *(See Note 3)*	1,423	703
Advances and Prepayments	477	0
Property, Plant and Equipment *(See Note 4)*	1,806,073	2,314,963
Other Assets *(See Note 5)*	120,359	166,959
Total Assets	***$ 2,193,196***	***$ 2,746,766***
Liabilities:		
Liabilities Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Accounts Payable	$ 20,922	$ 19,918
Other Liabilities *(See Note 6)*	425	364
Governmental Liabilities:		
Accounts Payable	89,109	95,448
Other Liabilities *(See Note 6)*	12,732	7,149
Total	123,188	122,879
Liabilities not Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Other Liabilities *(See Note 6)*	57	57
Governmental Liabilities:		
Other Liabilities *(See Note 6)*	16,853	16,468
Total	***16,910***	***16,525***
Total Liabilities	***$ 140,098***	***$ 139,404***
Net Position (Note 7):		
Unexpended Appropriations	$ 143,576	$ 141,965
Invested Capital	1,926,432	2,481,923
Cumulative Results of Operations	0	0
Future Funding Requirements	(16,910)	(16,526)
Total Net Position	***$ 2,053,098***	***$ 2,607,362***
Total Liabilities & Net Position	***$ 2,193,196***	***$ 2,746,766***

The accompanying notes are an integral part of these statements.

FINANCIAL STATEMENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN F. KENNEDY SPACE CENTER

ANNUAL REPORT FY1998

Statement of Operations and Changes in Net Position

For the Year Ended September 30, 1998 (In Thousands)

See Financial Notes 1 through 8 on the following pages

	1998	1997
Revenues and Financing Sources:		
Appropriated Capital Used	$ 389,196	$ 622,162
Revenues from Sales of Goods and Services:		
To the Public	4,255	4,414
Intragovernmental	17,044	16,639
Other Revenues and Financing Sources *(See Note 8)*	491	302
Less: Receipts Transferred to Treasury	(491)	(302)
Total Revenues and Financing Sources	***$ 410,495***	***$ 643,215***
Expenses:		
Program or Operating Expenses by Appropriation:		
Mission Support	256,223	250,838
Human Space Flight	89,089	326,109
Science, Aeronautics and Technology	31,392	41,632
Construction of Facilities	12,387	3,718
Research and Development	196	(27)
Research and Program Management	2	(16)
Space Flight Control and Data Communications	(93)	(92)
Reimbursable Expenses	21,299	21,053
Total Expenses	***$ 410,495***	***$ 643,215***
Total Expenses in Excess of Revenues and Financing Sources:	***0***	***0***
Nonoperating Changes:		
Unexpended Appropriations *(See Note 7)*	1,611	(100,056)
Invested Capital *(See Note 7)*	(555,491)	(5,900,447)
Future Funding Requirements *(See Note 7)*	(384)	830
Total Nonoperating Changes	***$ (554,264)***	***$ 5,999,673***
Change in Net Position	(554,264)	5,999,673
Net Position, Beginning Balance	***$ 2,607,362***	***$ 8,607,035***
Net Position, Ending Balance	***$ 2,053,098***	***$ 2,607,362***

The accompanying notes are an integral part of these statements.

FINANCIAL STATEMENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN F. KENNEDY SPACE CENTER

ANNUAL REPORT FY1998

Notes to the Financial Statements

For the Year Ended September 30, 1998

1. Summary of Accounting Policies and Operations

Basis of Presentation

These financial statements were prepared to report the financial position and results of operations of John F. Kennedy Space Center (KSC), pursuant to the requirements of the Chief Financial Officers Act of 1990. The statements were prepared from the books and records of KSC, in accordance with the comprehensive basis of accounting specified in OMB Bulletin 94-01.

Reporting Entity

KSC is one of nine NASA field centers established to aide NASA in its mission to provide for aeronautical and space activities. Financial management of its operations is the responsibility of Center officials at all organizational levels. KSC's accounting system is one of ten distinct operations located at nine NASA Centers and Headquarters. Although KSC, like the other Centers, is independent and has its own deputy chief financial officer for finance, it operates under Agencywide financial management regulations. KSC provides payroll accounting for approximately 1,732 civilian employees and processes approximately 6,497 non-payroll related accounting transactions monthly. This data provides the basic information necessary to meet internal and external financial reporting requirements and provides both funds control and accountability.

Seven appropriations require individual treatment in the KSC accounting and control system.

(1) The Human Space Flight (HSF) appropriation supports human space flight research and development activities for space flight, spacecraft control, and communications actions. This includes research, development, operations, services, maintenance, and construction of facilities, which encompasses the repair, rehabilitation, and modification of real and personal property.

(2) The Science Aeronautics and Technology (SAT) appropriation provides for the conduct and support of science, aeronautics, and technology. This includes research, development, operations, services, maintenance, and construction of facilities, which encompasses the repair, rehabilitation, and modification of real and personal property.

(3) The Mission Support (MS) appropriation provides for safety, reliability, and quality assurance activities supporting Agency programs, space communication services for NASA programs, salaries and related expenses in support of research in NASA Field Centers, and construction of facilities, which encompasses the repair, rehabilitation, and modification of real and personal property.

(4) The Research and Development (R&D) appropriation, which was restructured and replaced in the 1995 budget, includes research and development of aeronautics and space, space vehicles, space systems effort, related institutional activities, minor construction repair, maintenance, rehabilitation, and modifications.

(5) The Space Flight, Control, and Data Communications (SFCDC) appropriation, which was restructured and replaced in the 1995 budget, includes production, operations and support activities for the Space Transportation System, which includes the Space Shuttle and expendable launch vehicles. The appropriation also provides for tracking, telemetry, command and data acquisition support of all flight projects.

(6) The Construction of Facilities (CofF) appropriation, which was restructured and replaced in the 1995 budget, includes the construction of new facilities and the repair, rehabilitation, and modification of facilities.

(7) The Research and Program Management (R&PM) appropriation which was restructured and replaced in the 1995 budget, includes salaries, travel, and related expenses for the civil servants in support of NASA programs.

In addition to the basic operating programs described above, KSC expenditures in FY 1998 included $21 million of reimbursable activity.

Basis of Accounting

KSC accounts are maintained on an accrual basis (i.e., expense and revenue are recorded in the accounts in the period in which they are incurred or earned). Expenses are classified in the accounts according to the appropriation that financed the activity. These expenses are coded in accordance with the Agencywide coding structure, which sets forth a uniform classification of financial activity that is used for planning, budgeting, accounting, and reporting. The expenses are further categorized in the General Ledger as operating expenses or capitalized expenses.

Funds with the U.S. Treasury and Cash

KSC's cash receipts and disbursements are processed by the U.S. Treasury. The funds with the U.S. Treasury include appropriated funds and deposit funds for advances received for reimbursable services. Balances are not held outside the U.S. Treasury.

Advances

KSC funds its University Contracts and Grants program through the use of predetermined payment schedules where letters of credit are not used; recipients are required to schedule drawdowns to coincide with actual, immediate cash requirements, in accordance with OMB Circular A-125 and Department of Treasury regulations. Quarterly financial reporting of cash transactions is provided on Federal Cash Transactions Reports (SF 272's). Detailed monitoring and accountability records are maintained; monitoring includes audits by the Defense Contract Audit Agency and NASA's Office of the Inspector General.

Accounts Receivable

The largest portion of accounts receivable is due from other Federal agencies and includes research and development of satellites as well as launch services. Nongovernment customers are required to provide advance payments which are placed on deposit with the U.S. Treasury until services are performed. In unusual cases, exceptions and waivers to this general rule have been granted under the Space Act, allowing customers to postpone advance payments.

Notes to the Financial Statements (cont'd.) *For the Year Ended September 30, 1998*

Property, Plant and Equipment

KSC-owned Property, Plant and Equipment may be held by the Center or its contractors. Under the provisions of the Federal Acquisition Regulation (FAR), contractors are responsible for control over and accountability for such property in their possession.

Under the User Charge Act and OMB Circular A-25, Property, Plant and Equipment may be depreciated while in prior years a "use" charge was applied to commercial reimbursable customers, which included a factor for depreciation of facilities and equipment. KSC is permitted to charge depreciation under the "full cost" concept to non-government reimbursable customers.

Automated data processing software is costed as an operating expense when acquired rather than capitalized in accordance with GAO Title II guidelines.

Equipment with a unit cost of $100,000 or more and a useful life of 2 years or more, that will not be consumed in an experiment, is capitalized. Capitalized cost includes unit cost, transportation, installation, and handling and storage costs.

Real property such as land, buildings, and other structures and facilities, is capitalized when the asset value is $100,000 or more. The capitalized value represents the total cost to NASA, including both acquisition and preparation costs. Land values are recorded at original acquisition cost and do not reflect current value or include the cost of improvements. Buildings are also valued at acquisition cost, including the cost of capital improvements and fixed equipment required for functional use of the facility. Other structures include the acquisition cost of capital improvements.

Government-owned/contractor-held property includes KSC materials, plant equipment, space hardware, special tooling, and special test equipment. Contractors are directed to annually report plant equipment costing $100,000 or more and having a useful life of 2 years and which will not be consumed in an experiment. Reporting is also required for special test equipment, special tooling, materials, and space hardware which, for the most part, includes items that are in excess of $100,000; however, reporting on all such items is required and their total value is included in the statement of financial position. Contractors report, as of September 30, on a NASA Form 1018, Report of Government-owned/Contractor-held Property, is certified by the contractor's representative and reviewed by a Government property administrator.

Contractor-held space hardware includes flight pallets, mission peculiar experiment support structures, spacelab, transfer tunnel, igloo assembly and similar components unique to NASA space programs and held by NASA prime contractors or their first-tier subcontractors who are responsible for building, refurbishing and launching the hardware. Contractor reporting is required for cost-type contracts exceeding $500,000 where space hardware costs exceed $75,000. These items are priced in accordance with guidance set forth in a NASA supplement to the FAR. The valuation policy allows for use of actual or estimated costs, which may be abstracts of data from contractors' records, computations based upon engineering estimates, estimates from NASA contractor financial management reports, formula procedures, latest acquisition/pricing estimates or other approved methods.

Notes to the Financial Statements *(cont'd.)* *For the Year Ended September 30, 1998*

Other Assets

Other assets include Government-owned/Contractor-held materials.

Liabilities

Accounts payable includes amounts recorded for receipt of goods or services furnished to the Center, based on receiving reports and billings rendered. Additionally, KSC accrues cost and recognizes liability based on information that is provided monthly by contractors on cost and performance reports (NASA Form 533, Contractor Financial Management Report). KSC relies on independent audits by the DCAA to ensure the reliability of reported costs and estimates. To provide further assurance, financial managers are required to test the accuracy of cost accruals generated from the NF 533's, and NASA Headquarters independently analyzes the validity of KSC's data.

Revenues and Other Financing Sources

KSC receives the majority of its funding through multi-year appropriations. These include 3-year appropriations for construction activities, 2-year appropriations for operational and space flight activities, and a single year appropriation for civil service payroll and travel. In addition to appropriated funds, the Center performs services for other Federal agencies and the public and receives reimbursable funding authority.

Notes to the Financial Statements (cont'd.) For the Year Ended September 30, 1998

2. Fund Balance with Treasury:

(In Thousands)

Fund Balances:	Obligated	Unobligated Available	Unobligated Restricted	Fund Balance
Appropriated Funds	$ 196,141	$ 48,869	$ 12,602	$ 257,612
Deposit Funds				0
Suspense/Clearing Accounts				84
Total Fund Balance with Treasury				**$ 257,696**

3. Accounts Receivable, Net:

(In Thousands)

	Entity Accounts Receivable	Non-Entity Accounts Receivable	Allowance for Uncollectible Receivables	Net Amount Due
Intragovernmental	$ 7,168	$ 0	$ 0	$ 7,168
Governmental	994	1,168	(739)	1,422
Total	**$ 8,162**	**$ 1,168**	**($739)**	**$ 8,590**

Nonentity accounts receivable represent amounts that will be deposited to miscellaneous receipts when collected.

4. Property, Plant and Equipment:

(In Thousands)

	1998	1997	Change
Government-owned/Government-held:			
Land	$ 73,672	$ 73,672	$ 0
Structures, Facilities and Leasehold Improvements	1,399,861	1,363,460	36,401
Equipment	29,386	101,603	(72,218)
Work in Progress	38,508	81,785	(43,277)
Total	**$ 1,541,427**	**$ 1,620,520**	**$ (79,092)**
Government-owned/Contract-held:			
Equipment	50,130	134,669	(84,538)
Special Tooling	1,239	21,958	(20,719)
Special Test Equipment	58,227	76,613	(18,386)
Space Hardware	154,215	459,920	(305,705)
Work in Process	835	1,283	(448)
Total	**$ 264,646**	**$ 694,443**	**$ (429,797)**
Total Property, Plant and Equipment	**$ 1,806,073**	**$ 2,314,963**	**$ (508,889)**

See Note 1 for further discussion on property, plant and equipment.

Notes to the Financial Statements (cont'd.) For the Year Ended September 30, 1998

5. Other Assets:

(In Thousands)

	1998	1997	Change
Contractor-held Materials:	$ 120,359	$ 166,959	$ (46,600)
Total	**$ 120,359**	**$ 166,959**	**$ (46,600)**

6. Other Liabilities:

(In Thousands)

Liabilities Covered by Budgetary Resources:

	Current	Non-Current	Total
Intragovernmental Liabilities:			
Liability for Deposit and Suspense Funds:	$ 425	$ 0	$ 425
Total	**$ 425**	**$ 0**	**$ 425**
Governmental Liabilities:			
Liability for Deposit and Suspense Funds:	$ 1,691	$ 0	$ 1,691
Accrued Funded Payroll and Benefits	11,041	0	11,041
Total	**$ 12,732**	**$ 0**	**$ 12,732**

The liability for deposit and suspense funds includes cash advances received from other Government agencies and public reimbursable customers. Also included are funds on deposit with the U.S. Treasury for employees' savings bonds and state tax withholdings.

Liabilities Not Covered by Budgetary Resources:

	Current	Non-Current	Total
Intragovernmental Liabilities:			
Accounts Payable for Closed Appropriations	$ 57	$ 0	$ 57
Total	**$ 57**	**$ 0**	**$ 57**
Governmental Liabilities:			
Accounts Payable for Closed Appropriations	$ 2,898	$ 0	$ 2,898
Contingent Liabilities	1,119	0	1,119
Unfunded Annual Leave	0	12,835	12,835
Total	**$ 4,017**	**$ 12,835**	**$ 16,853**

See Note 1 for further discussion of liabilities not covered by budgetary resources.

Notes to the Financial Statements (cont'd.) For the Year Ended September 30, 1998

7. Net Position:

(In Thousands)

	Appropriated Funds
Unexpended Appropriations:	
Undelivered	$ 82,105
Unobligated:	
Available	48,869
Unavailable	12,602
Invested Capital	1,926,432
Cumulative Results	
Future Funding Requirements:	
Annual Leave	(12,835)
Closed appropriations	(2,956)
Other	(1,119)
Total	**$ 2,053,098**

8. Other Revenues and Financing Resources:

(In Thousands)

	1998	1997
General Fund Proprietary Receipts	$ 491	$ 302
Total	**$ 491**	**$ 302**

General Fund Proprietary Receipts represent user fees, gifts, fines or interest penalties.