NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 2001 BUDGET ESTIMATES

NASA'S VISION FOR THE FUTURE

NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

NASA's unique mission of exploration, discovery, and innovation has preserved the United States' role as both a leader in world aviation and as the preeminent spacefaring nation. It is NASA's mission to:

- Advance human exploration, use and development of space;
- Advance and communicate scientific knowledge and understanding of the Earth, the Solar System, and the Universe;
- Research, develop, verify and transfer advanced aeronautics, space and related technologies.

The outcomes of NASA's activities contribute significantly to the achievement of America's goals in five key areas:

- Economic growth and security - NASA conducts aeronautics and space research and develops technology in partnership with industry, academia, and other federal agencies to keep America capable and competitive.
- Increased understanding of science and technology – NASA communicates widely the content, relevancy, and excitement of our mission and discoveries to inspire and increase the understanding and the broad application of science and technology.
- Sustainable Development of the Environment - NASA studies the Earth as a planet and as a system to understand global climate change, enabling the world to address environmental issues.
- Educational Excellence - NASA involves the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds.
- Peaceful Exploration and Discovery - NASA explores the Universe to enrich human life by stimulating intellectual curiosity, opening new worlds of opportunity, and uniting nations of the world in this quest.

STRATEGY FOR ACHIEVING OUR GOALS

The NASA budget request for FY 2001 continues the President's commitment to invest in the future. This budget request recognizes the enormous potential for investments in the civil space and aeronautics program to benefit this country. The President's 1996 National Space Policy outlined a strong and stable program in space that will ensure America's role as the world's space leader. The Space Policy reaffirmed the United States' commitment to the International Space Station, to the next generation of launch vehicle programs, to an aggressive Space Science program, and to the continuing commitment to a long-term program of environmental monitoring from space. The President's strategy for investing in science and technology, encompassing goals which emphasize world leadership in science, mathematics and engineering, economic growth, improved environmental quality,

and harnessing information technology continues as the framework for development of federal science and technology policy. The President's budget request for NASA for FY 2001 fully supports these goals.

The NASA budget request for FY 2001 is reflected in four appropriations:

Human Space Flight - providing funding for the Space Station and Space Shuttle programs, including development of research facilities for the International Space Station and continuing safe, reliable access to space through augmented investments to improve Space Shuttle safety, support of payload and expendable launch vehicle (ELV) operations, and other investments including innovative technology development and commercialization.

Science, Aeronautics and Technology - providing funding for NASA's research and development activities, including all science activities, global change research, aeronautics, technology investments, education programs, space operations, and direct program support;

Mission Support - providing funding for NASA's civil service workforce, safety and quality assurance activities, and facilities construction activities to preserve NASA's core infrastructure;

Inspector General - providing funding for the workforce and support required to perform audits and evaluations of NASA's programs and operations.

The NASA Strategic Plan establishes a framework for making management decisions by separating the Agency's programs into four Strategic Enterprises through which we implement our mission and communicate with our external customers: Space Science; Earth Science; Human Exploration and Development of Space; and Aero-Space Technology

Each Enterprise, similar to the strategic business units employed by the private sector, has a unique set of strategic goals, objectives, and concerns, and a unique set of primary external customers. NASA also provides capabilities that are required for each Enterprise to achieve its goals and meet the needs of their customers. These agency-level activities serve multiple Enterprises and the strategies of these functions are driven primarily by the strategic plans of the Enterprises. The fundamental values of excellence, responsibility, teamwork, trust, and honor form the bedrock of all of NASA's activities.

NASA's Strategic Plan transcends its organizational structure. Each of the Strategic Enterprises seeks to respond to a unique customer community. Each of the Enterprises has its own set of technology needs which are closely linked to performing future planned missions while reducing cost and technical risk. At the same time, there is considerable synergy between the Enterprise activities, which strengthens each Enterprise. The Strategic Enterprises comprise an integrated national effort. Synergism of broad purposes, technology requirements, workforce skills, facilities, and many other dimensions was the basis for amalgamating these activities within NASA in the National Aeronautics and Space Act in 1958, and the benefits remain strong today.

A broad description of the focus of each Strategic Enterprise follows:

Space Science - The activities of the Space Science Enterprise seek answers to fundamental questions, such as understanding the origin and evolution of the universe and our solar system, if there are planets around other stars, whether the Earth is unique, and if life exists elsewhere. The quest for this information, and the answers themselves, maintains scientific leadership, excites and inspires our society, strengthens education and scientific literacy, develops and transfers technologies to promote U.S. competitiveness, fosters international cooperation to enhance programs and share their benefits, and sets the stage for future space ventures.

Earth Science - The activities that comprise this Enterprise are dedicated to understanding the total Earth system and the effects of humans on the global environment. This pioneering program of studying global climate change is developing many of the capabilities that will be needed for long-term environment and climate monitoring and prediction. Governments around the world need information based on the strongest possible scientific understanding. The unique vantage-point of space provides information about the Earth's land, atmosphere, ice, oceans, and biota as a global system, which is available in no other way. In concert with the global research community, the Earth Science Enterprise is developing the understanding needed to support the complex environmental policy decisions that lie ahead.

Human Exploration and the Development of Space - The Human Exploration and Development of Space Enterprise seeks to bring the frontiers of space fully within the sphere of human activities. HEDS conducts research and development to sustain a permanent human presence in space in low-Earth orbit. HEDS will use the environment of space for research on biological, chemical and physical processes and facilitates the development of space for commercial enterprise. In pursuit of these goals, HEDS delivers knowledge and technologies that help to improve medical care and industrial processes on Earth while strengthening education and scientific literacy.

Aero-Space Technology - - The Aero-Space Technology Enterprise features the Aeronautics and Space Transportation programs. NASA, and its predecessor, the National Advisory Committee for Aeronautics, have worked closely with U.S. industry, universities, and other Federal agencies to give the United States a preeminent position in Aeronautics. The Aeronautics program will pioneer the identification, development, verification, transfer, application and commercialization of high-payoff aeronautics technologies. Activities pursued as part of this Enterprise emphasize customer involvement, encompassing U.S. industry, the Department of Defense, and the Federal Aviation Administration. NASA is playing a leadership role as part of a Government-industry partnership to develop breakthrough technology that will help the aviation community cut the fatal accident rate five-fold within ten years and ten-fold within twenty years. NASA also supports the development of technologies to address airport crowding, aircraft engine emissions, aircraft noise, and other issues that could constrain future U.S. air system growth. The Space Transportation Technology program will develop new technologies aimed at access to space. The targeted technologies will reduce launch costs dramatically over the next decade, as well as increase the safety and reliability of current and future generation launch vehicles. Additionally, new plateaus of performance for in-space propulsion will be established, while reducing cost and weight.

NASA's ability to inspire and expand the horizons of present and future generations rests on the success of these efforts to maintain this nation's leadership in space. In order to ensure the stability to manage and execute programs within budget and schedule, NASA is seeking multi-year appropriations for the International Space Station.

PLANS AND ACCOMPLISHMENTS

HUMAN SPACE FLIGHT

International Space Station
The International Space Station (ISS) is an international laboratory in low Earth orbit on which American and international crews will conduct unique scientific and technological investigations in a microgravity environment. The goal of the Station is to support activities requiring the unique attributes of humans in space and establish a permanent human presence in Earth orbit. The proposed budget provides multi-year funding through an advanced appropriation for the continued development of the vehicle and its research components and for current operations, assembly and utilization of the station. With the first launches successfully completed, the budget includes funding to keep subsequent assembly missions on schedule for completion in 2004-2005 and provide a long-term solution to the safe return of the full complement of station crewmembers in the event of an emergency.

In FY 1999, successful launches of the first two components of the Station - the FGB control module and the first node - were completed in November and December respectively, and the elements were assembled in orbit and activated. A third flight delivering supplies to support the first crews was successfully performed in May 1999. Flight hardware elements for the next six U.S. assembly launches -- the Z1 and SO trusses, the control moment gyros, the first photo-voltaic array and battery sets, initial thermal radiators, communication equipment, the U.S. Laboratory, the mobile servicing system and the Multi-Purpose Logistics Carrier -- were delivered to the launch site and the first phases of multi-element integrated testing (MEIT) were completed. Crew training, payload processing, hardware element processing, and mission operations were supported. In 2000, fabrication of flight hardware, qualification testing, assembly, integration and mission operations will all continue. Difficulties with completion of U.S. MEIT testing, coupled with delays to the Russian Service Module, caused by recent failures of the Proton launch system, have delayed planned assembly and expedition flights. The Service Module will be launched in mid- to late-2000, and assembly and expedition flights will follow. The Russian launch of a Soyuz vehicle will enable permanent occupation of the station with rotating crews of three. In 2001 plans are to launch seven U.S. missions to station, including the lab module. Phase 2 of the station assembly will be completed with the launch of the airlock, and preparations will continue for the start of Phase 3 and the first shuttle mission dedicated to research utilization in late 20O1/early 2002.

As part of the FY 1999 operating plan, Russian Program Assurance (RPA) was re-established within the Space Station budget line. The RPA funding provides contingency activities to address ISS program requirements resulting from delays or shortfalls on the part of Russia in meeting its commitments to the ISS program. The first step in the contingency plan is to protect against a potential further delay in the Russian Service Module (SM) and its capabilities. The ISS program is purchasing, from the U.S. Naval Research Laboratory (NRL), an interim control module (ICM) to provide backup attitude control and reboost functions for the ISS. Additionally, the Shuttle fleet is being configured for reaction control system (RCS) interconnectivity modifications to enable greater Shuttle reboost capability to the ISS. A permanent U.S. propulsion capability is being developed for implementation in the 2002 timeframe. This includes a propulsion module, carriers, and activities to support propulsion logistics. An agreement negotiated with the Russians in 1999 will provide needed hardware and services to the U.S., including services to provide additional crew return capability when the Station attains the ability to support a permanent crew of six.

Phase 1 development of a crew return vehicle (CRV), to provide the U.S. capability to return up to seven crew members, is initiated in 2000. Design and operational technologies tested and demonstrated in Phase 1 will reduce CRV development risk. The X-38, including the space test flight in 2002, is being transitioned to merge with the ISS CRV funding in 2000 because of the overlap of CRV and X-38 technology developments. Pending a final decision to develop an X-38 based CRV, Phase 2 development funding will be included in the Aero-Space Technology budget estimates, beginning in FY 2002.

Payload and ELV Support

Activities funded by the payload carriers and support budget provide the required technical expertise and facilities to perform the payload buildup, test and checkout, integration, servicing, transportation and installation and deintegration in the Shuttle launch vehicle. In FY 1999, activities were provided for four Space Shuttle missions, including the first American segment of the ISS, and payload processing support activities and facilities for six manifested major payloads. In FY 2000, launch and landing payload support activities will be provided for six Space Shuttle missions including the Hubble Space Telescope (HST-03A) launch, the Shuttle Radar Topography Mission (SRTM) launch, and three assembly flights for the ISS. In FY 2001, launch and landing payload support activities will be provided for nine Space Shuttle missions, including seven ISS assembly and utilization flights. During this period, five pallets will be used in Space Shuttle missions, including the fourth HST servicing mission and three of the ISS assembly flights. In FY 2000 and 2001, over 20 major and secondary payloads will be supported, including major hardware for ISS assembly.

The Expendable Launch Vehicle (ELV) Mission Support budget provides funds for acquiring requisite launch services to meet all NASA requirements and for technical insight of commercially provided launch services. Advanced mission design/analysis and leading edge integration services are provided for the full range of NASA missions under consideration for launch on ELVs. During FY 1999, 10 ELV launches and 1 secondary ELV missions were successfully launched. Support for 13 missions, including Tracking and Data Relay Satellite-H (TDRS-H), Terra and Geostationary Operational Environmental Satellite-L (GOES-L), and four planetary missions are planned for launch in FY 2000, and integration and technical management of 28 payloads are planned for launch in FY 2000 and FY 2001. Support for 11 missions and 1 secondary payload is planned for FY 2001.

Investments and Support

Beginning in FY 2001, the Human Exploration and Development of Space (HEDS) Commercialization and Technology Initiative will include human space exploration and development activities emphasizing highly innovative technologies, advances in science, and enabling synergistic commercial space development efforts.

A consolidated project activity will begin in FY 2001 to ensure NASA's rocket propulsion test capabilities are properly managed and maintained in world class condition. The project will significantly enhance our ability to properly manage NASA's rocket testing activities and infrastructure across all four participating NASA centers.

Engineering and technical base (ETB) activity will continue to support the institutional capability in the operation of space flight laboratories, technical facilities, and testbeds; to conduct independent safety, and reliability assessments; and to stimulate science and technical competence in the United States.

Space Shuttle
The U.S. Space Shuttle provides several unique capabilities to the United States space program. These include retrieving payloads from orbit for reuse, servicing and repairing satellites in space, launching ISS components and providing an assembly platform in space, and operating and returning space laboratories. In FY 1999, the Space Shuttle launched four flights successfully including the first ISS assembly mission, one resupply flight to the ISS, one microgravity research mission which included the return to space of Senator John Glenn, and the successful deployment of the Chandra-Advanced X-Ray Astrophysics Facility (AXAF).

The six flights manifested in FY 2000 include the emergency HST Servicing Mission 3A which will replace failing gyros on the HST and the Shuttle Radar Topography Mission (SRTM), a joint DOD/NASA payload to study the earth. The Space Shuttle will also visit the ISS four more times, for both assembly and maintenance. Finally, the first crew will begin the permanent occupation and presence aboard the ISS in FY 2000.

Nine flights are planned during FY 2001, including seven ISS assembly and servicing missions. In addition, a dedicated microgravity research flight and another HST Servicing Mission (3B) will be flown.

SCIENCE, AERONAUTICS AND TECHNOLOGY

Space Science
The Space Science program seeks to answer fundamental questions concerning: the galaxy and the universe; the connection between the Sun, Earth and heliosphere; the origin and evolution of planetary systems; and, the origin and distribution of life in the universe. The Space Science program is comprised of a base program of research and development activities, including research and flight mission activities, and major space-based facilities.

In 1999, the Space Science program produced many notable scientific accomplishments. The Hubble Space Telescope fulfilled one of its most important objectives in May 1999, when the Hubble Space Telescope Key Project Team announced the results of their studies, which yielded an estimate of the Hubble constant to within 10% accuracy. The Hubble constant indicates the rate at which the universe is expanding from the primordial "Big Bang" and is one of the most important numbers in cosmology because it is needed to estimate the age and size of the universe. Combining the Hubble constant measurement with estimates of the density of the universe, the team estimated that the universe is approximately 12 billion years old. The Chandra X-ray Observatory (CXO), the third of the four "great observatories," was successfully launched and activated. As soon as science operations began, images showing astonishing detail of X-ray sources were obtained. With its unprecedented capabilities in energy coverage, spatial resolution, spectral resolution and sensitivity, CXO has just begun to investigate some of the most important topics in space science, including the age and size of the universe, dark matter, and X-ray background radiation. Other scientific discoveries related to the structure and evolution of the universe include the detection of "middleweight" black holes that are 100 to 10,000 times as massive as the Sun but occupy less space than the Moon, and the first-ever optical image of a gamma ray burst. Gamma ray bursts are the most powerful explosions in the universe, and for a very short period produce more energy than the rest of the universe combined. Also in 1999, several teams of researchers supported by NASA discovered many new planets orbiting nearby stars, including evidence of the first known planet orbiting a pair of stars. Within our own solar system, the Mars Global Surveyor

(MGS) generated the first global three-dimensional view of Mars. These images revealed an impact basin deep enough to swallow Mount Everest, as well as pathways for water flow. Scientist using MGS' magnetometer discovered surprising evidence of past movement of the Martian crust, further evidence that ancient Mars was a more dynamic, Earth-like planet than it is today. A dramatic time-lapse movie by the Hubble Space Telescope showed, for the first time, seasonal changes on Uranus. The Galileo spacecraft produced new images showing volcanic activity on Jupiter's moon Io, similar to the volcanism that occurred on Earth eons ago. Analysis of data from the Lunar Prospector spacecraft confirmed that the Moon has a small core, supporting the theory that the bulk of the Moon was ripped away from the Earth when an object the size of Mars collided with the Earth. In the field of solar science NASA sponsored scientists using the Japanese Yohkoh spacecraft discovered that an S-shaped structure often appears on the Sun in advance of a coronal mass ejection (CME), a violent eruption that is as powerful as billions of nuclear explosions. The Solar and Heliospheric Observatory (SOHO) spacecraft discovered the source of high-speed solar wind, a stream of electrified gas that affects the Earth's space environment.

To capitalize on these enormous successes during the past year, the President's FY 2001 Budget for NASA once again highlights Space Science. Space Science continues to focus on the Origins program and fundamental questions regarding the creation of the universe and planetary systems and the possibility of life on places other than planet Earth. Planning and technology development continues for the deployment of powerful telescopes to detect Earth-like planets beyond our solar system, for the launch of a mission to directly observe subsurface oceans on Europa, and for future missions to seek evidence of past or present life on Mars. The President's Budget supports two major initiatives in Space Science. The first is an enhanced Solar System Exploration program to establish a sustained presence at multiple locations on and around Mars and other potential research targets. Using advanced outposts of numerous, networked spacecraft, NASA will greatly enhance the science return and overall success of future missions. Eventually, such outposts will bring continuous access to live data and video so researchers and the public can explore and experience other worlds first-hand. The second is the "Living With a Star" Initiative to develop better solar weather forecasting capabilities and to better protect high-tech infrastructure from dangerous events like solar flares.

Development activities continue on the Relativity (Gravity Probe-B) mission, which is currently scheduled for launch in 2001. The Space Infrared Telescope Facility (SIRTF) initiated development in April 1998, with launch planned for December 2001. Development activities on the Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (TIMED) mission continued in 1999, with launch planned in 2000. Development activities on the Stratospheric Observatory for Infrared Astronomy (SOFIA) continue. The upgraded Hubble Space Telescope (HST) is providing new insights into our universe. Funding for HST continues to support operations, as well as preparation for servicing mission 3B in 2001 and servicing mission 4 in 2003.

In Explorer missions, development activities continue for the Microwave Anisotropy Probe (MAP) and Imager for Magnetosphere-to-Aurora Global Exploration (IMAGE) Medium-Class Explorer (MIDEX) missions. MAP will be launched in November 2000, IMAGE in February 2000. Two new MIDEX missions were selected in 1999: Full-sky Astrometric Mapping Explorer (FAME) scheduled for launch in 2004, and Swift, a multi-wavelength observatory for gamma-ray burst astronomy, to be launched in 2003. Three Small Explorer (SMEX) missions continued development in FY 1999: the High Energy Spectroscopic Imager (HESSI) is to launch in 2000; the Galaxy Evolution Explorer (GALEX) will launch in 2001; and the Two Wide-Angle Neutral Atom Spectrometers (TWINS) has been selected as a mission of opportunity, to be launched in 2003 and 2004. These missions emphasize reduced mission costs and accelerated launch schedules.

The Mars Global Surveyor entered Mars orbit in September 1997, the Mars Climate Orbiter was launched in December 1998 and the Mars Polar Lander was launched in January 1999. Unfortunately, the Orbiter was lost while attempting to enter Mars orbit in September 1999, and the Lander was lost during entry, descent and landing in December 1999. Funds are requested for the development of future Mars missions to establish a sustained presence at Mars that will greatly increase the science return and overall success of the Mars program. A review to be accomplished in 2000 will provide the plan for future launches.

In the Discovery program, the fourth mission, Stardust, was launched on schedule in February 1999, and is operating normally during its cruise to comet Wild-2, with the encounter scheduled for 2004. Two Discovery missions selected in 1997 are proceeding on schedule: the Comet Nucleus Tour (CONTOUR) will begin development in CY 2000 and will be launched in 2002; the Genesis solar wind sample return mission has begun development and will be launched in 2001. Two new missions were selected for implementation during 1999: The MErcury Surface, Space ENvironment, GEochemistry and Ranging (MESSENGER) mission to orbit Mercury; and the Deep Impact mission to fly by and fire an impactor into a comet. Both MESSENGER and Deep Impact are planned for launch in 2004. The President's Budget supports a new class of Discovery micromissions that will also be undertaken in 2001 to complement solar system exploration efforts with more frequent and varied research opportunities.

The Flight Validation program is providing flight demonstrations of critical new technologies which will reduce the mass and cost of future science and spacecraft subsystems, while maintaining or improving mission capabilities. The Deep Space-1 mission was launched in October 1998 and has validated its technologies and completed its primary mission, and is now in an extended mission. The Deep Space-2 mission was launched along with the Mars Polar Lander in January 1999, and was lost, along with the Lander, during entry, descent and landing on Mars in December 1999. The Space Technology-4 mission was terminated during 1999 due to the need to fund higher priority programs within the Space Science Enterprise. Also in 1999, NASA selected the Nanosat Constellation Trailblazer as the Space Technology -5 Flight Validation mission. This mission will feature three very small satellites (each about the size of a large birthday cake), that will fly in formation and test eight technologies in the harsh space environment near the boundary of Earth's protective magnetic field. The Flight Validation program has been restructured to enhance openness and competition as well as to increase the number of opportunities for technologies to be flight-validated. Funding for the restructured program has been increased.

Life and Microgravity Sciences and Applications

This program uses the microgravity environment of space to conduct basic and applied research to understand the effect of gravity on living systems and to conduct research in the areas of fluid physics, combustion science, fundamental physics, materials science and biotechnology. In FY 1999, the program flew one science mission (STS-95) on a Spacehab carrier with ISS precursor science experiments. STS-95 included commercially sponsored research as well as research on the effects of aging conducted in collaboration with the National Institution of Health, National Institute on Aging. FY 1999 has also seen the beginning of ISS assembly. In FY 2000, the Russian Service Module (Zvezda) will be launched, enabling permanent human presence aboard the ISS. In FY 2001, the U.S. laboratory module for the ISS will be launched, which will enable initial life and microgravity hardware and experiments to be established aboard the ISS. This will begin a new era of research. In FY 2001, the President's Budget supports a new Bioastronautics Initiative to accelerate research and develop countermeasures that will improve the health and safety of astronauts aboard the International Space station. Devices and countermeasures developed through this initiative may also have

many health benefits on Earth. As assembly of the ISS continues to advance, ISS Crew Health Care System (CHECS) components will be utilized to provide on-orbit medical, environmental, and countermeasure capabilities for all ISS crew members. In early FY 2001, prior to full research capabilities aboard the ISS, the program will fly a dedicated Space Shuttle research mission that will extend previous Space Shuttle research results and help the program as well as the community prepare for increasing research operations on the ISS.

Earth Science

The purpose of NASA's Earth Science Enterprise (ESE) is to understand the total Earth system and the effects of natural and human-induced changes on the global environment. ESE is pioneering the new interdisciplinary field of research called Earth system science, which recognizes that the Earth's land surface, oceans, atmosphere, ice sheets and *biota* are both dynamic and highly interactive. Earth system science is an area of research with the potential for immense benefit to the nation, yielding new knowledge and tools for weather forecasting, agriculture, urban and land use planning, and other areas of economic and environmental importance. In concert with other agencies and the global research community, ESE is providing the scientific foundation needed for the complex policy choices that lie ahead on the road to sustainable development. ESE has established three broad goals to fulfill its purpose: (1) expand scientific knowledge of the Earth system using NASA's unique capabilities from the vantage points of space, aircraft and in situ platforms; (2) disseminate information about the Earth system; and, (3) enable productive use of Earth Science and technology in the public and private sectors.

FY 1999 was a year of substantial scientific accomplishment in our understanding of the major elements that comprise the Earth system. Over the oceans, ESE had several accomplishments. ESE reduced the uncertainty in global rainfall over the tropics (2/3 of global precipitation) by one half, helping improve predictions for short-term weather and global availability of fresh water by improving our understanding of the hydrological cycle; produced near-daily ocean color maps that help us understand the role of oceans in removing carbon dioxide from the atmosphere; documented the waxing and waning of El Nino, enabling seasonal climate prediction; and resumed global measurement of winds at the ocean surface to improve short-term weather prediction and tracking major hurricanes and tropical storms globally. Over the ice caps, researchers determined the thinning and thickening rates for the Greenland ice sheet; provided the first detailed radar mosaic of Antarctica; and provided daily observations of the Polar Regions from space.

Over the land, ESE produced the first satellite-derived assessments of global forest cover, began refreshing the global archive of 30-meter land cover data, and conducted an international field experiment in the Amazonia to help understand the role of vegetation on Earth in removing carbon dioxide from the atmosphere . In the solid Earth, ESE and United States Geological Survey (USGS) measured surface displacement, which can help predict earthquakes. In the atmosphere, ESE continued to measure concentrations of both ozone and ozone-depleting substances and assess the recovery of upper ozone correlation and continued work on a 17-year data record of aerosols and cloud properties toward predicting annual to decadal climate variations. Initial cloud products are available and being used through the LaRC Distributed Active Archive Center (DAAC).

The Earth Observing System (EOS), the centerpiece of Earth Science, is a program of multiple spacecraft, supporting technology and interdisciplinary science investigations to provide a long-term data set of key parameters needed to understand global climate change. The first EOS satellite launches began in 1999 with the launches of Landsat-7, Terra (formerly AM-1), and QuikSCAT. EOS

PM-1 (now called Aqua) and Chemistry are on schedule to launch in 2000 and 2002 respectively. Preceding the EOS Aqua launch are a number of individual satellite and Shuttle-based missions that are helping to reveal basic processes.

Complementing EOS, under the Earth Probes Program, will be a series of small, rapid development Earth System Science Pathfinder (ESSP) missions to study emerging science questions and to use innovative measurement techniques in support of EOS. The first two ESSP missions, Vegetation Canopy Lidar (VCL) and Gravity Recovery and Climate Experiment (GRACE) are scheduled for launch in 2000 and 2001, respectively. The second pair of ESSP missions, the Pathfinder Instruments for Cloud and Aerosol Spaceborne Observations - Climatologie Etendue des Nuages et des Aerosols (PICASSO-CENA) mission, and Cloudsat, will be launched together in 2003.

Data from Earth Science missions, both current and future, will be captured, processed into useful information, and broadly distributed by the EOS Data Information System (EOSDIS). EOSDIS will ensure that data from these diverse missions remain available in active archives for use by current and future scientists. These data are expected to find uses well beyond the Earth Science research community. Therefore, ESE is engaging in a variety of demonstrations of public/private partnerships to demonstrate the utility of Earth Science data to environmental decision-makers, resource managers, commercial firms, social scientists and the general academic community, educators, state and local governments and others.

The ESE research and analysis program is essential to the discovery of new concepts and to the design of future missions. ESE research is coordinated through the U.S. Global Change Research Program (USGCRP), the Committee on the Environment and Natural Resources (CENR) and its Subcommittee on Global Change Research, and the various boards and committees at the National Academy of Sciences.

Aero-Space Technology

The mission of this Enterprise is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aerospace technologies. Through its research and technology accomplishments, Aero-Space Technology promotes economic growth and national security through a safe, efficient national aviation system and affordable, reliable space transportation. To meet this challenge, the Enterprise has established three pillar goals. Within these three pillar goals, a set of ten objectives, each with its own roadmap, has been defined to address current and future National needs. The technologies associated with these objectives are pre-competitive, long-term, high-risk research endeavors with high-payoff in terms of market growth, safety, low acquisition cost, consumer affordability and a cleaner environment. The goals of this Enterprise directly support National policy in Aero-Space, documented in the 1999 National R&D Plan for Aviation Safety, Security, Efficiency, and Environmental Compatibility and the 1994 National Space Transportation Policy.

The first pillar, Global Civil Aviation, addresses the fundamental, systemic issues in the aviation system to ensure continued growth and development appropriate to the needs of the national and global economies. These systemic issues -- safety, capacity, environmental compatibility, and affordability-cut across markets including large subsonic civil transports, air cargo, commuter and general aviation, and rotorcraft. The second pillar, Revolutionary Technology Leaps, will revolutionize air travel and the way in which aircraft are designed, built, and operated, and addresses the challenges in small aircraft, short-haul transportation; supersonic, transoceanic transportation; design tools, and experimental planes. The third pillar, Access to Space, will enable

greater commercial potential of space and the expansion of space research and exploration by significantly reducing the cost of space transportation systems while improving reliability, operability, responsiveness, and safety.

A major restructuring and replanning of the Aero-Space Enterprise's base R&T program was accomplished during 1999 to integrate the Enterprise's existing space transportation and aeronautics base R&T development programs into a single entity. There were several benefits that accrued from this effort. First, the restructuring better aligned the required technology development efforts with our core competencies and brought the expertise resident in the Aeronautics Research Centers to bear on the technological challenges associated with space transportation. Second, the integration of the space and aeronautics development needs resulted in a synergistic technology development plan that better utilized our resources, eliminated overlaps, and allowed dual use, between the space transportation and aeronautics users, to be planned up front rather than relying on serendipitous events.

The President's FY 2001 Budget for NASA increases investments in technology development activities that will address the challenges (safety, environmental impact, capacity, and space transportation costs) that face the aero-space community.

The Administration's request supports the development and deployment of Smart Air Transport System (SATS) technologies that could enable a revolution in accessibility and mobility in America. The product of the SATS (Phase I) Program will demonstrate the technological potential for transportation-driven economic development throughout the nation.

The Administration's request also supports a new Quiet Airplane Technology program will build upon the highly successful noise reduction efforts that were begun in the AST program and maintain the progress toward meeting the Enterprise's Noise Reduction Goal. The achievement of these goals will support an air transportation system that contains objectionable aircraft noise within airport boundaries.

By 2005, NASA will conduct a competitive launch services procurement to support the launch requirements of human spaceflight operations -- The 2nd Generation RLV Focused Program. The objectives will be to dramatically improve safety while significantly reducing the cost of such launch services, and to eliminate the current need for the Government to own and operate the full system. The President's Budget includes new funding for a Space Launch Initiative to support this competition and fulfills a 1994 National Space Transportation Policy guideline calling for government and private sector decisions by 2000 on development of a operational, next-generation reusable launch system.

As part of NASA's response to the national goal of reducing aircraft accidents by a factor of 5 by 2001, NASA increased its safety base R&T efforts in order to provide a foundation for a focused safety program beginning in FY 2000. In 1999, the base R&T programs matured these required safety related technologies to the point where they were successfully transferred to the focussed Aviation Safety Program (AvSP) which begins in FY 2000. These technologies will provide the foundation for the focused safety development efforts in the future. They also will result in some near-term achievements. For example, in FY 1999, the causes of controlled flight into terrain (responsible for 30% of fatal accidents) were identified and 13 contracts issued via a NASA research announcement (NRA) to develop and demonstrate approaches for fully operational and certifiable synthetic vision and health management systems. Also in FY 1999, the preparations for flight evaluation of a crew-centered synthetic vision display were completed and a study initiated to understand the applicability of synthetic vision to General Aviation (GA) type aircraft was begun.

In FY 2000, the AvSP program will produce an icing training program for GA and commuter pilots, complete a flight evaluation of an initial national capability for digital data link and graphical display of weather information, and demonstrate a concept for the integration of air traffic control runway incursion information onto aircraft flight deck displays. In FY 2001, the AvSP will complete a laboratory demonstration of a fuel system modification to reduce flammability, define the architecture for an integrated onboard health management system, and down-select synthetic vision concepts suitable for retrofit in commercial, business, and general aviation aircraft. The base R&T will continue to develop the technologies that will contribute to the FY 2007 goal. For example, in FY 2001, NASA will downselect ground-based remote sensor technologies for a prototype ground-system to sense icing conditions and continue work on a related computer.

NASA also continued its efforts to reduce the environmental impact associated with aviation systems. In FY 1999, in partnership with industry, a demonstration in an engine test rig of a low emission combustor that produced a 50% reduction in oxides of nitrogen (NOx) emissions was successfully demonstrated. The Ultra Efficient Engine Technology (UEET) program will carry this effort forward and demonstrate a system that achieves significant reductions in NOx and carbon dioxide (CO2) emissions in FY 2001. The UEET is a focused program that begins in FY 2000 and is planned and designed to develop high-payoff, high-risk technologies to enable the next breakthroughs in propulsion systems to spawn a new generation of high performance, operationally efficient and economical, reliable and environmentally compatible U.S. aircraft.

Similarly with noise, in FY 1999, NASA validated an Aircraft Noise Impact model and demonstrated that improved high-lift systems in combination with advanced operational procedures have the potential to reduce community impact by the equivalent of 2-4 db source noise reduction. In 2000, NASA will validate the technologies required to reduce community noise impact by up to 10 dB relative to 1992 technology.

In 1999, the Aviation System Capacity program conducted field evaluation of an initial demonstration of Aircraft Vortex Spacing System (AVOSS) technologies with transport of vortices and class-wise spacing features that have the potential to reduce approach spacing standards. In FY 2000, NASA will demonstrate all technologies in a realistic Terminal Area environment achieving a 12-15% increase in single runway throughput and proving the ability to space aircraft closer than 3,400 feet on parallel runways while meeting all Federal Aviation Administration (FAA) safety criteria. In FY 2001, NASA will demonstrate transition airspace decision support tools for: (1) Air Traffic Control (ATC)/Airline operations center and ATC/cockpit information exchange, and (2) conflict resolution.

Building on its world record setting performances, the Environmental Research Aircraft and Sensor technology (ERAST) project in FY 1999 demonstrated a multistage turbo-charged Remotely Piloted Aircraft (RPA) to 60,000 feet for an 8 hour duration. The Centurion solar-powered airplane, a vehicle with a wingspan greater than 200 ft., completed initial low altitude evaluation under battery power. The Centurion solar-powered RPA was modified to a wingspan configuration of greater than 245 ft., named Helios and will continue flight testing in FY 2000. This configuration will be more suitable for extreme endurance as well as short flights to the 100,000 ft altitude. In FY01, the Flight Research program will demonstrate a solar powered RPA at 100,000 ft and complete development of a heavyweight energy storage system under the ERAST project. Both achievements will demonstrate technologies that could provide atmospheric satellites for commercial use, disaster relief efforts such as communication relays and real time sensing, and increase the Nation's capability to make scientific sampling high in the atmosphere.

Also in FY 2000, NASA initiated a new project entitled Revolutionary Concepts (REVCON) to accelerate the exploration of high-risk, breakthrough technologies in order to enable revolutionary departures from traditional approaches to air vehicle design. At the end of FY 1999, three concepts were accepted for inclusion in the REVCON program. Flight of these vehicles will begin in FY 2001 or 2002. Also in FY 2001, NASA will issue the first NRA under REVCON to select the next set of REVCON concepts.

Low-cost space transportation remains the key enabler for a more aggressive civil space program. NASA's Integrated Space Transportation Planning activities have identified a strategy based upon competition, safety, industry leadership and a comprehensive systems approach to NASA requirements. Funding supports aggressive technical risk reduction and advanced development for multiple reusable launch vehicle concepts. Identification and preliminary development of NASA-unique systems and near-term pursuit of alternative access for key Space Station needs are also both critical elements of the Integrated Space Transportation Plan. All of these efforts combined will move NASA closer to a full and open Reusable Launch Vehicle (RLV) competition by 2005 to meet NASA's Human Space Flight needs by the end of the decade.

Under ISTP, the 2nd Generation RLV Focused Program, through the X-33, X-34 and Future-X Pathfinder Programs, continues to develop, apply and demonstrate new technologies that significantly advance the ability of the launch vehicle industry to initiate commercially viable reusable launch systems.

The X-33 and X-34 have completed several major hardware fabrication and test milestones. However, technical difficulties and program replanning have delayed the flight testing of these advanced technology demonstrators. The X-34 is now expected to fly in 2000. The X-33 flight schedule is under review, following the failure of the composite liquid hydrogen tanks during testing. The X-37 complements the X-33 and X-34 vehicles by investigating the orbit-to-Earth and orbital operations regimes of the flight spectrum, and will begin flight tests in 2002.

The Commercial Technology Program's focus in FY 1999 was continued investment of 10-20 percent of the NASA R&D budget in commercial partnerships with industry. Based on experience to date, these commercial partnerships are expected to increase the return on the government's R&D investment, allowing NASA to do more with limited funds, and strengthening the international competitiveness of key industry sectors. In FY 2000 and 2001, the program will continue to emphasize increasing commercial partnerships with industry and continue to refine and expand a technology and partnership database.

Space Operations

The primary goal of Space Operations is to provide highly reliable, cost-effective space operations services in support of NASA's science and aeronautics programs. In addition, support is provided to interagency, international, and commercial space-faring enterprises on a reimbursable basis. The Space Communications Mission and Data Services program is composed of Operations, Mission and Data Service Upgrades, Tracking and Data Relay Satellite Replenishment, and Technology Projects, as well as spectrum management and data standards coordination. Services are provided to a large number of NASA Missions including planetary missions; Human Space Flight missions; near-Earth and Earth-orbiting missions; and sub-orbital and aeronautical flight tests. A Consolidated Space Operations (CSOC) contract was successfully implemented by the Space Operations Management Office at Johnson Space Center, with the Lockheed Martin Space Operations Company. The CSOC provides end-to-end mission and

data services to both NASA and non-NASA customers. A total of nine contracts were consolidated at inception, and four more have been consolidated in FY 2000 to date, with two additional contracts to be consolidated in FY 2001. Management responsibility for all Wide Area Network data distribution services for all Human Space Flight, Earth orbiting and deep space missions and NASA administrative communications was outsourced by CSOC in FY 2000. Development of the TDRS Replenishment Spacecraft is ongoing, with the first satellite scheduled for launch in FY 2000.

Academic Programs
The goal of this program is to promote excellence in America's education system through enhancing and expanding scientific and technological competence. NASA's education programs span the elementary through graduate levels and are directed at both students and faculty. The goal of the Minority University Research Program is to expand opportunities for talented students from underrepresented groups who are pursuing degrees in science and engineering and to strengthen the research capabilities of minority universities and colleges. The range of activities conducted under this program will continue to capture the interest of all students in science and technology, develop talented students at the undergraduate and graduate levels, provide research opportunities for students and faculty members at NASA centers, and strengthen and enhance the research capabilities of the Nation's colleges and universities.

MISSION SUPPORT

Safety, Mission Assurance, Engineering, and Advanced Concepts
The goal of this program is to invest in the safety and success of NASA missions by assuring that sound and robust policies, processes, and tools for safety, reliability, quality assurance, and engineering disciplines are in place and applied throughout NASA. The program also examines long-term technology requirements for NASA's strategic objectives.

Research and Program Management
This activity provides for the salaries, travel support, other personnel expenses of the entire NASA civil service workforce, and includes vital support to the physical plant at the Centers and at NASA Headquarters.

Construction of Facilities
This activity provides for facility construction activities to preserve NASA's infrastructure and enable NASA's missions; environmental compliance and restoration activities, design of facilities projects, and advanced planning and critical functional leadership activities related to future facilities needs. In 1999-2001, the major focus is on eliminating safety-related concerns by undertaking construction projects to repair and modernize the basic infrastructure and institutional facilities at NASA centers. Increasing attention is being given to activities in support of environmental compliance and restoration requirements. A key project in this area is the Nuclear Regulatory Commission's mandated cleanup of the Plumbrook, Ohio, inactive nuclear reactor site. Planning for this project is underway, with significant clean-up activities slated to begin with funding made available in the FY 2002 appropriation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 2001 ESTIMATES
(IN MILLIONS OF REAL YEAR DOLLAR

	FY 1999 OPLAN 12/23/99	FY 2000 OPLAN REVISED	FY 2001 PRES BUDGET
HUMAN SPACE FLIGHT	**5,480.0**	**5,467.7**	**5,499.9**
INTERNATIONAL SPACE STATION	2,299.7	2,323.1	2,114.5
SPACE FLIGHT OPERATIONS (SPACE SHUTTLE)	2,998.3	2,979.5	3,165.7
PAYLOAD & UTILIZATION OPS	182.0	165.1	--
PAYLOAD & ELV SUPPORT	--	--	90.2
INVESTMENT & SUPPORT	--	--	129.5
SCIENCE, AERONAUTICS & TECHNOLOGY	**5,653.9**	**5,580.9**	**5,929.4**
SPACE SCIENCE	2,119.2	2,192.8	2,398.8
LIFE & MICROGRAVITY SCIENCES & APPS	263.5	274.7	302.4
EARTH SCIENCE	1,413.8	1,443.4	1,405.8
AERO-SPACE TECHNOLOGY	1,338.9	1,124.9	1,193.0
MISSION COMMUNICATIONS SERVICES	380.0	406.3	--
SPACE OPERATIONS	--	--	529.4
ACADEMIC PROGRAMS	138.5	138.8	100.0
MISSION SUPPORT	**2,499.5**	**2,532.2**	**2,584.0**
SAFETY, MSN ASSURANCE, ENGRING & ADV. CONCEPTS	35.6	43.0	47.5
SPACE COMMUNICATION SERVICES	185.8	89.7	--
RESEACH & PROGRAM MANAGEMENT	2,109.6	2,217.6	2,290.6
CONSTRUCTION OF FACILITIES	168.5	181.9	245.9
INSPECTOR GENERAL	**19.6**	**20.0**	**22.0**
TOTAL BUDGET AUTHORITY	**13,653.0**	**13,600.8**	**14,035.3**
TOTAL BUDGET OUTLAYS	**13,663.0**	**13,446.0**	**13,675.0**

*FY 2000 INCLUDES RESCISSION AND SUPPLEMENTAL/ TRANSFER OF $20.2M FROM HSF TO MS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FISCAL YEAR 2001 ESTIMATES
SUMMARY RECONCILIATION OF APPROPRIATIONS TO BUDGET PLANS
(IN MILLIONS OF REAL YEAR DOLLARS)

	TOTAL	Human Space Flight	Science, Aero, & Technology	Mission Support	Office of Inspector General
FISCAL YEAR 1999					
VA-HUD INDEPENDENT AGENCIES APPROPRIATIONS ACT, FY 1999 (P.L. 105-276)	**13,665.0**	5,480.0	5,653.9	2,511.1	20.0
FY 1999 RESCISSION (P.L. 106-51)	**-11.4**			-11.4	
LAPSE OF FY 1999 UNOBLIGATED FUNDS	**-0.6**			-0.2	-0.4
TOTAL FY 1999 BUDGET PLAN	**13,653.0**	**5,480.0**	**5,653.9**	**2,499.5**	**19.6**
FISCAL YEAR 2000 REQUEST	**13,578.4**	5,638.0	5,424.7	2,494.9	20.8
VA-HUD INDEPENDENT AGENCIES APPROPRIATIONS ACT, FY 2000 (P.L. 106-74) AS PASSED BY CONGRESS, DIRECTION INCLUDED IN CONFERENCE REPORT H.R. 106-379	**74.3**	-127.1	182.0	20.2	-0.8
FY 2000 RESCISSION (P.L. 106-113)	**-51.9**	-23.0	-25.8	-3.1	
PROPOSED SUPPLEMENTAL TRANSFER	**0.0**	-20.2		20.2	
TOTAL FY 2000 BUDGET PLAN	**13,600.8**	**5,467.7**	**5,580.9**	**2,532.2**	**20.0**

Note: Human Space Flight activities were submitted to the Congress in FY 2000 as two appropriations per P.L. 105-276 (International Space Station for $2,482.7M and Launch Vehicles and Payload Operations for $3,155.3M). However, these activities were appropriated as Human Space Flight.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

ADMINISTRATIVE PROVISIONS

Notwithstanding the limitation on the availability of funds appropriated for "Human space flight", "Science, aeronautics and technology", or "Mission support" by this appropriations Act, when any activity has been initiated by the incurrence of obligations for construction of facilities as authorized by law, such amount available for such activity shall remain available until expended. This provision does not apply to the amounts appropriated in "Mission support" pursuant to the authorization for [repair, rehabilitation and modification of facilities minor *revitalization and* construction of [new facilities and additions to existing] facilities, and facility planning and design

Notwithstanding the limitation on the availability of funds appropriated for "Human space flight", "Science, aeronautics and technology", or "Mission support" by this appropriations Act, the amounts appropriated for construction of facilities shall remain available until September 30, [2002] 2003.

Notwithstanding the limitation on the availability of funds appropriated for "Mission support" and "Office of Inspector General", amounts made available by this Act for personnel and related costs and travel expenses of the National Aeronautics and Space Administration shall remain available until September 30, [2000] 2001 and may be used to enter into contracts for training, investigations, costs associated with personnel relocation, and for other services, to be provided during the next fiscal year. *Funds for announced prizes otherwise authorized shall remain available, without fiscal year limitation, until the prize is claimed or the offer is withdrawn.*

[Unless otherwise provided for in this Act or in the joint explanatory statement of the committee of conference accompanying this Act, no part of the funds appropriated for 'Human space flight" may be used for the development of the International Space Station in excess of the amounts set forth in the budget estimates submitted as part of the budget request for fiscal year 2000.] (Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2000.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

GENERAL PROVISIONS

SEC. 423. NASA Full Cost Accounting. Title III of The National Aeronautics and Space Act of 1958. P.L. 85-568 is amended by adding the following new section at the end:

Section 312

"(a) Appropriations for the Administration for fiscal year 2002 and thereafter shall be made in three accounts. "Human Space Flight", "Science, Aeronautics and Technology," and an account for amounts appropriated for the necessary expenses of the Office of Inspector General. Appropriations shall remain available for two fiscal years. Each account shall include the planned full costs of the Administration's related activities

"(b) To ensure the safe, timely, and successful accomplishment of Administration missions, the Administration may transfer amounts for Federal salaries and benefits; training, travel and awards; facility and related costs; information technology services; publishing services; science, engineering, fabricating and testing services; and other administrative services, among accounts, as necessary.

"(c) The Administrator, in consultation with the Director of the Office of Management and Budget, shall determine what balances from the "Mission Support" account are to be transferred to the "Human Space Flight" and "Science, Aeronautics, and Technology" accounts. Such balances shall the be transferred and merged with the "Human Space Flight" and "Science, Aeronautics, and Technology" accounts, and remain available for the period for which originally appropriated."

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

HUMAN SPACE FLIGHT

For necessary expenses, not otherwise provided for, in the conduct and support of human space flight research and development activities, including research, development, operations, and services; maintenance; construction of facilities including [repair, rehabilitation,] *revitalization* and modification of [real and personal property] *facilities, construction of new facilities and additions to existing facilities, facility planning and design,* and acquisition or condemnation of real property, as authorized by law; space flight, spacecraft control and communications activities including operations, production, and services; and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, [$5,510,900,000] $5,499,900,000, to remain available until September *30, [2001: Provided,* That $40,000,000 of the amount provided in this paragraph shall be available to the space shuttle program only for preparations necessary to carry out a life and micro-gravity science mission, to be flown between STS-107 and December 2001] *2002. For necessary expenses of the International Space Station, to become available on October 1 of the fiscal year specified and remain available for that and the following fiscal year, as follows: for fiscal year 2002, $1,858,500,000, for fiscal year 2003, $ 1,452,500,000, for fiscal year 2004, $1,327,000,000; and for fiscal year 2005, $1,275,000,000. (Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2000.)*

SCIENCE, AERONAUTICS AND TECHNOLOGY

For necessary expenses, not otherwise provided for, in the conduct and support of science, aeronautics and technology research and development activities, including research, development, operations, and services; maintenance; construction of facilities including [repair, rehabilitation] *revitalization,* and modification of [real and personal property] *facilities, construction of new facilities and additions to existing facilities, facility planning and design,* and acquisition or condemnation of real property, as authorized by law; space flight, spacecraft control and communications activities including operations, production, and services; and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, [$5,606,700,000] $5,929,400,000, to remain available until September 30, [2001] 2002. *(Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2000.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

MISSION SUPPORT

For necessary expenses, not otherwise provided for, in carrying out mission support for human space flight programs and science, aeronautical, and technology programs, including research operations and support; maintenance; construction of facilities including [repair, rehabilitation,] revitalization and modification of facilities, [minor construction of new facilities and additions to existing facilities, facility planning and design, environmental compliance and restoration, and acquisition or condemnation of real property, as authorized by law; program management, personnel and related costs, including uniforms or allowances therefore, as authorized by 5 U.S.C. 5901-5902; travel expenses; purchase, lease, charter, maintenance, and operation of mission and administrative aircraft; not to exceed [$35,000] $40,0000 for official reception and representation expenses; and purchase (not to exceed 33 for replacement only) and hire of passenger motor vehicles, [$2,515,100,000] $2,584,000,000 to remain available until September 30, [2001] 2002. *(Departments of* Veterans *Affairs* and Housing and *Urban Development, and Independent Agencies Ap*propriations *Act, 2000.)*

OFFICE OF INSPECTOR GENERAL

For necessary expenses of the Office of Inspector General in carrying out the Inspector General Act of 1978, as amended, *[$20,000,000] $22,000,000. (Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2000.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 2001 ESTIMATES

DISTRIBUTION OF PROGRAM AMOUNT BY INSTALLATION
(Thousands of Dollars)

	Total			Human Space Flight			Science, Aeronautics and Technology			Mission Support		
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001
Johnson Space Center	4,279,259	4,105,814	4,112,307	3,634,561	3,389,731	3,312,300	246,897	307,999	399,427	397,801	408,084	400,580
Kennedy Space Center	941,666	919,041	1,043,816	354,365	378,168	405,900	288,682	239,193	339,591	298,619	301,680	298,325
Marshall Space Flight Center	2,312,511	2,303,352	2,346,142	1,322,539	1,514,700	1,497,800	622,932	458,378	502,277	367,040	330,274	346,065
Stennis Space Center	163,185	167,379	168,036	39,750	41,900	53,300	69,416	68,984	54,551	54,019	56,495	60,185
Ames Research Center	617,522	612,477	693,434	45,800	51,600	80,900	379,548	368,243	398,404	192,174	192,634	214,130
Dryden Flight Research Center	187,793	210,466	217,837	4,600	7,300	10,800	121,881	137,311	139,002	61,312	65,855	68,035
Langley Research Center	631,850	566,709	645,827	7,185	800	4,100	397,293	317,597	376,247	227,372	248,312	265,480
Glenn Research Center	589,763	551,165	599,706	41,150	40,900	75,200	335,766	290,179	291,716	212,847	220,086	232,790
Goddard Space Flight Center	2,286,192	2,269,788	2,277,958	18,200	9,300	10,300	1,841,830	1,864,565	1,868,698	426,162	395,923	398,960
Jet Propulsion Laboratory	1,143,217	1,263,830	1,434,835	6,200	12,135	14,500	1,113,818	1,224,810	1,393,460	23,199	26,885	26,875
Headquarters	480,442	610,798	473,402	5,650	21,166	34,800	235,837	303,636	166,027	238,955	285,996	272,575
Undistributed:												
Construction of Facilities: Various locations	0	0	0									
Inspector General	19,600	20,000	22,000									
TOTAL NASA	13,653,000	13,600,819	14,035,300	5,480,000	5,467,700	5,499,900	5,653,900	5,580,895	5,929,400	2,499,500	2,532,224	2,584,000