

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

## Federal Funds

### General and special funds:

#### RESEARCH AND DEVELOPMENT

(INCLUDING RESCISSION OF FUNDS)

For necessary expenses, not otherwise provided for, including research, development, operations, services, minor construction, maintenance, repair, rehabilitation and modification of real and personal property; purchase, hire, maintenance, and operation of other than administrative aircraft, necessary for the conduct and support of aeronautical and space research and development activities of the National Aeronautics and Space Administration; **[\$4,191,700,000]** \$5,751,600,000, to remain available until September 30, **[1990]** 1991, of which **[\$900,000,000]** \$2,050,200,000 is for the **[space station program only: Provided, That \$515,000,000 of the \$900,000,000 for the space station program shall not become available for obligation until May 15, 1989, and pursuant to section 202(b) of the Balanced Budget and Emergency Deficit Control Reaffirmation Act of 1987, this action is a necessary (but secondary) result of a significant policy change: Provided further, That the aforementioned \$515,000,000 shall become available unless the President submits a special message after February 1, 1989, notifying the Congress that such funds will not be made available for the space station program.**

Of the funds appropriated under this head in the Department of Housing and Urban Development—Independent Agencies Appropriations Act, 1988 (H.R. 2783), as enacted under the provision of section 101(f) of Public Law 100-202, an Act making further continuing appropriations for the fiscal year ending September 30, 1988, \$25,000,000 are rescinded] *Space Station Freedom. Further, for the Space Station Freedom, \$2,980,500,000 is to be available for obligation on October 1, 1990 and to remain available until September 30, 1992; and further, for the Space Station Freedom, \$3,494,400,000 to be available for obligation on October 1, 1991 and to remain available until September 30, 1993: Provided, That for the Space Station Freedom revised baseline, the funds appropriated for U.S. program development will not exceed \$13.0 billion in fiscal year 1984 terms, adjusted for inflation and commercial participation. (Department of Housing and Urban Development-Independent Agencies Appropriations Act, 1989; additional authorizing legislation to be proposed.)*

#### Program and Financing (in thousands of dollars)

Identification code	80-0108-0-1-999	1988 actual	1989 est.	1990 est.
<b>Program by activities:</b>				
Direct program:				
Space transportation systems:				
00.01	Capability development .....	598,564	848,201	641,100
00.02	Space station .....	489,509	887,129	1,992,690
Scientific investigations in space:				
00.10	Physics and astronomy .....	585,837	764,995	886,480
00.11	Planetary exploration .....	347,482	422,511	397,885
00.13	Life sciences .....	67,611	79,964	121,895
Space and terrestrial applications:				
00.20	Space applications .....	577,485	724,894	580,785
00.21	Commercial programs .....	48,936	84,867	60,185
00.30	Space research and technology .....	208,919	325,927	335,990
00.31	Transatmospheric vehicle research and technology .....	51,312	69,257	124,120
00.32	Aeronautical research and technology .....	324,149	412,894	459,870
00.33	Safety, reliability and quality assurance .....	17,148	23,725	23,255
00.34	University space science and technology academic program .....			33,250
00.35	Supporting activity: Tracking and data advanced systems .....	17,588	19,360	19,845
00.91	Subtotal, direct program .....	3,334,640	4,663,724	5,677,350
01.01	Reimbursable program .....	669,497	706,910	556,874
10.00	Total obligations .....	4,004,137	5,370,634	6,234,024

### Financing:

Offsetting collections from:				
11.00	Federal funds .....	—580,298	—701,053	—552,062
14.00	Non-Federal sources .....	—4,848	—5,857	—4,612
21.40	Unobligated balance available, start of year .....	—753,958	—610,454	—188,330
24.40	Unobligated balance available, end of year .....	610,454	188,330	262,580
25.00	Unobligated balance lapsing .....	4,413	.....	.....
39.00	<b>Budget authority .....</b>	<b>3,279,900</b>	<b>4,241,600</b>	<b>5,751,600</b>
Budget authority:				
40.00	Appropriation .....	3,374,200	4,191,700	5,751,600
40.00	Appropriation rescinded (unobligated balance) (P.L. 100-404) .....	.....	—25,000	.....
41.00	Transferred to other accounts .....	—159,400	.....	.....
42.00	Transferred from other accounts .....	65,100	74,900	.....
43.00	<b>Appropriation (adjusted) .....</b>	<b>3,279,900</b>	<b>4,241,600</b>	<b>5,751,600</b>
Relation of obligations to outlays:				
71.00	Obligations incurred, net .....	3,418,991	4,663,724	5,677,350
72.40	Obligated balance, start of year .....	1,390,672	1,889,518	2,835,264
74.40	Obligated balance, end of year .....	—1,889,518	—2,835,264	—3,538,876
77.00	Adjustments in expired accounts .....	—4,345	.....	.....
90.00	<b>Outlays .....</b>	<b>2,915,800</b>	<b>3,717,978</b>	<b>4,973,738</b>

This appropriation provides for research and development activities of the National Aeronautics and Space Administration. The elements of the program and the work to be performed during 1990 are described below:

*Space Transportation Systems Capability Development.*—The principal activities include efforts related to the Spacelab, the upper stages that will place satellites in high altitude orbits not attainable by the Shuttle, the engineering and technical base support at NASA centers, payload operations and support equipment, development of the joint U.S./Italy Tethered Satellite System, building of the orbital maneuvering vehicle, and advanced programs study and evaluation efforts.

The Spacelab is being prepared to resume flight activity in mid-1990.

For Space Transportation System upper stages, the two stage Inertial Upper Stages will be modified to accommodate planetary spacecraft, and additional upper stages will be procured for both Shuttle and ELV launches including Tracking and Data Satellite missions and several NASA scientific missions.

Development of the Tethered Satellite System will continue for first flight in 1991. The development of the Orbital Maneuvering Vehicle (OMV) will also continue in 1990, with the initial operating capability planned for 1994. The OMV will retrieve spacecraft and provide remote satellite servicing and other operations beyond the reach of the Space Shuttle or the Space Station.

In Payload Operations, efforts will begin on the development of a docking module for use between the Shuttle and the Space Station or other spacecraft requiring this capability. Private sector investment is being pursued for the docking module development.

Definition and preliminary design activities on the Assured Crew Return Capacity (ACRC) for the Space Station will be continued. Technology development and advanced launch system study activities will continue

**General and special funds—Continued****RESEARCH AND DEVELOPMENT—Continued**

along with the definition studies on critical propulsion systems.

*Space Station.*—The space station will provide permanently manned, "space-based" facilities for the Nation's science and applications programs, and for commercial exploitation of space, while exploring advanced technologies potentially useful to the economy.

In 1990, development efforts will continue. Planning for operations, utilization and transition will also continue. NASA is actively pursuing approaches for private investment in the Flight Telerobotic Servicer capability. NASA will also seek commercialization of the Solar Dynamics Power System for the Space Station, and will encourage the private sector to invest in future requirements for the Space Station.

*Scientific Investigations in Space.*—Space Science and Applications programs perform basic research to expand our knowledge of the Earth and its space environment, to explore the far reaches of the universe, and to conduct research and experiments to encourage the application of space technology to needs on Earth.

*Physics and Astronomy.*—Research is being conducted to investigate the environment of planets, the interplanetary medium, and distant space. Preparations will continue for launch of the Hubble Space Telescope in late 1989. Planning activities will continue in 1989 for future Spacelab missions beginning in 1990. Development of the Gamma Ray Observatory will continue towards a launch in 1990 along with design activities for the Global Geospace Science mission planned for launch in 1993. Development of several ongoing Explorer class satellites will be continued as well as initiation of a series of small, Scout-class free-flyer spacecraft designed to respond rapidly to scientific opportunities. Design and development activities will continue on the Advanced X-Ray Astrophysics Facility (AXAF) flight optics, mirror assembly and science instruments. AXAF will allow astronomers to view the universe in the x-ray region of the spectrum with an unprecedented degree of sensitivity.

*Planetary Exploration.*—This program encompasses the scientific exploration of the planets, comets, asteroids, and the interplanetary medium to provide increased knowledge of the origin and evolution of the solar system. Mission operations and support will be provided to the Magellan mission scheduled for launch in April 1989. Development will continue on major flight projects initiated in prior years. The Galileo and Ulysses missions continue to be reconfigured to accommodate a Space Shuttle launch with Inertial Upper Stages. These missions are scheduled for launch in late 1989 and 1990, respectively. The design and development of the Mars Observer will continue with launch planned in 1992. Funding is included to continue operation of the Voyager 1 and 2 spacecraft and science teams to explore the solar system beyond the neighborhood of the outer limits of the Sun's sphere of influence. Funds are also included to initiate development of the Comet Rendezvous Asteroid Flyby (CRAF)/Cassini mission. The CRAF mission will make *in situ* observations of a comet and its interaction with the particles

and electromagnetic fields of interplanetary space. The Cassini mission will make detailed observations of the system of Saturn. Observations by both missions will produce a much better understanding of the origin of the Solar System.

*Life Sciences.*—This program provides for the research and technology required to meet the goals of ensuring human health, safety, and productivity in space. In 1990, emphasis will be placed on research on the effects of long-term exposure to weightlessness and development of flight experiments for use on the Space Shuttle and ultimately the Space Station. Definition of hardware requirements for life science research on the Space Station will be initiated.

*Space and Terrestrial Applications:*

*Space Applications.*—The major programs in space applications are concerned with observations of the Earth and its environment, materials processing, space communications and information systems. Major activities in 1990 include research to better understand mechanisms that affect Earth processes, continued development of Space Shuttle and Space Station payloads, and ground-based research in areas well suited to take advantage of microgravity conditions.

Development will continue on major flight projects initiated in prior years. The Upper Atmospheric Research Satellite is scheduled for launch in 1991. The Ocean Topography Experiment (TOPEX) is scheduled for a 1992 launch as part of a collaborative mission with France. Development of the Scatterometer continues and the instrument is targeted for inclusion on the Japanese ADEOS satellite in 1995. Funding is included to support definition of the Earth Observing System (EOS) to be flown on the Space Station polar platform. This research includes NASA's contribution to the U.S. Global Change Research Program being coordinated by the Federal Coordinating Council on Science, Engineering, and Technology's Committee on Earth Sciences. The U.S. Global Change Research Program will be highlighted in a separate document accompanying the President's 1990 Budget.

Research activities and flight experiment development in materials processing will continue. Work will be initiated in defining and developing the facilities to be used on the Space Station through the evolution of experiment technology using Space Shuttle flight opportunities.

In space communications, research and analysis will continue to support development of advanced component and device technology for communications satellite systems. Development work will be terminated on the Advanced Communications Technology Satellite demonstration flight.

Information systems activities in 1990 will provide computational and archival systems and technology to address concerns of the science community for improved access to and manipulation of data from space science and applications missions.

*Commercial Programs.*—These programs include technology utilization and commercial use of space.

The technology utilization program is designed to transfer aerospace technology from NASA's research

and development base to nonaerospace sectors of the U.S. economy. During 1990, NASA will continue its efforts to help foster the dissemination of new technology developed by the Agency's programs.

The commercial use of space is designed to increase private sector awareness of the opportunities in space. Private industry will be encouraged to invest and participate in high technology research and development using the unique characteristics of space.

**Space Research and Technology.**—In 1990, work directed toward providing the broad base of technology underlying the conduct of future space missions will continue. Project Pathfinder continues the advancement of technological capabilities and extends the foundation established under the Civil Space Technology Initiative (CSTI) started in 1988. Pathfinder is oriented towards technology activities underlying potential future space missions beyond the Earth's orbit and will provide the advanced technologies to continue U.S. leadership in space. Additional funding is included for the design and development of space experiments to provide validated technologies for incorporation in future space projects.

**Transatmospheric Research and Technology.**—A joint NASA/DOD program will explore new approaches for cost-effective hypersonic flight in the atmosphere with the capability to accelerate to orbit. The program will pursue research and advanced technology development in the area of hypersonic flight, cooperatively with DOD, and is expected to lead to a transatmospheric flight research vehicle in the 1990's.

**Aeronautical Research and Technology.**—This program conducts research and develops technology for future U.S. military and civil aircraft.

Major thrusts of 1990 activities include: continuing advancement in both basic aeronautical disciplines and systems research; maintaining and operating specialized facilities essential to aeronautical research; and pursuing technological advances in critical areas of high risk and potentially high payoff to the Nation. These activities will continue to provide a strong research and technology base in the aeronautical disciplines of fluid and thermal physics, applied aerodynamics, materials and structures, controls and guidance, human factors, information sciences, propulsion and power, flight systems, and systems analysis and studies. Some 1990 key activities in the research and technology base will be augmented to address the challenges of fundamental technology surrounding high speed aircraft. Systems technology efforts will continue in a variety of areas including materials and structures, which will be augmented in advanced composite materials, high-performance aircraft, advanced propulsion systems, and numerical aerodynamic simulation.

**Safety, Reliability, and Quality Assurance.**—This activity will continue to enhance the safety and technical execution of NASA programs through an agency-wide problem reporting, trend analysis, and corrective action system, in-depth safety reviews, independent assessments, and the continuation of the nondestructive evaluation (NDE) program.

**University Space Science and Technology Academic Program.**—This new budget line item is a continuation of agency-wide university and minority university pro-

grams previously budgeted in other NASA programs. FY 1990 funding will support graduate student fellowships, faculty fellowships, the historically black colleges and university research program and the Space Grant College and Fellowship Program, established in the FY 1988 NASA Authorization Act (Public Law 100-147).

**Supporting Activity: Tracking and Data Advanced Systems.**—This program provides advanced studies to ensure capability for tracking, data acquisition, communications, and data processing support required by all NASA flight projects in accomplishing their mission objectives. Research and development activities will provide tracking and data acquisition support systems for future flight programs.

#### Object Classification (in thousands of dollars)

Identification code	80-0108-0-1-999	1988 actual	1989 est.	1990 est.
Direct obligations:				
22.0	Transportation of things.....	3,281	4,589	5,586
23.2	Rental payments to others.....	36,050	50,418	61,376
23.3	Communications, utilities, and miscellaneous charges...	6,563	9,179	11,174
24.0	Printing and reproduction .....	932	1,303	1,587
25.0	Other services.....	3,097,329	4,331,828	5,273,319
26.0	Supplies and materials.....	83,547	116,846	142,242
31.0	Equipment.....	87,166	121,908	148,403
32.0	Land and structures.....	128	179	218
41.0	Grants, subsidies, and contributions .....	19,634	27,460	33,428
43.0	Interest and dividends.....	10	14	17
99.0	Subtotal, direct obligations.....	3,334,640	4,663,724	5,677,350
99.0	Reimbursable obligations .....	669,497	706,910	556,674
99.9	Total obligations.....	4,004,137	5,370,634	6,234,024

#### SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS

For necessary expenses, not otherwise provided for; in support of space flight, spacecraft control and communications activities of the National Aeronautics and Space Administration, including operations, production, services, minor construction, maintenance, repair, rehabilitation, and modification of real and personal property; tracking and data relay satellite services as authorized by law; purchase, hire, maintenance and operation of other than administrative aircraft; [\$4,364,200,000: *Provided*, That notwithstanding any provision of this or any other Act, not to exceed \$100,000,000 may be transferred to the National Aeronautics and Space Administration in fiscal year 1989 from any funds appropriated to the Department of Defense and such funds may only be transferred to the "Space flight, control and data communications" appropriation for space shuttle operations: *Provided further*, That the transfer limitation in the immediately preceding proviso shall not apply to funds transferred for advanced launch systems or under existing reimbursement arrangements: *Provided further*, That the funds appropriated under this heading are, together with funds permitted to be transferred hereunder] \$5,139,600,000, to remain available until September 30, [1990] 1991, of which \$174,435,000 shall be used only for the purpose of reducing outstanding debt to the Federal Financing Bank. (Department of Housing and Urban Development-Independent Agencies Appropriations Act, 1989; additional authorizing legislation to be proposed.)

#### Program and Financing (in thousands of dollars)

Identification code	80-0105-0-1-250	1988 actual	1989 est.	1990 est.
Program by activities:				
Direct program:				
Space transportation systems:				
00.01	Shuttle production and capability development .....	1,815,517	1,947,571	1,746,350
00.02	Operations .....	1,836,352	2,442,912	2,715,220
00.10	Supporting activity: Tracking and data acquisition .....	979,868	1,094,011	967,760
00.91	Total direct program .....	4,631,737	5,484,494	5,429,330

## I-W4

Federal Funds—Continued

## APPENDIX TO THE BUDGET FOR FISCAL YEAR 1990

## General and special funds—Continued

## SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS—Continued

## Program and Financing (in thousands of dollars)—Continued

Identification code	80-0105-0-1-250	1988 actual	1989 est.	1990 est.
01.01	Reimbursable program .....	254,662	243,383	189,107
10.00	Total obligations .....	4,886,399	5,727,877	5,618,437
<b>Financing:</b>				
Offsetting collections from:				
11.00	Federal funds .....	-285,006	-222,143	-172,603
14.00	Non-Federal sources .....	-27,251	-21,240	-16,504
21.40	Unobligated balance available, start of year .....	-2,445,760	-1,667,187	-743,309
24.40	Unobligated balance available, end of year .....	1,667,187	743,309	327,079
25.00	Unobligated balance lapsing .....	10,140		
39.00	Budget authority .....	3,805,709	4,560,616	5,013,100
<b>Budget authority:</b>				
Current:				
40.00	Appropriation .....	3,818,111	4,364,200	5,139,600
40.47	Portion applied to debt reduction .....	-148,442	-156,692	-174,435
41.00	Transferred to other accounts .....	-102,600		
42.00	Transferred from other accounts .....		100,000	
43.00	Appropriation (adjusted) .....	3,567,069	4,307,508	4,965,165
Permanent:				
67.10	Authority to borrow (permanent, indefinite) (Federal Financing Bank) .....	238,640	253,108	47,935
<b>Relation of obligations to outlays:</b>				
71.00	Obligations incurred, net .....	4,574,142	5,484,494	5,429,330
72.40	Obligated balance, start of year .....	1,094,243	1,304,620	1,954,355
74.40	Obligated balance, end of year .....	-1,304,620	-1,954,355	-2,018,200
77.00	Adjustments in expired accounts .....	-1,532		
90.00	Outlays .....	4,362,232	4,834,759	5,365,485

## Status of Direct Loans (in thousands of dollars)

Cumulative balance of direct loans outstanding:				
1210	Outstanding, start of year .....	815,015	898,804	995,220
1231	Disbursements: Direct loan disbursements .....	315,855	568,963	616,898
1251	Repayments: Repayments and prepayments .....	-232,066	-472,547	-743,398
1290	Outstanding, end of year .....	898,804	995,220	868,720

This appropriation provides for production and operational activities for the Space Transportation System; and for tracking, telemetry, command, and data acquisition support of all NASA flight projects. The elements of the program and the work to be performed during 1989 are described below.

## Space Transportation Systems:

**Shuttle production and capability development.**—The Space Shuttle provides a unique capability which meets a wide variety of scientific and governmental requirements and obligations.

In 1990, the principal activities are focused on providing necessary capabilities to continue the safe buildup of the Shuttle flight rate. Work on the replacement orbiter will continue, with delivery scheduled for 1991. Design and development activities will continue in 1990 to complete those activities associated with the redesigned solid rocket motor, and to develop the Advanced Solid Rocket Motor (ASRM). The ASRM will enhance the flight safety and reliability of the Space Shuttle fleet and achieve increased payload capability. Development of the hardware necessary to extend the on-orbit stay time of the Space Shuttle to 14-16 days will be continued with NASA seeking private sector financing

for elements of this program. Modification of Space Shuttle with this extended duration capability is expected by 1992.

**Operations.**—This activity provides the standard operational services for the Space Shuttle and procurement of expendable launch vehicle services to satisfy the launch requirements of scientific and operational payloads. Space Shuttle flights resumed in FY 1988. Five flights are planned in FY 1989, and nine are planned in FY 1990, leading to a capability of 14 flights per year. Shuttle operations will support flight preparation, training, mission planning, and hardware and payload processing activities for flights planned in 1990 and initial requirements for flights in 1991 and 1992. Implementation of NASA's mixed fleet plan will be continued and expanded with support provided for additional procurements of expendable launch vehicle services on a commercial competitive basis where available for specified missions requiring small, medium and large launch systems. Studies will be initiated to develop a more uniform process to encourage multiple sources of private sector launch services.

**Supporting Activity: Tracking and Data Acquisition.**—This program, using ground-based and satellite (tracking and data relay satellite system) components, provides vital tracking, telemetry, command, and data acquisition support to meet the requirements of all NASA flight projects. In addition to NASA flight projects, support is provided on a reimbursable basis for projects of the Department of Defense and other Government agencies, commercial firms, and other countries and international organizations engaged in space research endeavors. In 1990, work will continue on the replacement tracking and data relay satellite spacecraft for the one lost in the Challenger accident. The Status of Direct Loans table reflects NASA's continued repayment of a loan from the Federal Financing Bank for Tracking and Data Relay Satellite System (TDRSS).

## Object Classification (in thousands of dollars)

Identification code	80-0105-0-1-250	1988 actual	1989 est.	1990 est.
<b>Direct obligations:</b>				
22.0	Transportation of things .....	4,205	5,252	5,194
23.2	Rental payments to others .....	9,129	11,401	11,275
23.3	Communications, utilities, and miscellaneous charges .....	67,526	84,331	83,401
24.0	Printing and reproduction .....	141	176	174
25.0	Other services .....	4,096,824	5,116,412	5,059,975
26.0	Supplies and materials .....	79,488	99,270	98,175
31.0	Equipment .....	54,188	67,674	66,927
32.0	Land and structures .....	2,620	3,272	3,236
41.0	Grants, subsidies, and contributions .....	233	291	288
43.0	Interest and dividends .....	317,383	96,415	100,685
99.0	Subtotal, direct obligations .....	4,631,737	5,484,494	5,429,330
99.0	Reimbursable obligations .....	254,662	243,383	189,107
99.9	Total obligations .....	4,886,399	5,727,877	5,618,437

## CONSTRUCTION OF FACILITIES

For construction, repair, rehabilitation and modification of facilities, minor construction of new facilities and additions to existing facilities, and for facility planning and design not otherwise provided, for the National Aeronautics and Space Administration, and for the acquisition or condemnation of real property, as authorized by law, **[\$270,100,000] \$341,800,000**, to remain available until September 30, **[1991] 1992: Provided**, That, notwithstanding the limitation on the

availability of funds appropriated under this heading by this appropriations Act, when any activity has been initiated by the incurrence of obligations therefor, the amount available for such activity shall remain available until expended, except that this provision shall not apply to the amounts appropriated pursuant to the authorization for repair, rehabilitation and modification of facilities, minor construction of new facilities and additions to existing facilities, and facility planning and design: *Provided further*, That no amount appropriated pursuant to this or any other Act may be used for the lease or construction of a new contractor-funded facility for exclusive use in support of a contract or contracts with the National Aeronautics and Space Administration under which the Administration would be required to substantially amortize through payment or reimbursement such contractor investment, unless an appropriations Act specifies the lease or contract pursuant to which such facilities are to be constructed or leased or such facility is otherwise identified in such Act: *Provided further*, That the Administrator may authorize such facility lease or construction, if he determines, in consultation with the Committees on Appropriations, that deferral of such action until the enactment of the next appropriations Act would be inconsistent with the interest of the Nation in aeronautical and space activities: *Provided further*, That in addition to sums otherwise provided by this paragraph, an additional \$20,000,000, to remain available until expended: *Provided further*, That up to \$30,000,000 of the funds provided by this paragraph may be transferred to and merged with sums appropriated for "Research and development" and/or "Research and program management" (Department of Housing and Urban Development-Independent Agencies Appropriations Act, 1989; additional authorizing legislation to be proposed.)

Program and Financing (in thousands of dollars)

Identification code	80-0107-0-1-999	1988 actual	1989 est.	1990 est.
<b>Program by activities:</b>				
Direct program:				
00.01	Space transportation systems.....	19,344	50,416	84,260
00.02	Scientific investigations in space.....	11,404	8,159	17,520
00.04	Space research and technology.....	8,529	491	.....
00.05	Aeronautical research and technology.....	39,176	50,623	63,660
00.07	Supporting activity.....	117,049	135,979	149,680
00.91	Total direct program.....	195,502	245,668	315,120
01.01	Reimbursable program.....	1,022	2,000	2,000
10.00	Total obligations.....	196,524	247,668	317,120
<b>Financing:</b>				
11.00	Offsetting collections from: Federal funds.....	-484	-2,000	-2,000
21.40	Unobligated balance available, start of year.....	-98,380	-80,608	-110,040
24.40	Unobligated balance available, end of year.....	80,608	110,040	136,720
25.00	Unobligated balance lapsing.....	34,919	.....	.....
39.00	Budget authority.....	213,188	275,100	341,800
Budget authority:				
40.00	Appropriation.....	178,272	290,100	341,800
41.00	Transferred to other accounts.....	.....	-30,000	.....
42.00	Transferred from other accounts.....	.....	15,000	.....
43.00	Appropriation (adjusted).....	178,272	275,100	341,800
50.00	Reappropriation.....	34,916	.....	.....
Relation of obligations to outlays:				
71.00	Obligations incurred, net.....	196,040	245,668	315,120
72.40	Obligated balance, start of year.....	141,664	171,514	248,415
74.40	Obligated balance, end of year.....	-171,514	-248,415	-326,418
77.00	Adjustments in expired accounts.....	-248	.....	.....
90.00	Outlays.....	165,943	168,767	237,118

This appropriation provides for contractual services for the design, repair, rehabilitation, and modification of facilities; the construction of new facilities; the purchase of land and equipment related to construction and modification; environmental compliance activities agencywide; and advanced design related to facilities planned for future authorization. The principal projects in the 1990 program are described below:

**Space transportation systems.**—This activity includes funds for space flight and some Space Station facilities at various locations. Private sector financing will be sought for a Neutral Buoyancy Laboratory at the Johnson Space Center, Houston, TX and the Space Station processing facility at the Kennedy Space Center, FL. Private sector financing will also be sought for the Advanced Solid Rocket Motor production and test facility.

**Scientific investigations in space.**—This activity provides for rehabilitation of the Spacecraft Assembly and Encapsulation Facility II at the Kennedy Space Center, FL, and construction of a Quality Assurance and Detector Development Laboratory at the Goddard Space Flight Center, Greenbelt, MD. Private sector financing will be sought for the Observational Instruments Laboratory at the Jet Propulsion Laboratory, Pasadena, CA.

**Space Research and Technology.**—This activity provides for the construction of an Automation Science Research Facility at the Ames Research Center, Moffett Field, CA.

**Aeronautical Research and Technology.**—This activity provides for construction of a Supersonic/Hypersonic Low Disturbance Tunnel at the Langley Research Center, Hampton, VA; and for continuation of the structured, multi-year effort to restore and modernize NASA's aeronautical research and development facilities at various NASA installations. These aging facilities, which have been the key to establishment of current U.S. preeminence in aeronautics, will be modernized and their productivity increased to support the aeronautical research and development needed to maintain U.S. competitiveness in this key high technology sector.

**Supporting activity.**—The estimates for this activity include funds to refurbish bridges at Merritt Island at the Kennedy Space Center, FL; rehabilitate the Central Heating/Cooling Plant at the Johnson Space Center, Houston, TX; construct a Customer Data Operations Facility at the Goddard Space Flight Center, Greenbelt, MD; modernize the South Utility Systems at the Jet Propulsion Laboratory, Pasadena, CA; make modifications for seismic safety, Goldstone, CA; repair, rehabilitation and modification of facilities, not in excess of \$750 thousand per project, minor construction of new facilities and additions to existing facilities, not in excess of \$500 thousand per project at various NASA installations and at Government-owned plants operated by contractors; environmental compliance activities agencywide; and for facility planning and design.

Object Classification (in thousands of dollars)

Identification code	80-0107-0-1-999	1988 actual	1989 est.	1990 est.
Direct obligations:				
22.0	Transportation of things.....	21	26	34
24.0	Printing and reproduction.....	37	46	60
25.0	Other services.....	12,987	16,319	20,933
26.0	Supplies and materials.....	787	989	1,269
31.0	Equipment.....	523	657	843
32.0	Land and structures.....	181,147	227,631	291,981
99.0	Subtotal, direct obligations.....	195,502	245,668	315,120
99.0	Reimbursable obligations.....	1,022	2,000	2,000
99.9	Total obligations.....	196,524	247,668	317,120

## I-W6

Federal Funds—Continued

## APPENDIX TO THE BUDGET FOR FISCAL YEAR 1990

## General and special funds—Continued

## RESEARCH AND PROGRAM MANAGEMENT

For necessary expenses of research in Government laboratories, management of programs and other activities of the National Aeronautics and Space Administration, not otherwise provided for, including uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901-5902); awards; lease, hire, purchase of one aircraft for replacement only (for which partial payment may be made by exchange of at least one existing administrative aircraft and such other existing aircraft as may be considered appropriate), maintenance and operation of administrative aircraft; purchase (not to exceed thirty-three for replacement only) and hire of passenger motor vehicles; and maintenance and repair of real and personal property, and not in excess of \$100,000 per project for construction of new facilities and additions to existing facilities, repairs, and rehabilitation and modification of facilities; **[\$1,855,000,000] \$2,032,200,000: Provided,** That contracts may be entered into under this appropriation for maintenance and operation of facilities, and for other services, to be provided during the next fiscal year: *Provided further,* That not to exceed \$35,000 of the foregoing amount shall be available for scientific consultations or extraordinary expense, to be expended upon the approval or authority of the Administrator and his determination shall be final and conclusive. (*Department of Housing and Urban Development-Independent Agencies Appropriations Act, 1989; additional authorizing legislation to be proposed.*)

## Program and Financing (in thousands of dollars)

Identification code	80-0103-0-1-999	1988 actual	1989 est.	1990 est.
<b>Program by activities:</b>				
Direct program:				
00.01	Space transportation systems.....	829,301	906,628	989,904
00.02	Scientific investigations in space.....	231,934	241,580	255,999
00.03	Space and terrestrial applications.....	158,040	162,891	164,916
00.04	Space research and technology.....	139,728	150,945	167,360
00.05	Transatmospheric vehicle research and technology.....	28,452	31,029	32,188
00.06	Aeronautical research and technology.....	288,457	308,292	326,525
00.07	Supporting activity.....	68,138	70,150	73,777
00.08	Safety, reliability and quality assurance.....	18,110	20,085	21,531
00.91	Total direct program.....	1,762,160	1,891,600	2,032,200
01.01	Reimbursable program.....	39,506	40,000	40,000
10.00	Total obligations.....	1,801,666	1,931,600	2,072,200
<b>Financing:</b>				
Offsetting collections from:				
11.00	Federal funds.....	-37,012	-37,475	-37,475
14.00	Non-Federal sources.....	-2,494	-2,525	-2,525
25.00	Unobligated balance lapsing.....	420		
39.00	Budget authority.....	1,762,580	1,891,600	2,032,200
Budget authority:				
40.00	Appropriation.....	1,495,680	1,855,000	2,032,200
42.00	Transferred from other accounts.....	266,900	36,600	
43.00	Appropriation (adjusted).....	1,762,580	1,891,600	2,032,200
Relation of obligations to outlays:				
71.00	Obligations incurred, net.....	1,762,160	1,891,600	2,032,200
72.40	Obligated balance, start of year.....	168,586	280,090	282,871
74.40	Obligated balance, end of year.....	-280,090	-282,871	-303,221
77.00	Adjustments in expired accounts.....	-2,949		
90.00	Outlays.....	1,647,707	1,888,819	2,011,850

This appropriation provides for research in Government laboratories, management of programs, and other expenses for the operation of eight NASA field installations.

Programwide support and management are provided by NASA headquarters, Washington, DC.

The budget levels proposed in this account reflect management reform efforts now underway or planned.

## Object Classification (in thousands of dollars)

Identification code	80-0103-0-1-999	1988 actual	1989 est.	1990 est.
Direct obligations:				
Personnel compensation:				
11.1	Full-time permanent.....	888,283	943,344	982,959
11.3	Other than full-time permanent.....	15,705	17,946	18,734
11.5	Other personnel compensation.....	18,239	21,020	20,699
11.8	Special personal services payments.....	6,592	6,907	7,816
11.9	Total personnel compensation.....	928,819	989,217	1,030,208
12.1	Civilian personnel benefits.....	137,416	157,731	166,470
13.0	Benefits for former personnel.....	676	695	863
21.0	Travel and transportation of persons.....	40,168	47,116	50,957
21.0	Payments to interagency motor pools.....	1,542	1,837	1,924
22.0	Transportation of things.....	6,576	5,890	6,027
23.1	Rental payments to GSA.....	14,186	14,983	15,668
23.2	Rental payments to others.....	1,050	633	651
23.3	Communications, utilities, and miscellaneous charges.....	129,865	140,157	146,588
24.0	Printing and reproduction.....	14,020	16,390	17,297
25.0	Other services.....	423,883	439,292	508,791
26.0	Supplies and materials.....	48,453	53,182	56,053
31.0	Equipment.....	14,486	23,622	29,641
32.0	Land and structures.....	61		
41.0	Grants, subsidies, and contributions.....	959	855	1,062
99.0	Subtotal, direct obligations.....	1,762,160	1,891,600	2,032,200
99.0	Reimbursable obligations.....	39,506	40,000	40,000
99.9	Total obligations.....	1,801,666	1,931,600	2,072,200

## Personnel Summary

Total number of full-time permanent positions.....	21,552	23,110	23,779
Total compensable workyears:			
Full-time equivalent employment.....	22,198	23,588	23,861
Full-time equivalent of overtime and holiday hours.....	238	240	245

## Trust Funds

## MISCELLANEOUS TRUST FUNDS

## Program and Financing (in thousands of dollars)

Identification code	80-9971-0-7-255	1988 actual	1989 est.	1990 est.
<b>Financing:</b>				
21.40	Unobligated balance available, start of year.....	-176	-322	-322
24.40	Unobligated balance available, end of year.....	322	322	322
60.00	Budget authority (appropriation) (permanent, indefinite).....	147		
Relation of obligations to outlays:				
71.00	Obligations incurred, net.....			
90.00	Outlays.....			

Foreign governments advance funds to allow the National Aeronautics and Space Administration to procure, in the United States, nonmilitary space-oriented materials and services on their behalf. Authority for this action is granted by the National Aeronautics and Space Act of 1958 (42 U.S.C. 2451 et seq.).

## OFFICE OF INSPECTOR GENERAL

For necessary expenses of the Office of the Inspector General in carrying out the provisions of the Inspector General Act of 1978, as amended, \$8,795,000.

## Program and Financing (in thousands of dollars)

Identification code	80-0109-0-1-255	1988 actual	1989 est.	1990 est.
<b>Program by activities:</b>				
10.00	Total obligations.....			8,795

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Trust Funds

I-W7

<b>Financing:</b>	
40.00 Budget authority (appropriation) .....	8,795
Relation of obligations to outlays:	
71.00 Obligations incurred, net .....	8,795
74.40 Obligated balance, end of year .....	-1,266
90.00 Outlays .....	7,529

This appropriation provides agencywide audit and investigative functions to identify and correct management and administrative deficiencies which create conditions for existing or potential instances of fraud, waste and mismanagement. The audits function provides internal audit, contract audit, and inspections services. Contract audits provide professional advice to agency contracting officials on accounting and financial matters relative to the negotiation, award, administration, repricing, and settlement of contracts. Internal audits review and evaluate all facets of agency operations. Inspections services provide detailed technical evaluations of agency operations. The investigative function provides for the detection and investigation of improper and illegal activities involving programs, personnel, and operations.

## Object Classification (in thousands of dollars)

Identification code 80-0109-0-1-255	1988 actual	1989 est.	1990 est.
Personnel compensation:			
11.1 Full-time permanent .....			6,200
11.3 Other than full-time permanent .....			200
11.5 Other personnel compensation .....			100
11.9 Total personnel compensation .....			6,500
12.1 Civilian personnel benefits .....			1,420
21.0 Travel and transportation of persons .....			360
22.0 Transportation of things .....			105
25.0 Other services .....			135
31.0 Equipment .....			275
99.9 Total obligations .....			8,795

## Personnel Summary

Total number of full-time permanent positions .....	119	136	136
Total compensable workyears: Full-time equivalent employment .....	128	146	146

## Trust Funds

## [SCIENCE, SPACE, AND TECHNOLOGY EDUCATION TRUST FUND]

[There is appropriated, by transfer from funds appropriated in this Act for "Construction of facilities" the sum of \$15,000,000 to the "Science, Space, and Technology Education Trust Fund" which is hereby established in the Treasury of the United States: *Provided*, That the Secretary shall invest such funds in the United States Treasury special issue securities, that such interest shall be credited to the Trust Fund on a quarterly basis, and that such interest shall be available for the purpose of making grants for programs directed at improving science, space, and technology education in the United States: *Provided further*, That the Administrator of the National Aeronautics and Space Administration, after consultation with the Director of the National Science Foundation, shall review applications made for such grants and determine the distribution of such available funds on a competitive basis: *Provided further*, That such grants shall be made available to any awardee only to the extent that said awardee provides matching funds from non-Federal sources to carry out the program for which grants from this Trust Fund are made: *Provided further*, That of the funds made available by this Trust Fund, \$250,000 shall be disbursed each calendar quarter for a ten-year period to the Challenger Center for Space Science Education: *Provided further*, That the Administrator of the National Aeronautics and Space Administration shall submit to the Congress an annual report on the grants made pursuant to this paragraph.] (*Department of Housing and Urban Development-Independent Agencies Appropriations Act, 1989.*)

## Program and Financing (in thousands of dollars)

Identification code 80-8978-0-7-503	1988 actual	1989 est.	1990 est.
<b>Program by activities:</b>			
10.00 Total obligations (object class 25.0) .....		500	1,000
<b>Financing:</b>			
60.00 Budget authority (appropriation) (permanent, indefinite) .....		500	1,000
Relation of obligations to outlays:			
71.00 Obligations incurred, net .....		500	1,000
90.00 Outlays .....		500	1,000