



Chronological History Fiscal Year 1990 Budget Submission

**Prepared by:
Comptroller
Budget Operations Office
Code BT**

National Aeronautics and Space Administration (NASA)
FY 1990 Chronological History

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National Aeronautics and Space Administration (NASA)
 Fiscal Year 1990
 Legislative Reference Index

Item	Statistics	Authorization			Appropriation			
		House Authorization Committee (H.R. 1759)	Senate Authorization Committee (S. 916)	House Authorization Committee (H.R. 3729)	Senate Authorization Committee (H.R. 3729)	Authorization Conference Committee	House Appropriations Committee (H.R. 2916)	Senate Appropriations Committee (H.R. 2916)
Summary by Appropriation	1-4	30-31	72-74, 79	111		131	144	
Research and Development	1-3, 5	30-31	72-74, 79-80, 107			122	134	153
253 Space Station Freedom	2-3, 5	30-31	73-74, 79, 81, 107	110	117	122	135	153
253 Space Transportation								
Capability Development	3, 5	30, 33	73-74, 82, 107	110	117	123-124	136	
254 Physics and Astronomy	3, 6	30, 34	73-74, 83, 107	110	117	123-124	136	
254 Space Life Sciences	3, 6	30, 35	73, 75, 84, 107	110	117	123-124	136	
254 Planetary Exploration	3, 7	30, 36	73, 75, 85, 107	110	117	123-124	136	
254 Space Applications	3, 7	30, 37	73, 75, 86, 107	110	117	123-124	136	
254 Technology Utilization	7	30, 39	73, 92, 107	110	117	123-124	137	
254 Commercial Use of Space	7	30, 40	73, 92, 107	110	117	123-124	137	
402 Aeronautical Research and								
Technology	3, 8	42	73, 75, 93, 107	110	117	123-124	137	
254 Transatmospheric Research and								
Technology	3, 8	42	74-75, 94, 107	110	117	123-124	137	
254 Space Research and Technology	3, 8	30, 44	74, 76, 95, 107	110	117	123-124	137	
254 Space Exploration	3, 8	30, 45		110	117			
254 Safety, Reliability, Maintainability,								
Quality Assurance	3, 8	30, 47	74, 96, 107	110	117	123-124	138	
254 University Space Science and								
Technology Academic Programs	3, 9	30, 47	74, 76, 97, 107	110	117	123-124	138	
255 Advanced Systems	3, 9	30, 47	74, 96, 107	110	117	123-124	138	
Space Flight, Control and Data								
Communications	1-3, 9	30, 49	72, 76, 79, 98, 107			124	139	153
253 Shuttle Production and								
Operational Capability	3, 9	30, 49	74, 76, 79, 98, 107	110	117	124	139	
253 Space Transportation Operations	3, 10	50-51	74, 76, 79, 99, 107	111	117	124	139	
255 Space and Ground Network								
Communications & Data Systems	3, 10	50, 51	74, 76, 79, 100, 107	111	117	124	139	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
 Chronological History of the FY 1990 Budget Submission
 (in thousands of dollars)

Item	Budget Submission to Congress	AUTHORIZATION					Difference from Budget Submission	APPROPRIATION				Difference from Budget Submission
		House Comm. H. R. 1759	Senate Comm. S. 916	House Comm. H. R. 3729	Senate Comm. H. R. 3729	Conf. Comm. P. L. 101-222		House Comm. H. R. 2916	Senate Comm. H. R. 2916	Conf. Comm. P. L. 101-144		
		Rpt. 101-224 8-31-89 Appd. 9-21-89	Rpt. 101-157 10-3-89 Appd. 11-9-89	CR Page H9130 11-20-89 Appd. 11-20-89	CR Page S16590 11-21-89 Appd. 11-22-89	Rpt. 101-222 11-11-89 Appd. 1-2-90		Rpt. 101-150 7-17-89 Appd. 7-20-89	Rpt. 101-126 9-13-89 Appd. 9-28-89	Rpt. 101-297 10-10-89 Appd. 11-9-89		
Total Appropriation												
Research and Development	5,751,600	7,537,400 1/	5,788,600	7,219,900 2/	7,202,900	0	-5,751,600	5,203,100	5,367,600	5,281,076	-469,724	
Space Flight, Control and Data												
Communications	5,139,600	5,013,800	5,104,600	5,133,800	5,131,800	0	-5,139,600	4,759,600 3/	4,639,600	4,610,076 4/	-521,526	
Construction of Facilities	341,800	331,800	449,300	449,300	449,300	0	-341,800	384,300	341,000	591,980 5/	250,180	
Research and Program Management	2,032,200	2,032,200	2,049,200	2,032,200	2,049,200	0	-2,032,200	1,957,200	1,982,200	1,951,476 6/	-80,724	
Inspector General	8,795	8,795	8,795	8,795	8,795	0	-8,795	8,795	8,795	8,659	-136	
Total NASA	13,273,995	14,923,995 7/	13,398,495	14,843,995 8/	14,841,995	0 9/	-13,273,995	12,312,995 10/	12,339,195	12,452,065 11/	-821,830	

Item	Budget Submission to Congress	APPROPRIATION				Difference from Budget Submission
		Conf. Comm. P. L. 101-144	Gramm-Rudman-Hollings Reduction	Appropriation Transfers Pursuant to P. L. 101-144	Supplemental Conf. Comm. P. L. 101-302	
		Rpt. 101-297 10-18-89 Appd. 11-9-89	P. L. 99-177 & P. L. 100-119	P. L. 101-144	Rpt. 101-493 Appd. 5-25-90	

Subsequent Adjustments:

Item	Budget Submission to Congress	Conf. Comm. P. L. 101-144	Gramm-Rudman-Hollings Reduction	Appropriation Transfers Pursuant to P. L. 101-144	Supplemental Conf. Comm. P. L. 101-302	Difference from Budget Submission
Total Appropriation						
Research and Development	5,751,600	5,281,076	5,220,716	5,245,776	5,227,776	-523,824
Space Flight, Control and Data						
Communications	5,139,600	4,610,076	4,555,685	4,640,685	4,625,715	-513,885
Construction of Facilities	341,800	591,960	587,990	410,990	410,990	89,190
Research and Program Management	2,032,200	1,951,476	1,923,464	1,990,464	2,023,434	-8,788
Inspector General	8,795	8,659	8,659	8,659	8,659	-136
Total NASA	13,273,995	12,452,065	12,296,574	12,296,574	12,296,574	-977,421

Item	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION				Difference from Budget Submission
	Budget Submission to Congress	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.		House Comm.	Senate Comm.	Conf. Comm.		
		H. R. 1759 Rpt 101-226 8-31-89 Appd. 9-21-89	S 916 Rpt 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page M0130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	P.L. 0 xxx-xxx Rpt 0 xxx-xxx xx-xx-xx Appd. x-x-xx		H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-120 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89		
Research & Development Appropriation												
OSS	2,050,200	2,130,200	2,050,200	1,800,900	1,800,000	-2,050,200	1,655,200	1,050,200	1,000,000		-250,200	
OSF	639,000	651,500	635,500	651,500	651,500	-639,000	584,000	583,200	574,200		-64,800	
OSSA	1,985,300	3,646,600	2,078,800	3,656,300	3,661,300	-1,985,300	2,008,300	2,047,300	2,058,600		63,300	
DCP	61,000	63,000	61,000	63,000	61,000	-61,000	51,000	56,000	56,000		-5,000	
DAST	927,900	967,900	914,900	967,900	947,900	-927,900	836,400	761,700	782,050		-135,650	
OSRMOA	23,300	23,300	23,300	23,300	23,300	-23,300	23,300	23,300	23,300		0	
USSTAP	35,000	35,000	38,000	38,000	38,000	-35,000	35,000	39,000	42,000		7,000	
OSTDS	19,900	19,900	19,900	19,900	19,900	-19,900	19,900	19,900	19,900		0	
Congressional Action on R&D total	0	0	-35,000	0	0	0	-10,600	-13,000	-84,174		-84,174	
Total R&D	5,751,600	7,537,400 1/	5,786,600	7,219,900 2/	7,202,900	0	-5,751,600	5,203,100	5,367,600	5,281,876	-469,724	
Space Flight, Control and Data Communications Appropriation												
OSF	4,037,500	3,936,700	4,072,500	4,056,700	4,054,700	-4,037,500	3,707,500	3,637,500	3,687,500		-350,000	
OSIOS	1,182,100	1,077,100	1,077,100	1,077,100	1,077,100	-1,182,100	1,052,100	1,002,100	1,002,100		-180,000	
Congressional Action on SFC&DC total	0	0	-45,000	0	0	0	0	0	-71,526		-71,526	
Total SFC&DC	5,139,600	5,013,800	5,104,600	5,133,800	5,131,800	0	-5,139,600	4,759,600 3/	4,639,600	4,610,874 4/	-521,526	
Construction of Facilities Appropriation												
OSS	38,100	38,100	53,100	53,100	53,100	-38,100	53,100	53,100	53,100		15,000	
OSF	64,200	64,200	154,200	154,200	154,200	-64,200	64,200	64,200	154,200		90,000	
OSSA	12,900	26,900	12,900	26,900	26,900	-12,900	12,900	12,900	12,900		0	
DAST	81,700	81,700	81,700	81,700	81,700	-81,700	81,700	78,200	78,200		-3,500	
All Other	144,900	144,900	147,900	147,400	147,400	-144,900	144,900	147,400	147,400		2,500	
Congressional Action on Conf total	0	-24,000	0	-14,000	-14,000	0	27,500	-14,600	146,100		146,100	
Total Conf	341,800	331,800	449,200	449,300	449,300	0	381,300	341,000	591,900		250,100	
Total Research and Program Management	2,032,200	2,032,200	2,049,200	2,032,200	2,049,200	-2,032,200	1,957,200	1,982,200	1,951,876		-80,724	
Total Inspector General	8,795	8,795	8,795	8,795	8,795	-8,795	8,795	8,795	8,659		-136	
Total NASA	13,273,995	14,923,995 7/	13,398,495	14,843,995 8/	14,841,995	0 9/	-13,273,995	12,312,995 10/	12,339,195	12,432,065 11/	-821,930	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
 Chronological History of the FY 1990 Budget Submission
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		House Comm. H. R. 1759 Rpt. 101-226 8-31-89 Appd. 9-21-89	Senate Comm. S 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	House Comm. H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	Senate Comm. H. R. 3729 CR Page S16598 11-21-89 Appd. 11-22-89	Conf. Comm. P. L. 8 811-811 Rpt. 8 811-811 11-11-89 Appd. 11-11-89		House Comm. H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	Senate Comm. H. R. 2916 Rpt. 101-128 9-13-89 Appd. 9-28-89	Conf. Comm. P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	
Research and Development	5,751,800	7,537,400 1/	5,788,600	7,219,900 2/	7,202,900	0 9/	-5,751,600	5,203,100	5,367,600	5,281,876	-469,724
253 Space Station Freedom	2,050,200	2,130,200	2,050,200	1,800,000	1,800,000		-2,050,200	1,655,200	1,650,200	1,800,000	-250,200
253 Space Transportation Capability Development	839,000	651,500	635,500	651,500	651,500		-639,000	584,000	583,200	574,200	-64,800
254 Physics and Astronomy	894,500	914,500	903,500	914,500	914,500		-894,500	916,500	901,500	902,800	8,300
254 Space Life Sciences	124,200	124,200	122,700	124,200	124,200		-124,200	109,200	109,200	109,200	-15,000
254 Planetary Exploration	396,900	1,961,900	396,900	1,961,300	1,966,900		-396,900	396,900	386,900	396,900	0
254 Space Applications	579,700	616,000	655,700	655,700	655,700		-579,700	585,700	649,700	655,700	76,000
254 Commercial Programs	61,000	63,000	61,000	63,000	61,000		-61,000	51,000	56,000	53,500	-7,500
402 Aeronautical Research and Technology	462,800	462,800	462,800	462,800	462,800		-462,800	462,800	462,800	462,800	0
254/402 Transatmospheric Research and Technology	127,000	127,000	127,000	127,000	127,000		-127,000	76,000	0	35,000	-92,000
254 Space Research and Technology	338,100	358,100	325,100	358,100	338,100		-338,100	295,600	298,900	294,250	-43,850
254 Space Exploration	0	20,000	0	20,000	20,000		0	0	0	0	0
254 Safety, Reliability, Maintainability, & Quality Assurance Program	23,300	23,300	23,300	23,300	23,300		-23,300	23,300	23,300	23,300	0
254 University Space Science and Technology Academic Programs	35,000	35,000	38,000	38,000	38,000		-35,000	35,000	38,000	38,000	3,000
255 Advanced Systems	19,900	19,900	19,900	19,900	19,900		-19,900	19,900	19,900	19,900	0
CONGRESSIONAL ACTION on R&D	0	0	-35,000	0	0		0	-10,000	-13,000	-83,674	-83,674
Space Flight, Control and Data											
Communications	5,139,600	5,013,800	5,104,600	5,133,800	5,131,800	0 9/	-5,139,600	4,759,600 3/	4,639,600	4,618,074 4/	-521,526
253 Shuttle Production and Operational Capability	1,303,300	1,264,500	1,340,300	1,340,300	1,340,300		-1,303,300	1,355,300	1,305,100	1,355,300	50,000
253 Space Transportation Operations	2,732,200	2,672,700	2,732,200	2,716,400	2,714,400		-2,732,200	2,732,200	2,732,200	2,732,200	0
253 General Reduction	0	0	0	0	0		0	-388,000	-389,200	-400,000	-400,000
253 Adjustment	0	0	0	0	0		0	0	-600	0	0
255 Space and Ground Network Communications and Data Systems	1,102,100	1,077,100	1,077,100	1,077,100	1,077,100		-1,102,100	1,052,100	1,002,100	1,002,100	-100,000
CONGRESSIONAL ACTION on SFCIOC	0	0	-15,000	0	0		0	0	0	-71,526	-71,526

Item	AUTHORIZATION							APPROPRIATION			
	Budget Submission to Congress	House Comm	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission	House Comm	Senate Comm.	Conf. Comm.	Difference from Budget Submission
		H. R. 1759 Rpt. 101-226 8-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page M9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	P. L. 9 953-125 Rpt 9 221-222 11-22-89 Appd. 11-22-89		H. R. 2916 Rpt. 101-156 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt 101-128 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	
Construction of Facilities	341,000	331,800	449,300	449,300	449,300	0 9/	-341,000	384,300	311,000	591,000	250,100
253 Johnson Space Center	34,100	34,100	49,100	49,100	49,100		-34,100	49,100	49,100	49,100	15,000
253 Kennedy Space Center	44,600	44,600	44,600	44,600	44,600		-44,600	44,600	44,600	44,600	0
253 Marshall Space Flight Center	4,000	4,000	4,000	4,000	4,000		-4,000	4,000	4,000	4,000	0
253 Stennis Space Center	5,000	5,000	5,000	5,000	5,000		-5,000	5,000	5,000	5,000	0
253 Various Locations	3,800	3,800	93,800	93,800	93,800		-9,000	3,800	3,800	93,800	90,000
254 Ames Research Center	10,600	10,600	10,600	10,600	10,600		-10,600	10,600	10,600	10,600	0
254 Goddard Space Flight Center	7,500	7,500	7,500	7,500	7,500		-7,500	7,500	7,500	7,500	0
254 Kennedy Space Center	8,000	8,000	8,000	8,000	8,000		-8,000	8,000	8,000	8,000	0
254 Jet Propulsion Laboratory	0	14,000	0	14,000	14,000		0	0	0	0	0
254 Various Locations	0	0	2,500	2,500	2,500		0	0	2,500	2,500	2,500
255 Goddard Space Flight Center	12,000	12,000	12,000	12,000	12,000		-12,000	12,000	12,000	12,000	0
255 Johnson Space Center	2,800	2,800	2,800	2,800	2,800		-2,800	2,800	2,800	2,800	0
255 Jet Propulsion Laboratory	5,400	5,400	5,400	5,400	5,400		-5,400	5,400	5,400	5,400	0
255 Various Locations	2,600	2,600	2,600	2,600	2,600		-2,600	2,600	2,600	2,600	0
255 M-Repair of Facilities	28,000	28,000	28,000	28,000	28,000		-28,000	28,000	28,000	28,000	0
255 M-Rehabilitation and Modification of Facilities	36,000	36,000	36,000	36,000	36,000		-36,000	36,000	36,000	36,000	0
255 M-Minor Construction and Additions to Facilities	10,000	10,000	10,000	10,000	10,000		-10,000	10,000	10,000	10,000	0
255 M-Facility Planning and Design	26,300	26,300	26,300	26,300	26,300		-26,300	26,300	26,300	26,300	0
255 M-Environmental Compliance and Restoration Program	30,000	30,000	30,000	30,000	30,000		-30,000	30,000	30,000	30,000	0
402 Ames Research Center	33,200	33,200	33,200	33,200	33,200		-33,200	33,200	33,200	33,200	0
402 Langley Research Center	17,400	17,400	17,400	17,400	17,400		-17,400	17,400	17,400	17,400	0
402 Lewis Research Center	20,500	20,500	20,500	20,500	20,500		-20,500	20,500	17,000	17,000	-3,500
CONGRESSIONAL ACTION on Calf	0	-24,000	0	-14,000	-14,000		0	27,500	-14,000	146,100	146,100
Research and Program Management	2,032,200	2,032,200	2,049,200	2,032,200	2,049,200		-2,032,200	1,957,200	1,982,200	1,951,476	-80,724
Inspector General	8,795	8,795	8,795	8,795	8,795		-8,795	8,795	8,795	8,659	-136
TOTAL NASA	13,273,995	14,923,995	13,398,495	14,043,995	14,841,995	0 9/	-13,273,995	12,312,995	12,338,195	12,452,065	-821,930

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
Chronological History of the FY 1990 Budget Submission
(in thousands of dollars)

Item	AUTHORIZATION							APPROPRIATION			
	Budget	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.	Difference	House Comm.	Senate Comm.	Conf. Comm.	Difference
	Submission to Congress	H. R. 1758 Rpt. 101-228 8-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	P. L. 101-144 Rpt. 101-228 11-22-89 Appd. 11-22-89	from Budget Submission	H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	from Budget Submission
Research and Development (R&D)	5,751,600	7,537,400 1/	5,783,600	7,219,900 2/	7,199,900	0 9/	-5,751,600	5,203,100	5,367,600	5,281,876	-469,724
Office of Space Station	2,050,200	2,130,200	2,050,200	1,800,000	1,800,000	0	-2,050,200	1,655,200	1,850,200	1,800,000	-250,200
253 Space Station Freedom	2,050,200	2,130,200	2,050,200	1,800,000	1,800,000	0	-2,050,200	1,655,200	1,850,200	1,800,000	-250,200
Development	1,970,200	1,970,200	1,905,200	1,720,000	1,720,000	0	-1,970,200	1,575,200	1,770,200	1,720,000	-250,200
Pressurized Modules	366,000	366,000	366,000	366,000	366,000		-366,000	366,000	366,000	366,000	0
Assembly Hardware/Subsystems	762,000	762,000	762,000	762,000	762,000		-762,000	762,000	762,000	762,000	0
Platforms and Servicing	130,000	130,000	130,000	130,000	130,000		-130,000	130,000	130,000	130,000	0
Power System	298,000	298,000	298,000	298,000	298,000		-298,000	298,000	298,000	298,000	0
Operations/Utilization Capability	184,000	184,000	184,000	184,000	184,000		-184,000	184,000	184,000	184,000	0
Management and Integration	230,200	230,200	230,200	230,200	230,200		-230,200	230,200	230,200	230,200	0
General Reduction	0	0	-65,000	-250,200	-250,200		0	-395,000	-200,000	-250,200	-250,200
Flight Tele robotic Services	15,000	15,000	80,000	80,000	80,000		-15,000	80,000	80,000	80,000	65,000
Operations	25,000	25,000	25,000	0	0		-25,000	0	0	0	-25,000
Transition Definition	25,000	25,000	25,000	0	0		-25,000	0	0	0	-25,000
Orbital Debris Radar	15,000	15,000	0	0	0		-15,000	0	0	0	-15,000
Adjustment	0	80,000	15,000	0	0		0	0	0	0	0
Office of Space Flight	639,000	651,500	635,500	651,500	651,500	0	-639,000	584,000	583,200	574,200	-64,800
253 Space Transportation	639,000	651,500	635,500	651,500	651,500	0	-639,000	584,000	583,200	574,200	-64,800
Capability Development	639,000	651,500	635,500	651,500	651,500	0	-639,000	584,000	583,200	574,200	-64,800
Space Lab	98,900	98,900	98,900	98,900	98,900		-98,900	98,900	98,900	98,900	0
Upper Stages	88,600	94,600	88,600	94,600	94,600		-88,600	73,600	78,600	78,600	-10,000
Engineering and Technical Base	189,800	189,800	189,800	189,800	189,800		-189,800	179,800	174,800	174,800	-15,000
Payload Operations and											
Support Equipment	81,100	77,600	77,600	77,600	77,600		-81,100	81,100	64,800	64,800	-16,300
Advanced Programs	48,700	58,700	48,700	58,700	58,700		-48,700	28,700	51,700	40,200	-8,500
Advanced Launch Systems	5,000	5,000	5,000	5,000	5,000		-5,000	5,000	0	0	-5,000
Tethered Satellite System	19,900	19,900	19,900	19,900	19,900		-19,900	19,900	19,900	19,900	0
Orbital Maneuvering Vehicle	107,000	107,000	107,000	107,000	107,000		-107,000	97,000	94,500	97,000	-10,000

Item	AUTHORIZATION						APPROPRIATION				
	Budget Submission to Congress	House Comm. H. R. 1759	Senate Comm. S. 916	House Comm. H. R. 3729	Senate Comm. H. R. 3729	Conf. Comm. P. L. 0 000-000	Difference from Budget Submission	House Comm. H. R. 2916	Senate Comm. H. R. 2916	Conf. Comm. P. L. 101-144	Difference from Budget Submission
		Rpt. 101-226 8-31-89 Appd. 9-21-89	Rpt. 101-157 10-3-89 Appd. 11-9-89	CR Page M9130 11-20-89 Appd. 11-20-89	CR Page S16590 11-21-89 Appd. 11-22-89	Rpt. 0 000-000 00-00-00 Appd. 00-00-00		Rpt. 101-150 7-17-89 Appd. 7-20-89	Rpt. 101-297 9-13-89 Appd. 9-20-89	Rpt. 101-207 10-10-89 Appd. 11-9-89	
Office of Space Science											
and Applications	1,895,300	3,646,600	2,078,000	3,656,300	3,661,300	0	-1,915,300	2,000,300	2,047,300	2,044,600	69,300
254 Physics and Astronomy	894,500	914,500	903,500	914,500	914,500	0	-894,500	916,500	901,500	902,000	8,300
Hubble Space Telescope											
Development	67,000	67,000	67,000	67,000	67,000						
Gamma Ray Observatory Development	26,700	26,700	26,700	26,700	26,700		-67,000	67,000	67,000	67,000	0
Global Geospace Science Advanced X-Ray Astrophysics Facility Development (AXAF)	112,300	112,300	112,300	112,300	112,300		-26,700	26,700	26,700	26,700	0
Payload and Instrument Development	44,000	44,000	44,000	44,000	44,000		-112,300	112,300	112,300	112,300	0
Shuttle/Spacelab Payload Mission Management and Integration	71,400	91,400	71,400	91,400	91,400		-44,000	44,000	44,000	44,000	0
Space Station Integrated Planning and Attached Payloads	86,100	86,100	86,100	86,100	86,100		-71,400	93,400	93,400	93,400	22,000
Explorer Development	23,000	23,000	23,000	23,000	23,000		-86,100	86,100	86,100	86,100	0
Mission Operations and Data Analysis	93,200	93,200	93,200	93,200	93,200		-23,000	23,000	8,000	9,300	-13,700
Research and Analysis	204,800	204,800	204,800	204,800	204,800		-93,200	93,200	93,200	93,200	0
Suborbital Program	112,500	112,500	112,500	112,500	112,500		-204,800	204,800	204,800	204,800	0
Adjustment	53,500	53,500	53,500	53,500	53,500		-112,500	112,500	112,500	112,500	0
	0	0	9,000	0	0		-53,500	53,500	53,500	53,500	0
254 Space Life Sciences	124,200	124,200	122,700	124,200	124,200	0	-124,200	109,200	109,200	109,200	-15,000
Human Space Flight & Systems											
Engineering	42,800	42,800	42,800	42,800	42,800						
Space Biological Sciences	27,600	27,600	27,600	27,600	27,600		-42,800	42,800	42,800	42,800	0
Research and Analysis	53,800	53,800	53,800	53,800	53,800		-27,600	27,600	27,600	27,600	0
General Reduction	0	0	-1,500	0	0		-53,800	53,800	48,000	48,000	-5,000
							0	-15,000	-10,000	-10,000	-10,000

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	Budget Submission to Congress	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission
		H. R. 1759 Rpt. 101-226 8-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	P. L. 0 122-222 Rpt. 0 222-222 22-22-22 Appd. 22-22-22		H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	
254 Planetary Exploration	396,900	1,961,900	396,900	1,961,900	1,966,900	0	-396,900	396,900	396,900	396,900	0
Galileo Development	17,400	17,400	17,400	17,400	17,400		-17,400	17,400	17,400	17,400	0
Ulysses	14,500	14,500	14,500	14,500	14,500		-14,500	14,500	14,500	14,500	0
Mars Observer	100,500	100,500	100,500	100,500	100,500		-100,500	100,500	100,500	100,500	0
Comet Rendezvous Asteroid Flyby (CRAF)/Cassini	30,000	1,600,000 12/	30,000	1,600,000 12/	1,600,000 12/		-30,000	30,000	20,000	30,000	0
Mission Operations & Data Analysis Research and Analysis	155,400	155,400	155,400	155,400	155,400		-155,400	155,400	155,400	155,400	0
	78,100	74,100	79,100	74,100	78,100		-78,100	79,100	79,100	79,100	0
254 Space Applications	579,700	646,000	655,700	655,700	655,700	0	-579,700	585,700	649,700	655,700	76,000
Earth Science and Applications	434,300	434,300	444,300 13/	444,300 13/	444,300 13/		-434,300	445,300	449,300	453,300	19,000
Materials Processing in Space	92,700	92,700	90,700	92,700	92,700		-92,700	92,700	90,700	92,700	0
Communications	18,600	84,800	80,600	84,600	84,600		-18,600	18,600	80,600	80,600	62,000
Information Systems	34,100	34,100	34,100	34,100	34,100		-34,100	29,100	29,100	29,100	-5,000
Adjustment	0	0	6,800	0	0		0	0	0	0	0
Office of Commercial Programs	61,800	63,800	61,000	63,800	61,000	0	-61,800	51,000	56,000	53,500	-7,500
254 Technology Utilization	22,700	22,700	22,700	22,700	22,700	0	-22,700	22,700	22,700	22,700	0
Civil Systems	3,000	3,800	3,000	3,000	3,000		-3,000	3,000	3,000	3,000	0
Product Development	2,400	2,400	2,400	2,400	2,400		-2,400	2,400	2,400	2,400	0
Acquisition, Dissemination and Network Operations	5,800	5,800	5,800	5,800	5,800		-5,800	5,800	5,800	5,800	0
Program Development, Evaluation and Coordination	1,700	1,700	1,700	1,700	1,700		-1,700	1,700	1,700	1,700	0
Technology Applications	6,800	6,800	6,800	6,800	6,800		-6,800	6,800	6,800	6,800	0
Industrial Outreach	3,000	3,000	3,000	3,000	3,000		-3,000	3,000	3,000	3,000	0
254 Commercial Use of Space	38,300	40,300	38,300	40,300	38,300	0	-38,300	28,300	38,300	38,300	0
Commercial Applications and Enhancements	34,400	36,400	34,400	36,400	34,400		-34,400	34,400	34,400	34,400	0
Commercial Development Support	3,900	3,900	3,900	3,900	3,900		-3,900	3,900	3,900	3,900	0
General Reduction	0	0	0	0	0		0	-10,000	0	0	0
General Reduction	0	0	0	0	0		0	0	-5,000	-7,500	-7,500

Item	Budget Submission to Congress	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION			
		House Comm. H. R. 1759 Rpt. 101-226 8-31-89 Appd. 9-21-89	Senate Comm. S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	House Comm. H. R. 3729 CR Page M9130 11-20-89 Appd. 11-20-89	Senate Comm. H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	Conf. Comm. P.L. 9 111-111 Rpt. 9 111-111 11-11-11 Appd. 11-11-11	Difference		House Comm. H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	Senate Comm. H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	Conf. Comm. P.L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	Difference from Budget Submission
Office of Aeronautics and Space												
Technology	927,900	967,900	914,000	967,900	947,900	0	-927,900	836,400	761,700	792,050	-135,850	
402 Aeronautical Research and Technology	462,600	462,600	462,800	462,800	462,800	0	-462,600	462,800	462,800	462,800	0	
Research and Technology Base	335,700	335,700	335,700	335,700	335,700		-335,700	335,700	335,700	335,700	0	
Systems Technology Programs	127,100	127,100	127,100	127,100	127,100		-127,100	127,100	127,100	127,100	0	
254/402 Transatmospheric Research and Technology	127,000	127,000	127,000	127,000	127,000	0	-127,000	78,000	0	35,000	-92,000	
Research and Technology Base	127,000	127,000	127,000	127,000	127,000		-127,000	78,000	0	35,000	-92,000	
254 Space Research and Technology	338,100	358,100	325,100	358,100	338,100	0	-338,100	295,600	298,900	294,250	-43,850	
Research and Technology Base	130,100	135,100	130,100	135,100	130,100		-130,100	130,100	130,100	130,100	0	
Civil Space Technology Initiative (CSTI) Program	144,500	144,500	144,500	144,500	144,500		-144,500	127,000	127,000	127,000	-17,500	
Pathfinder Program	47,300	62,300	40,300	62,300	47,300		-47,300	22,300	31,600	26,950	-20,350	
In-space Experiments Technology Program	16,200	16,200	10,200	16,200	16,200		-16,200	16,200	10,200	10,200	-6,000	
254 Space Exploration	0	20,000	0	20,000	20,000	0	0	0	0	0 147	0	
Exploration	0	20,000	0	20,000	20,000		0	0	0	0	0	
Office of Safety, Reliability, Maintainability and Quality												
Assurance	23,300	23,300	23,300	23,300	23,300	0	-23,300	23,300	23,300	23,300	0	
254 Safety, Reliability, Maintainability, and Quality Assurance Program	23,300	23,300	23,300	23,300	23,300		-23,300	23,300	23,300	23,300	0	

Item	AUTHORIZATION							APPROPRIATION				
	House Comm. H. R. 1759	Senate Comm. S. 916	House Comm. H. R. 3729	Senate Comm. H. R. 3729	Conf. Comm. P.L. 101-226-227	Difference from Budget Submission	House Comm. H. R. 2916	Senate Comm. H. R. 2916	Conf. Comm. P. L. 101-144	Difference from Budget Submission		
	Rpt. 101-226 8-31-89 Appd. 9-21-89	Rpt. 101-157 10-2-89 Appd. 11-9-89	CR Page H9130 11-20-89 Appd. 11-20-89	CR Page S16590 11-21-89 Appd. 11-22-89	Rpt. 9-222-224 11-22-89 Appd. 11-22-89		Rpt. 101-150 7-17-89 Appd. 7-20-89	Rpt. 101-297 9-12-89 Appd. 9-28-89	Rpt. 101-297 10-18-89 Appd. 11-9-89			
754 University Space Science &												
Technology Academic Programs	35,000	35,000	35,000	38,000	35,000	0	-35,000	35,000	39,000	38,000	3,000	
University Affairs	15,900	15,900	15,900	15,900	15,900		-15,900	15,900	16,900	15,900	0	
Minority University Research	14,100	14,100	14,100	14,100	14,100		-14,100	14,100	14,100	14,100	0	
Space Grant College and Fellowship	5,000	5,000	5,000	8,000	5,000		-5,000	5,000	8,000	8,000	3,000	
Office of Space Operations (Tracking and Data Advanced Systems)	19,900	19,900	19,900	19,900	19,900	0	-19,900	19,900	19,900	19,900	0	
255 Advanced Systems	19,900	19,900	19,900	19,900	19,900		-19,900	19,900	19,900	19,900	0	
General Reduction of R&D	0	0	-17,000	0	0		0	-18,000	-13,000	0	0	
Adjustment of R&D	0	0	-18,000	0	0		0	0	0	500	500	
Title V, Section 517 Reduction of R&D	0	0	0	0	0		0	0	0	-84,174	-84,174	
Space Flight, Control and Data												
Communications (SFC&DC)	5,139,600	5,013,800	5,104,600	5,133,800	5,131,800	0 9/	-5,139,600	4,759,600 3/	4,839,600	4,618,074 4/	-521,526	
Office of Space Flight	4,037,500	3,936,700	4,072,500	4,056,700	4,054,700	0	-4,037,500	3,707,500	3,837,500	3,687,500	-350,000	
253 Shuttle Production and												
Operational Capability	1,305,300	1,284,500	1,340,300	1,340,300	1,340,300	0	-1,305,300	1,355,300	1,305,100	1,355,300	50,000	
Orbiter Operational Capability	237,000	237,000	237,000	237,000	237,000		-237,000	287,000	271,800	287,000	50,000	
Launch and Mission Support	341,000	341,000	341,000	341,000	341,000		-341,000	341,000	341,000	341,000	0	
Propulsion Systems	727,300	686,500	762,300	762,300	762,300		-727,300	727,300	692,300	727,300	0	

Item	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION				Difference from Budget Submission
	Budget Submission to Congress	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.		House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission	
		H. R. 1759 Rpt. 101-224 8-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page M9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	P. L. 0 102-111 Rpt. 0 102-111 11-21-89 Appd. 11-21-89		H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-10-89 Appd. 11-9-89		
253 Space Transportation Operations	2,732,200	2,672,200	2,732,200	2,716,400	2,714,400	0	-2,732,200	2,732,200	2,732,200	2,732,200	0	
Flight Operations	772,600	772,600	772,600	772,600	772,600		-772,600	772,600	772,600	772,600	0	
Flight Hardware	1,236,500	1,236,500	1,236,500	1,236,500	1,236,500		-1,236,500	1,236,500	1,236,500	1,236,500	0	
Launch and Landing Operations	553,600	553,600	553,600	553,600	553,600		-553,600	553,600	553,600	553,600	0	
General Reduction	0	-62,000	0	-17,000	-17,000		0	0	0	0	0	
Expendable Launch Vehicles and Services	169,500	171,500	169,500	171,500	169,500		-169,500	169,500	169,500	169,500	0	
General Reduction	0	0	0	0	0		0	-388,000	-399,200	-400,000	-400,000	
Adjustment	0	0	0	0	0		0	0	-600	0	0	
Office of Space Operations (Tracking and Data Advanced Systems)	1,102,100	1,077,100	1,077,100	1,077,100	1,077,100	0	-1,102,100	1,052,100	1,002,100	1,002,100	-100,000	
255 Space and Ground Network												
Communications and Data Systems	1,102,100	1,077,100	1,077,100	1,077,100	1,077,100	0	-1,102,100	1,052,100	1,002,100	1,002,100	-100,000	
Space Network	582,300	582,300	582,300	582,300	582,300		-582,300	582,300	582,300	582,300	0	
Ground Networks	269,600	269,600	269,600	269,600	269,600		-269,600	269,600	269,600	269,600	0	
Communications and Data Systems	250,200	250,200	250,200	250,200	250,200		-250,200	250,200	250,200	250,200	0	
General Reduction	0	-25,000	-25,000	-25,000	-25,000		0	-50,000	-10,000	-100,000	-100,000	
General Reduction of SFC&DC	0	0	-10,000	0	0		0	0	0	0	0	
Adjustment of SFC&DC	0	0	-35,000	0	0		0	0	0	0	0	
Title V, Section 517 Reduction of SFC&DC	0	0	0	0	0		0	0	0	-71,526	-71,526	
Construction of Facilities (Coff)	341,800	331,800	449,300	449,300	449,300	0 91	-341,800	384,300	341,000	591,000	250,180	
253 Space Station Freedom Facilities	38,100	38,100	53,100	53,100	53,100	0	-38,100	53,100	53,100	53,100	15,000	
55 - Construction of Addition for Space Systems Automated Integration and Assembly Facility (JSC)	10,500	10,500	10,500	10,500	10,500		-10,500	10,500	10,500	10,500	0	

Item	AUTHORIZATION						APPROPRIATION				
	Budget Submission to Congress	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission
		H. R. 1759 Rpt. 101-226 6-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16500 11-21-89 Appd. 11-22-89	P.L. 0 222-222 Rpt. 0 222-222 12-22-89 Appd. 12-22-89		H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	P.L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	
DC - Construction of Addition to Mission Control Center (JSC)	17,800	17,800	17,800	17,800	17,800		-17,800	17,800	17,800	17,800	0
SS - Construction of Addition to Simulator/Training Facility (JSC)	3,800	3,800	3,800	3,800	3,800		-3,800	3,800	3,800	3,800	0
SS - Modifications for Expanded Solar Simulation (JSC)	2,000	2,000	2,000	2,000	2,000		-2,000	2,000	2,000	2,000	0
SS - Modifications of Process Technology Facility for Space Station (NSFC)	4,000	4,000	4,000	4,000	4,000		-4,000	4,000	4,000	4,000	0
SS - Construction of Orbital Debris Radar Facility (JSC)	0	0	15,000	15,000	15,000		0	15,000	15,000	15,000	15,000
253 Space Flight Facilities	53,400	53,400	143,400	143,400	143,400	0	-53,400	53,400	53,400	143,400	90,000
SF - Replace Cooling Towers, Launch Complex 39 Utility Annex (KSC) ..	4,600	4,600	4,600	4,600	4,600		-4,600	4,600	4,600	4,600	0
SF - Replace Launch Complex 39, Pad A Chillers & Controls (KSC)	1,200	1,200	1,200	1,200	1,200		-1,200	1,200	1,200	1,200	0
SF - Replace Roofs, Launch Complex 39, (KSC)	11,000	11,000	11,000	11,000	11,000		-11,000	11,000	11,000	11,000	0
SF - Replace Vehicle Assembly Building Air Handling Units (KSC)	1,800	1,800	1,800	1,800	1,800		-1,800	1,800	1,800	1,800	0
SF - Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility 83 (KSC)	26,000	26,000	26,000	26,000	26,000		-26,000	26,000	26,000	26,000	0
SF - Modification of High Pressure Industrial Water System (SSC) ..	2,000	2,000	2,000	2,000	2,000		-2,000	2,000	2,000	2,000	0
SF - Replacement of High Pressure Gas Storage Vessels (SSC)	3,000	3,000	3,000	3,000	3,000		-3,000	3,000	3,000	3,000	0

Item	Budget Submission to Congress	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION			Difference from Budget Submission
		House Comm. H. R. 1759 Rpt 101-276 8-31-89 Appd. 9-21-89	Senate Comm. S. 916 Rpt 101-157 10-2-89 Appd. 11-9-89	House Comm. H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	Senate Comm. H. O. 3729 CR Page S16599 11-21-89 Appd. 11-22-89	Conf. Comm. P.L. 0 xxx-xxx Rpt 0 xxx-xxx xx-xx-xx Appd. xx-xx-xx	House Comm. H. R. 2816 Rpt 101-150 7-17-89 Appd. 7-28-89		Senate Comm. H. R. 2816 Rpt 101-297 9-13-89 Appd. 9-28-89	Conf. Comm. P. L. 101-144 Rpt 101-297 10-18-89 Appd. 11-9-89		
SF - Construction of National Resource Protection (various locations) ..	3,800	3,800	3,800	3,800	3,800	3,800	-3,800	3,800	3,800	3,800	0	
SF - Construction of Advanced Solid Rocket Motor Facility (various locations)	0	0	90,000	90,000	90,000	90,000	0	0	0	90,000	90,000	
254 Kennedy Space Center	8,000	8,000	8,000	8,000	8,000	8,000	0	8,000	8,000	8,000	0	
SF - Refurbish Bridges, Merritt Island	4,500	4,500	4,500	4,500	4,500	4,500	-4,500	4,500	4,500	4,500	0	
SF - Rehabilitation of Spacecraft Assembly and Encapsulation Facility II	3,500	3,500	3,500	3,500	3,500	3,500	-3,500	3,500	3,500	3,500	0	
255 Johnson Space Center	2,800	2,800	2,800	2,800	2,800	2,800	0	2,800	2,800	2,800	0	
SF - Rehabilitation of Central Heating/Cooling Plant	2,800	2,800	2,800	2,800	2,800	2,800	-2,800	2,800	2,800	2,800	0	
254 Goddard Space Flight Center	7,500	7,500	7,500	7,500	7,500	7,500	0	7,500	7,500	7,500	0	
SSA - Construction of Quality Assurance & Detector Development Lab	7,500	7,500	7,500	7,500	7,500	7,500	-7,500	7,500	7,500	7,500	0	
255 Goddard Space Flight Center	12,000	12,000	12,000	12,000	12,000	12,000	0	12,000	12,000	12,000	0	
SO - Construction of Data Operations Facility	12,000	12,000	12,000	12,000	12,000	12,000	-12,000	12,000	12,000	12,000	0	
254 Jet Propulsion Laboratory	0	14,000	0	14,000	14,000	14,000	0	0	0	0	0	
SSA - Construction of Observational Instrument Laboratory	0	14,000	0	14,000	14,000	14,000	0	0	0	0	0	
255 Jet Propulsion Laboratory	5,400	5,400	5,400	5,400	5,400	5,400	0	5,400	5,400	5,400	0	
SSA - Modernization of South Utility Systems	5,400	5,400	5,400	5,400	5,400	5,400	-5,400	5,400	5,400	5,400	0	

Item	AUTHORIZATION							APPROPRIATION			
	Budget Submission to Congress	House Comm.	Senate Comm.	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission	House Comm.	Senate Comm.	Conf. Comm.	Difference from Budget Submission
		H. R. 1759 Rpt. 101-224 8-31-89 Appd. 9-21-89	S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	H. R. 3729 CR Page S16599 11-21-89 Appd. 11-22-89	P. L. 9 111-111 Rpt. 9 111-111 11-11-11 Appd. 11-11-11		H. R. 2916 Rpt. 101-150 7-17-89 Appd. 7-20-89	H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-28-89	P. L. 101-144 Rpt. 101-297 10-18-89 Appd. 11-9-89	
402 Aeronautical Facilities	64,200	64,200	64,200	64,200	64,200	0	-64,200	64,200	60,700	60,700	-3,500
AST - Construction of 40x80 Drive Motor Roof (ARC)	1,000	1,000	1,000	1,000	1,000		-1,000	1,000	1,000	1,000	0
AST - Modifications to Thermo-Physics Facilities (ARC)	4,600	4,600	4,600	4,600	4,600		-4,600	4,600	4,600	4,600	0
AST - Modifications to 14x22 Subsonic Wind Tunnel (LaRC)	1,000	1,000	1,000	1,000	1,000		-1,000	1,000	1,000	1,000	0
AST - Modifications to National Transonic Facility for Productivity (LaRC)	7,400	7,400	7,400	7,400	7,400		-7,400	7,400	7,400	7,400	0
AST - Modifications to 20-foot Vertical Spin Tunnel (LaRC)	1,900	1,900	1,900	1,900	1,900		-1,900	1,900	1,900	1,900	0
AST - Rehabilitation of Central Air System (LaRC)	2,400	2,400	2,400	2,400	2,400		-2,400	2,400	2,400	2,400	0
AST - Rehabilitation of Central Refrigeration Equipment (LaRC)	7,200	7,200	7,200	7,200	7,200		-7,200	7,200	7,200	7,200	0
AST - Rehabilitation of B26 Supersonic and 9x15 Low-Speed Wind Tunnels (LaRC)	6,800	6,800	6,800	6,800	6,800		-6,800	6,800	6,800	6,800	0
AST - Rehabilitation of Hypersonic Tunnel (Plum Brook)	4,100	4,100	4,100	4,100	4,100		-4,100	4,100	600	600	-3,500
AST - Repair and Modernization of the 12-Foot Pressure Wind Tunnel (ARC)	27,600	27,600	27,600	27,600	27,600		-27,600	27,600	27,600	27,600	0
254 Ames Research Center	10,600	10,600	10,600	10,600	10,600	0	-10,600	10,600	10,600	10,600	0
AST - Construction of Automation Sciences Research Facility	10,600	10,600	10,600	10,600	10,600		-10,600	10,600	10,600	10,600	0

Item	AUTHORIZATION							APPROPRIATION			
	Budget Submission to Congress	House Comm. H. R. 1759 Rpt. 101-226 8-31-89 Appd. 9-21-89	Senate Comm. S. 916 Rpt. 101-157 10-3-89 Appd. 11-9-89	House Comm. H. R. 3729 CR Page H9130 11-20-89 Appd. 11-20-89	Senate Comm. H. R. 3729 CR Page S16590 11-21-89 Appd. 11-22-89	Conf. Comm. P. L. 0 101-222 Rpt. 0 101-223 11-21-89 Appd. 11-21-89	Difference from Budget Submission	House Comm. H. R. 2916 Rpt. 101-158 7-17-89 Appd. 7-20-89	Senate Comm. H. R. 2916 Rpt. 101-297 9-13-89 Appd. 9-20-89	Conf. Comm. P. L. 101-144 Rpt. 101-297 10-10-89 Appd. 11-9-89	Difference from Budget Submission
402 Langley Research Center	6,900	6,900	6,900	6,900	6,900	0	-6,900	6,900	6,900	6,900	0
AS1 - Construction of Supersonic/Hypersonic Low Disturbance Tunnel	6,900	6,900	6,900	6,900	6,900		-6,900	6,900	6,900	6,900	0
255 Various Locations	2,600	2,600	2,600	2,600	2,600	0	-2,600	2,600	2,600	2,600	0
50 - Modifications for Seismic Safety, Goldstone, CA (JPL)	2,600	2,600	2,600	2,600	2,600		-2,600	2,600	2,600	2,600	0
255 MGT - Repair of Facilities	28,000	28,000	28,000	28,000	28,000		-28,000	28,000	28,000	28,000	0
255 MGT - Rehabilitation and Modification of Facilities	36,000	36,000	36,000	36,000	36,000		-36,000	36,000	36,000	36,000	0
255 Mgt - Minor Construction and Additions to Facilities	10,000	10,000	10,000	10,000	10,000		-10,000	10,000	10,000	10,000	0
255 Mgt - Facility Planning and Design	26,300	26,300	26,300	26,300	26,300		-26,300	26,300	26,300	26,300	0
255 Mgt - Environmental Compliance and Restoration Program	30,000	30,000	30,000	30,000	30,000		-30,000	30,000	30,000	30,000	0
254 CP - Wake Shield Facility (various locations)	0	0	2,500	2,500	2,500		0	0	2,500	2,500	2,500
General Reduction of Conf	0	-10,000	0	0	0		0	0	-14,000	0	0
Adjustment of Conf	0	-14,000	0	-14,000	-14,000		0	0	-800	0	0
Title V, Section 517 Reduction of Conf	0	0	0	0	0		0	27,500	0	155,500	155,500
								0	0	-9,320	-9,320

Item	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION				
	House Comm. H. R. 1759	Senate Comm. S. 916	House Comm. H. R. 3729	Senate Comm. H. R. 3729	Conf. Comm. P. L. 0 xxx-xxx	House Comm. H. R. 2916		Senate Comm. H. R. 2916	Conf. Comm. P. L. 101-144	Difference from Budget Submission		
	Rpt. 101-226 8-31-89	Rpt. 101-157 10-3-89	CR Page M9130 11-20-89	CR Page S16590 11-21-89	Rpt. 0 xxx-xxx xx-xx-xx	Rpt. 101-150 7-17-89		Rpt. 101-297 9-13-89	Rpt. 101-297 10-18-89			
	Appd. 9-21-89	Appd. 11-9-89	Appd. 11-20-89	Appd. 11-22-89	Appd. xx-xx-xx	Appd. 7-20-89	Appd. 9-28-89	Appd. 11-9-89				
Research and Program Management	2,032,200	2,032,200	2,049,200	2,032,200	2,049,200	0 91	-2,032,200	1,957,200	1,982,200	1,951,476	-80,724	
By Installation:												
Johnson Space Center	323,171	323,171	323,171	323,171	323,171		-323,171	323,171	323,171	323,171	0	
Kennedy Space Center	279,263	279,263	279,263	279,263	279,263		-279,263	279,263	279,263	279,263	0	
Marshall Space Flight Center	265,709	265,709	265,709	265,709	265,709		-265,709	265,709	265,709	265,709	0	
Stennis Space Center	25,883	25,883	25,883	25,883	25,883		-25,883	25,883	25,883	25,883	0	
Goddard Space Flight Center	271,239	271,239	271,239	271,239	271,239		-271,239	271,239	271,239	271,239	0	
Ames Research Center	186,961	186,961	186,961	186,961	186,961		-186,961	186,961	186,961	186,961	0	
Langley Research Center	201,495	201,495	201,495	201,495	201,495		-201,495	201,495	201,495	201,495	0	
Lewis Research Center	207,790	207,790	207,790	207,790	207,790		-207,790	207,790	207,790	207,790	0	
Headquarters	270,689	270,689	270,689	270,689	270,689		-270,689	270,689	270,689	270,689	0	
General Reduction	0	0	0	0	0	0	0	-75,000	-50,000	-18,750	-18,750	
Adjustment	0	0	17,000	0	17,000	0	0	0	0	-31,250	-31,250	
By Function:												
Personnel and Related Costs	1,222,040	1,222,040	1,222,040	1,222,040	1,222,040		-1,222,040	1,194,540	1,208,200	1,208,200	-13,750	
Travel	50,957	50,957	50,957	50,957	50,957		-50,957	50,957	50,957	50,957	0	
Operation of Installations	759,203	759,203	759,203	759,203	759,203	0	-759,203	711,703	722,953	754,703	-5,000	
Facilities Services	305,468	305,468	305,468	305,468	305,468		-305,468	305,468	305,468	305,468	0	
Technical Services	195,671	195,671	195,671	195,671	195,671		-195,671	195,671	195,671	196,671	1,000	
Management and Operations												
Support	258,064	258,064	258,064	258,064	258,064		-258,064	258,064	258,064	258,064	0	
General Reduction	0	0	0	0	0		0	-47,500	-38,250	-6,000	-6,000	
Adjustment	0	0	17,000	0	17,000		0	0	0	-31,250	-31,250	
Title V, Section 517 Reduction of RSPN	0	0	0	0	0		0	0	0	-30,724	-30,724	

Item	AUTHORIZATION						Difference from Budget Submission	APPROPRIATION			
	House Comm. H. R. 1759	Senate Comm. S. 916	House Comm. H. R. 3729	Senate Comm. H. R. 3729	Conf. Comm. P.L. 959-959	House Comm. H. R. 2916		Senate Comm. H. R. 2916	Conf. Comm. P. L. 101-144	Difference from Budget Submission	
	Rpt. 101-220 8-21-89	Rpt. 101-157 10-3-89	CR Page M913D 11-20-89	CR Page S16500 11-21-89	Rpt. 959-959 11-22-89	Rpt. 101-150 7-17-89		Rpt. 101-297 9-13-89	Rpt. 101-297 10-18-89		
Office of Inspector General	0,795	0,795	0,795	0,795	0,795	0 9/	-0,795	0,795	0,795		0,659
Personnel and Related Costs	0,115	0,115	0,115	0,115	0,115		-0,115	0,115	0,115	0,115	0
Travel	360	360	360	360	360		-360	360	360	360	0
Operation of Installations	320	320	320	320	320	0	-320	320	320	320	0
Facilities Services	0	0	0	0	0		0	0	0	0	0
Technical Services	275	275	275	275	275		-275	275	275	275	0
Management and Operations Support	45	45	45	45	45		-45	45	45	45	0
Title V, Section 517 Reduction of IG	0	0	0	0	0		0	0	0	-136	-136
TOTAL NASA	13,273,995	14,923,995 7/	13,395,495	14,043,995 8/	14,038,995	0 9/	-13,273,995	12,312,995 10/	12,330,195	12,452,065 11/	-821,930

FOOTNOTES:

- 1/ Includes \$2,130,200,000 authorized in Public Law 100-685 for the Space Station Freedom FY 1990. H.R. 1759 proposals do not increase or decrease the P.L. 100-685 authority, actual new authority proposed in H.R. 1759 for Research and Development is \$5,407,200,000.
- 2/ Includes \$1,800,000,000 of the \$2,130,200,000 authorized in Public Law 100-685 for the Space Station Freedom FY 1990. H.R. 3729 proposals specify only \$1,800,000,000 authority from P.L. 100-685, actual new authority proposed in H.R. 3729 for Research and Development is \$5,419,900,000.
- 3/ Line item includes \$50,000,000 previously appropriated in P.L. # 99-591: \$25,000,000 for Space Shuttle Structural Spares; \$25,000,000 for continued development of an Extended Duration Orbiter (EDO). H.R. 2916 proposed an actual new appropriation of \$4,709,600,000 for the Space Flight, Control and Data Communications account.
- 4/ Line item includes \$75,000,000 previously appropriated in P.L. # 99-591: \$25,000,000 for Space Shuttle Structural Spares; \$25,000,000 for continued development of an Extended Duration Orbiter (EDO); \$25,000,000 for the Space Transportation Systems. P.L. # 101-144 established an actual new appropriation of \$4,543,074,000 for the Space Flight, Control and Data Communications account.
- 5/ Provides transfer authority not to exceed \$85,000,000 for Space Flight, Control and Data Communications, of which \$50,000,000 is available for Tracking & Data Acquisition activities and \$35,000,000 is available for the Advanced Solid Rocket Motor Program; \$67,000,000 for Research and Program Management - except that such funds may not be used to restore any reductions enumerated; \$25,000,000 for Research and Development to be available for the National Aerospace Plane.
- 6/ Provides transfer authority up to \$195,000 to the Office of Inspector General.
- 7/ Actual new authority proposed in H.R. 1759 for NASA is \$12,793,795,000.
- 8/ Actual new authority proposed in H.R. 3729 for NASA is \$13,043,995,000.
- 9/ At the time of this printing, the House had requested a Conference on H.R. 3729 and appointed Conferees on February 28, 1990. No further action has been taken on this bill.
- 10/ Actual new authority to appropriate proposed in H.R. 2916 for NASA is \$12,262,995,000.
- 11/ Actual new authority to appropriate in P.L. # 101-144 for NASA is \$12,377,065,000.
- 12/ Bills propose multiyear funding and identification as a separate line item.
- 13/ Bills propose funding for the Mission to Planet Earth (EOS) be identified as a separate item.
- 14/ Authorization bills propose a new line item "Space Exploration", the House bills propose transferring the entire \$20 million from other line items. The Request & Appropriation do not specify "Space Exploration" as a separate line item.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MULTIYEAR AUTHORIZATION ACT OF 1989

August 31, 1989.—Committed to the Committee of the Whole House on the State
of the Union and ordered to be printed

Mr. ROE, from the Committee on Science, Space, and Technology,
submitted the following

REPORT

[To accompany H.R. 1759]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 1759) to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, and research and program management, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment strikes out all after the enacting clause of the bill and inserts a new text which appears in italic type in the reported bill.

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Strike all after the enacting clause and insert in lieu thereof the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1989".

SEC. 2. FINDINGS.

The Congress finds that—

- (1) the United States aeronautics and space program is supported by an overwhelming majority of the American people;
- (2) the United States aeronautics and space program genuinely reflects our Nation's pioneer heritage and demonstrates our quest for leadership, economic growth, and human understanding;
- (3) the United States space program is based on a solid record of achievement and continues to promote the objective of international cooperation in the exploration of the universe;
- (4) the United States aeronautics and space program generates critical technology breakthroughs that benefit our economy and significantly improve our standard of living;
- (5) the United States aeronautics and space program excites the imagination of every generation and can stimulate the youth of our Nation toward the pursuit of excellence in the fields of science and mathematics;
- (6) the United States aeronautics and space program contributes to the Nation's technological competitive advantage;
- (7) the United States aeronautics and space program requires a sustained commitment of financial and human resources;
- (8) the United States space transportation system will depend upon a robust fleet of Space Shuttle Orbiters and expendable launch vehicle services;
- (9) the United States space program will be advanced with the deployment of a permanently manned space station with research, observation, servicing, manufacturing, and staging capabilities;
- (10) the United States aeronautics program has been a key factor in maintaining preeminence in aviation over many decades;
- (11) the United States needs to maintain a strong program with respect to transatmospheric research and technology; and
- (12) the National Aeronautics and Space Administration is primarily responsible for formulating and implementing the civil aeronautics and space program in the United States.

SEC. 3. POLICY.

It is declared to be national policy that the United States should—

- (1) rededicate itself to the goal of leadership in critical areas of space science, space exploration, and space commercialization;
- (2) increase its commitment of budgetary resources for the space program to reverse the dramatic decline in real spending for such program since the achievements of the Apollo program;
- (3) forge a robust national space program that maintains a healthy balance between manned and unmanned space activities and recognizes the mutually reinforcing benefits of both;
- (4) maintain an active fleet of space shuttle orbiters, including an adequate provision of structural spare parts, and evolve the Orbiter design to improve safety and performance, and reduce operational costs;
- (5) sustain a mixed fleet by utilizing commercial expendable launch vehicle services;
- (6) continue with the development and deployment of a permanently manned space station;
- (7) establish a dual capability for logistics and resupply of the space station utilizing the space shuttle and expendable launch vehicles, including commercial services if available;
- (8) continue to seek opportunities for international cooperation in space;
- (9) maintain an aggressive program of aeronautical research and technology development designed to enhance the United States preeminence in civil and

military aviation and improve safety and efficiency of the United States air transportation system; and

- (10) conduct a program of technology maturation and flight demonstration to prove the feasibility of the air-breathing, hypersonic aerospace plane capable of single stage-to-orbit operation and hypersonic cruise in the atmosphere.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are hereby authorized to be appropriated to the National Aeronautics and Space Administration for fiscal year 1990, except as otherwise provided:

- (1) For "research and development", for the following programs:

(A) United States International Space Station Freedom—

- (i) of the amounts authorized to be appropriated for the Space Station for fiscal year 1990 by section 201(a)(1)(A) of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1983, not more than \$15,000,000 shall be made available for the Flight Telerobotic Servicer program, and not more than \$3,700,000 shall be made available for the Space Station Docking Module program; and
- (ii) \$3,494,400,000 for fiscal year 1992.

(B) Space transportation capability development, \$651,500,000, along with \$716,000,000 for fiscal year 1991 and \$676,000,000 for fiscal year 1992.

(C) Physics and astronomy, \$914,500,000, along with \$1,013,000,000 for fiscal year 1991 and \$1,147,000,000 for fiscal year 1992.

(D) Life sciences, \$124,200,000, along with \$154,000,000 for fiscal year 1991 and \$151,000,000 for fiscal year 1992.

(E) Planetary exploration, \$361,900,000, along with \$322,000,000 for fiscal year 1991 and \$278,000,000 for fiscal year 1992.

(F) Space applications, \$646,000,000, along with \$552,000,000 for fiscal year 1991 and \$518,000,000 for fiscal year 1992, including not more than \$2,000,000 for each such fiscal year for experimenter ground stations for the Advanced Communications Technology Satellite, but only if the experimenter receiving funds obtains at least an equal amount of funds from sources other than the National Aeronautics and Space Administration as is received under this subparagraph.

(G) Technology utilization, \$22,700,000, along with \$23,400,000 for fiscal year 1991 and \$21,200,000 for fiscal year 1992.

(H) Commercial use of space, \$40,300,000, along with \$59,700,000 for fiscal year 1991 and \$92,450,000 for fiscal year 1992.

(I) Aeronautical research and technology, and transatmospheric research and technology, \$589,800,000, along with \$621,000,000 for fiscal year 1991 and \$603,000,000 for fiscal year 1992. None of the funds authorized under this subparagraph for fiscal year 1990 shall be expended unless at least \$127,000,000 are made available for such fiscal year for the National Aerospace Plane Program.

(J) Space research and technology, \$358,100,000, along with \$487,000,000 for fiscal year 1991 and \$530,000,000 for fiscal year 1992.

(K) Space exploration, \$20,000,000, along with \$35,000,000 for fiscal year 1991 and \$100,000,000 for fiscal year 1992.

(L) Safety, reliability, maintainability, and quality assurance, \$23,300,000, along with \$24,000,000 for fiscal year 1991 and \$24,000,000 for fiscal year 1992.

(M) Tracking and data advanced systems, \$19,900,000, along with \$21,000,000 for fiscal year 1991 and \$22,000,000 for fiscal year 1992.

(N) University Space Science and Technology Academic Program, \$35,000,000 along with \$40,000,000 for fiscal year 1991 and \$45,000,000 for fiscal year 1992.

(O) Comet Rendezvous Asteroid Flyby/Cassini mission, not to exceed \$1,600,000,000, to remain available until expended, of which—

- (i) \$490,000,000 shall be available for obligation after October 1, 1989;

- (ii) an additional \$370,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a preliminary design review to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate;

- (iii) an additional \$640,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a critical design review to the Committee on Science, Space, and Technology

of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate; and

(iv) an additional \$100,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a spacecraft integration and systems test to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(2) For "Space flight, control and data communications", for the following programs:

(A) Shuttle production and operational capability, \$1,264,500,000, of which \$90,000,000 are authorized only for safety enhancements to the shuttle orbiter, including—

(i) for the space shuttle main engine—

(I) improved design and installation of High Pressure Oxygen Turbopump bearings;

(II) installation of the 2-duct hot gas manifold;

(III) development of enlarged throat diameter;

(IV) development of single-crystal turbine blades; and

(V) general redesign to reduce welds and make welds totally inspectable;

(ii) for the solid rocket booster/solid rocket motor—

(I) implementation of the recommendations contained in the report of the National Research Council entitled "Collected Reports of the Panel on Technical Evaluation of NASA's Redesign of the Space Shuttle Solid Rocket Booster", issued in 1988;

(II) development of a locking feature for the nozzle leak check port plugs;

(III) development of one-piece case stiffener rings;

(IV) development of nonasbestos motor insulation;

(V) enhancement of lightning protection for case and nozzle; and

(VI) modification of aft skirt structure;

(iii) for the external tank—

(I) upgrading of liquid hydrogen and oxygen temperature, pressure, and liquid level sensors;

(II) upgrading of thermal insulation on areas where dislodged insulation can affect the orbiter; and

(III) investigation of corrosion prevention methods to preclude structural problems; and

(iv) for the orbiter—

(I) modification of structure to eliminate negative margins;

(II) upgrading of the auxiliary power units;

(III) development of a redundant nose wheel steering system (including possible extension of the nose wheel strut);

(IV) elimination of Kapton electrical wire insulation; and

(V) upgrading of valves and regulators to preclude leakage of fuels and oxidizers.

By September 30, 1990, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a full report on the completion of the safety enhancements specified in this subparagraph. Additionally, there are authorized to be appropriated \$1,303,000,000 for fiscal year 1991 and \$1,368,000,000 for fiscal year 1992.

(B) Shuttle operations, \$2,500,700,000, along with \$2,491,900,000 for fiscal year 1991 and \$2,667,900,000 for fiscal year 1992.

(C) Expendable launch vehicles and services, \$171,500,000, along with \$240,000,000 for fiscal year 1991 and \$308,000,000 for fiscal year 1992. Of such funds, \$2,000,000 in fiscal year 1990, \$26,000,000 in fiscal year 1991, and \$66,000,000 in fiscal year 1992 may be used only to purchase expendable launch vehicle services, supporting studies, and spacecraft modification for dual compatibility for the TDRS-G satellite.

(D) Space and ground network, communications and data systems, \$1,077,100,000, along with \$1,159,000,000 for fiscal year 1991 and \$1,228,000,000 for fiscal year 1992.

(3) For "Construction of facilities", including land acquisition, as follows:

(A) Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center, \$10,500,000.

(B) Construction of addition to Mission Control Center, Johnson Space Center, \$17,800,000.

(C) Construction of addition to Simulator/Training Facility, Johnson Space Center, \$3,800,000.

(D) Modifications for Expanded Solar Simulation, Johnson Space Center, \$2,000,000.

(E) Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center, \$4,000,000.

(F) Replace Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center, \$4,600,000.

(G) Replace Pad A Chillers and Controls, Launch Complex 39, Kennedy Space Center, \$1,200,000.

(H) Replace Roofs, Launch Complex 39, Kennedy Space Center, \$11,000,000.

(I) Replace Vehicle Assembly Building Air Handling Units, Kennedy Space Center, \$1,800,000.

(J) Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility No. 3, Kennedy Space Center, \$26,000,000.

(K) Modification of High Pressure Industrial Water System, Stennis Space Center, \$2,000,000.

(L) Replacement of High Pressure Gas Storage Vessels, Stennis Space Center, \$3,000,000.

(M) Construction of natural resource protection at various locations, \$3,800,000.

(N) Refurbish bridges, Merritt Island, Kennedy Space Center, \$4,500,000.

(O) Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center, \$3,500,000.

(P) Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center, \$2,800,000.

(Q) Construction of Data Operations Facility, Goddard Space Flight Center, \$12,000,000.

(R) Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center, \$7,500,000.

(S) Modernization of South Utility Systems, Jet Propulsion Laboratory, \$5,400,000.

(T) Construction of 40 x 80 Drive Motor Roof, Ames Research Center, \$1,000,000.

(U) Modifications to Thermo-Physics Facilities, Ames Research Center, \$4,600,000.

(V) Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center, \$1,000,000.

(W) Modifications to National Transonic Facility for Productivity, Langley Research Center, \$7,600,000.

(X) Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center, \$1,900,000.

(Y) Rehabilitation of Central Air Systems, Lewis Research Center, \$2,400,000.

(Z) Rehabilitation of Central Refrigeration Equipment, Lewis Research Center, \$7,200,000.

(AA) Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center, \$6,800,000.

(BB) Rehabilitation of Hypersonic Tunnel, Plum Brook, \$4,100,000.

(CC) Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center, \$27,600,000.

(DD) Construction of Automation Sciences Research Facility, Ames Research Center, \$10,600,000.

(EE) Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center, \$6,900,000.

(FF) Modifications for Seismic Safety, Goldstone, CA, Jet Propulsion Laboratory, \$2,600,000.

(GG) Repair of facilities at various locations, not in excess of \$750,000 per project, \$28,000,000.

(HH) Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project, \$36,000,000.

(II) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project, \$10,000,000.

(JJ) Environmental compliance and restoration, \$30,000,000.

(KK) Facility planning and design not otherwise provided for, \$26,300,000.

(LL) Construction of Observational Instrument Laboratory, Jet Propulsion Laboratory, \$14,000,000.

Notwithstanding subparagraphs (A) through (KK), the total amount appropriated under such paragraphs shall not exceed \$317,800,000.

(4) For "Research and program management", \$2,032,200,000.

(5) For "Inspector General", \$8,795,000, along with \$9,000,000 for fiscal year 1991 and \$9,000,000 for fiscal year 1992.

(6) Notwithstanding paragraph (9), appropriations authorized pursuant to this Act for "Research and development" and "Space flight, control and data communications" may be used (A) for any items of a capital nature (other than acquisition of land) which may be required at locations other than installations of the National Aeronautics and Space Administration for the performance of research and development contracts, and (B) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conduct of scientific research, for purchase or construction of additional research facilities; and title to such facilities shall be vested in the United States unless the Administrator of the National Aeronautics and Space Administration (hereafter in this Act referred to as the "Administrator") determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant. None of the funds appropriated for "Research and development" and "Space flight, control and data communications" pursuant to this Act may be used in accordance with this paragraph for the construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$500,000, unless the Administrator or the Administrator's designee has notified the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, of the nature, location, and estimated cost of such facility.

(7) Except as otherwise provided, and to the extent provided in an appropriation Act, (A) any amount appropriated pursuant to this Act for "Research and development", for "Space flight, control and data communications", or for "Construction of facilities" may remain available without fiscal year limitation, and (B) contracts may be entered into under "Research and program management" for maintenance and operation of facilities, and for other services to be provided, during the next fiscal year.

(8) Appropriations made pursuant to paragraph (4) may be used, but not to exceed \$35,000 per fiscal year, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and his determination shall be final and conclusive upon the accounting officers of the Government.

(9A) Funds appropriated pursuant to paragraphs (1), (2), and (4) may be used for the construction of new facilities and additions to, repair, rehabilitation, or modification of existing facilities, if the cost of each such project, including collateral equipment, does not exceed \$100,000.

(B) Funds appropriated pursuant to paragraphs (1) and (2) may be used for unforeseen programmatic facility project needs, if the cost of each such project, including collateral equipment, does not exceed \$500,000.

(C) Funds appropriated pursuant to paragraph (4) may be used for repair, rehabilitation, or modification of facilities controlled by the General Services Administration, if the cost of each project, including collateral equipment, does not exceed \$500,000.

SEC. 5. ADMINISTRATOR'S REPROGRAMMING AUTHORITY.

Any of the amounts authorized in section 4(3)(A) through (LL)—

(1) in the discretion of the Administrator or the Administrator's designee, may be varied upward 10 percent, or

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, on the circumstances of such action, may be varied upward 25 percent, to meet unusual cost variations.

The total amount authorized under section 4(3) for fiscal year 1990 shall not be increased as a result of reprogramming carried out pursuant to this section. The au-

thority to vary amounts under this section shall not include the authority to reduce the amount authorized under section 4(3)(L).

SEC. 6. SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES.

Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred; and that such changes require the use of additional funds for the purposes of construction, expansion, or modification of facilities at any location; and that deferral of such action until the enactment of the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities; the Administrator may transfer not to exceed ½ of 1 percent of the funds appropriated pursuant to section 4(1) and (2) to the "Construction of facilities" appropriation for such purposes. The Administrator may also use up to \$10,000,000 of the amounts authorized under section 4(3) (A) through (KK) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30 days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a written report describing the nature of the construction, its cost, and the reasons therefor.

SEC. 7. LIMITATIONS ON AUTHORITY.

Notwithstanding any other provision of this Act, no amount appropriated pursuant to this Act may be used for any program not authorized, or in excess of amounts authorized, by the Congress, unless a period of 30 days has passed after the receipt by the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

SEC. 8. PROCUREMENT OF SPACE SHUTTLE STRUCTURAL SPARE PARTS.

The Administrator is authorized and encouraged to use up to \$50,000,000 of the funds appropriated for orbiter production under section 101(g) of the joint resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes" (100 Stat. 3341-242) to procure shuttle structural spare parts.

SEC. 9. NON-FEDERAL FINANCING OF FACILITIES.

(a) LIMITATION ON GENERAL AUTHORITY FOR NON-FEDERAL FINANCING.—No agreement providing for non-Federal financing of any facility may be entered into by the Administrator unless specific authority is provided by law.

(b) NON-FEDERAL FINANCING AUTHORITY.—The Administrator may enter into agreements providing for non-Federal financing of a neutral buoyancy facility and a payload processing facility. No such agreement shall be entered into until 30 days after the Administrator certifies to the Congress that such agreement is in the best interests of the United States, considering—

- (1) net cost savings to the Federal Government over the life of the agreement;
- (2) the amount of non-Federal revenues the facility anticipates receiving;
- (3) the amount and nature of the equity investment or other risk assumed by the financing source;
- (4) the amount of potential exposure to termination liability of the United States under the agreement;
- (5) the annual burden of guaranteed payments, if any, incurred by the United States under the agreement; and
- (6) the ways in which such agreement promotes the commercialization of space.

Each such certification shall be made using standard accounting practices, and shall be annually updated and resubmitted to the Congress, along with the President's budget request for the National Aeronautics and Space Administration, during the time the agreement is in effect.

(c) PREFERRED AGREEMENTS.—In seeking non-Federal financing under subsection (b), the Administrator shall invite proposals for, and give special preference to, arrangements that may potentially reduce the cost to the United States through—

- (1) private sector operation of the facility;
- (2) private sector shared use of the facility;
- (3) innovative design and construction; and

(4) shared risk arrangements.

In no case shall the Administrator enter into a financing agreement under subsection (b) if to do so would substantially impair the National Aeronautics and Space Administration's program schedule.

(d) **TERMINATION LIABILITY.**—The Administrator may provide in any agreement entered into under subsection (b) contingent liability in the event the Government for its convenience terminates such agreement. Such agreement shall limit the amount of payments that the Federal Government is required to make for such contingent liability to amounts provided in advance to the National Aeronautics and Space Administration in appropriations Acts. If funds for such purpose have not been provided, such payments shall be made from other unobligated appropriations of the National Aeronautics and Space Administration. In no case shall such agreement provide for contingent liability in excess of 80 percent of the costs resulting from any such termination for convenience.

SEC. 10. GEOGRAPHICAL DISTRIBUTION.

The Administrator shall distribute research and development funds geographically in order to provide the broadest practicable participation in the programs of the National Aeronautics and Space Administration.

SEC. 11. BUY AMERICAN.

(a) **GENERAL RULE.**—The Administrator shall award to a domestic firm a contract that, under the use of competitive procedures, would be awarded to a foreign firm, if—

- (1) the final product of the domestic firm will be completely assembled in the United States;
- (2) when completely assembled, not less than 50 percent of the final product of the domestic firm will be domestically produced; and
- (3) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(b) **EXCEPTIONS.**—This section shall not apply to the extent to which—

- (1) such applicability would not be in the public interest;
- (2) compelling national security considerations require otherwise; or
- (3) the United States Trade Representative determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(c) **DEFINITIONS.**—For purposes of this section—

- (1) the term "domestic firm" means a business entity that is incorporated in the United States and that conducts business operations in the United States;
- (2) the term "foreign firm" means a business entity not described in paragraph (1).

(d) **LIMITATION.**—This section shall apply only to contracts for which—

- (1) amounts are made available pursuant to this Act; and
- (2) solicitations for bids are issued after the date of the enactment of this Act.

(e) **REPORT TO CONGRESS.**—The Administrator shall report to the Congress on contracts covered under this section and entered into with foreign entities in fiscal years 1990 and 1991 and shall report to the Congress on the number of contracts that meet the requirements of subsection (a) but which are determined by the United States Trade Representative to be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party. The Administrator shall also report to the Congress on the number of contracts covered under this Act and awarded based upon the parameters of this section.

SEC. 12. AMENDMENTS TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958.

Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) is amended—

(1) in subsection (a), by—

- (A) striking "and" at the end of paragraph (2);
- (B) striking the period at the end of paragraph (3) and inserting in lieu thereof a semicolon; and
- (C) adding at the end the following new paragraphs:

"(4) seek and encourage, to the maximum extent possible, the fullest commercial use of space; and

"(5) encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government."; and

(2) in subsection (c), by—

(A) striking "and" at the end of paragraph (13);

(B) striking the period at the end of paragraph (14) and inserting in lieu thereof a semicolon; and

(C) adding at the end the following new paragraphs:

"(15) to establish procedures for the procurement on a commercially reasonable basis by the Administration, for itself or other Government agencies, of space launch hardware and services or other space hardware and space services provided by the private sector, on an annual or multiyear basis consistent with Federal Government requirements; and

"(16) to seek and promote the commercial use of space by establishing procedures and developing appropriate agreement terms and conditions which facilitate commercial use of the Administration's facilities and services, consistent with Government needs, and associated commercial facilities and services."

SEC. 13. COMMERCIAL SPACE LAUNCH ACT AUTHORIZATION.

Section 24 of the Commercial Space Launch Act (49 U.S.C. App. 2623) is amended by adding at the end thereof the following: "There are authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990."

SEC. 14. NATIONAL SPACE COUNCIL AUTHORIZATION.

(a) **NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, FISCAL YEAR 1989 AMENDMENTS.**—Section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471) is amended by adding at the end the following new subsections:

"(d) Not more than 6 individuals may be employed by the National Space Council without regard to any provision of law regulating the employment or compensation of persons in the Government service, at rates not to exceed the rate of pay for Level VI of the Senior Executive Schedule as provided pursuant to section 5382 of title 5, United States Code.

"(e) The National Space Council may, for purposes of carrying out its functions, employ experts and consultants in accordance with section 3109 of title 5, United States Code, and may compensate individuals so employed for each day they are involved in a business of the National Space Council (including traveltime) at rates not in excess of the daily equivalent of the maximum rate of pay for grade GS-18 as provided pursuant to section 5332 of title 5, United States Code.

"(f) There are authorized to be appropriated \$1,200,000 to carry out the activities of the National Space Council for fiscal year 1990."

(b) **TITLE 5 AMENDMENT.**—Section 5314 of title 5, United States Code, is amended by adding at the end thereof the following:

"Executive Secretary, National Space Council."

SEC. 15. INTERNATIONAL SPACE YEAR.

(a) **SENSE OF THE CONGRESS.**—It is the sense of the Congress that the President should—

(1) lead the formulation of an International Space Year agenda developed in consultation with foreign leaders;

(2) declare a World Space Congress, to be convened in 1992, to establish a program for cooperative space activities among cooperating nations in space science, space exploration, and the application of space technologies;

(3) invite the American public to develop International Space Year activities that foster the cooperative spirit of the International Space Year; and

(4) direct the National Aeronautics and Space Administration to continue to develop International Space Year activities with a primary emphasis on Mission to Planet Earth, but also with a strong emphasis on the other space sciences, human exploration, education, and developing nations applications.

(b) **REPORT TO CONGRESS.**—The President shall report to Congress at the earliest practicable date, but no later than January 1, 1990, on the steps taken pursuant to this section.

SEC. 16. ADVANCED SOLID ROCKET MOTOR.

(a) **CONTINGENT LIABILITY.**—If, pursuant to section 207 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (Public Law 100-685), the Administrator selects a proposal for an Advanced Solid Rocket Motor (ASRM) offering a privately financed production facility to be constructed on a Government site, the Administrator may provide in any agreement contingent liability in the event the Government for its convenience terminates such agreement. Such agreement shall limit the amount of payments that the Federal Government is required to make for such contingent liability to amounts provided in advance to the National Aeronautics and Space Administration in appropriation Acts. If funds for

such purpose have not been provided, such payments shall be made from other unobligated appropriations of the National Aeronautics and Space Administration.

(b) **IMPACT ON OTHER PROGRAMS.**—Nothing in this Act shall preclude the Administrator from developing a liquid or hybrid rocket booster for the space shuttle.

(c) **REPORTS TO CONGRESS.**—The Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and Committee on Commerce, Science, and Transportation of the Senate the following:

(1) A report on the projected cost (principal and interest) to complete the design, development, and qualification of the Advanced Solid Rocket Motor. The first report shall be submitted at the end of six months after the signing of the ASRM contract and thereafter with the National Aeronautics and Space Administration's annual budget request.

(2) An annual report of interest rate changes on the loan.

(3) An annual report on the projected unit cost of the flight motors.

(4) An annual report on the increase in Space Shuttle payload capability provided by the Advanced Solid Rocket Motor. The report shall include the original baseline payload capability, adjustments to that baseline capability, and the projected payload capability.

(5) An assessment by the National Research Council of the need for the Advanced Solid Rocket Motor by September 1, 1990.

(6) An assessment by the National Research Council of options to the Advanced Solid Rocket Motor to provide desired performance and safety enhancements by September 1, 1990.

SEC. 17. SPACE SHUTTLE USE POLICY.

(a) **GENERAL STATEMENT OF POLICY.**—It shall be the policy of the United States to use the space shuttle for purposes that require the presence of man or the unique capabilities of the space shuttle.

(b) **IMPLEMENTATION REPORT.**—The Administrator shall, within 6 months after the date of enactment of this Act, submit a report to the Congress setting forth a plan for the implementation of the policy stated in subsection (a). Such plan shall include—

(1) details of the implementation plan;

(2) a list of purposes that require the presence of man;

(3) a proposed schedule for the implementation of the policy stated in subsection (a);

(4) an estimate of the costs to the United States of implementing the policy stated in subsection (a); and

(5) a list of the special certifications the Administrator expects to make under subsection (c)(1).

(c) **SPECIAL CERTIFICATIONS FOR SHUTTLE UNIQUE PAYLOADS THAT DO NOT REQUIRE THE PRESENCE OF MAN.**—

(1) **SPECIAL CIRCUMSTANCES.**—The Administrator shall certify in writing to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate when the Administrator determines that compelling circumstances exist that warrant the use of the space shuttle for purposes that do not require the presence of man. No funds may be expended on space shuttle planning and operations for a mission involving purposes that do not require the presence of man until the expiration of 30 days after such certification.

(2) **SECONDARY PAYLOADS.**—The policy stated in subsection (a) and paragraph (1) of this subsection shall not preclude the use of available cargo space, on a space shuttle mission otherwise in compliance with such policy, for the purpose of carrying secondary payloads (as such term is defined by the Administrator) that do not require the presence of man.

(d) **LIMITATION ON SECONDARY PAYLOADS.**—Secondary payloads (as such term is defined by the Administrator) carried on the space shuttle shall include only payloads consistent with requirements for authorized research, development, demonstration, scientific, and commercial programs.

SEC. 18. FAIR PRICING AGREEMENT.

(a) **FINDINGS.**—Congress finds that—

(1) The export of United States manufactured satellites is a valuable contributor to the United States balance of trade and should be encouraged;

(2) Unfair trade practices which undermine the viability of the United States launch vehicle industry will also ultimately lead to the loss of the United States competitive posture for United States manufactured satellites; and

(3) The viability of the United States commercial launch industry is undermined by competition from the Soviet Union, whose subsidized launch vehicles are priced significantly below world market prices.

(b) It is the policy of the United States that the United States Trade Representative should enter into negotiations for the purpose of achieving fair pricing agreements for international trade in commercial launch services. Such agreement shall support free and fair competition for those services.

(c) **PRESIDENTIAL CERTIFICATION.**—The policy stated in subsection (b) shall not apply if the President certifies to Congress that the price of launch services offered by the Australians utilizing Soviet Union launch vehicles is not more than 25 percent below the price of a comparable launch vehicle built in a market-based economy, as determined using generally accepted cost accounting standards used in market-based economies.

(d) **FURTHER POLICY.**—In absence of agreement stated in subsection (b) or Presidential Certification stated in subsection (c), it is the policy of the United States that the export of United States manufactured satellites for launch on Soviet Union manufactured vehicles should be prohibited.

SEC. 19. EXPORT OF SATELLITES FOR LAUNCH BY THE PEOPLE'S REPUBLIC OF CHINA.

(a) **EXPORT OF SATELLITES.**—Any license for the export of a satellite of United States origin that is intended for launch from a launch vehicle owned by the People's Republic of China (specifically including the Hughes Aircraft Model HS-601 Spacecraft (commercial communications satellites) whose export is described in the certification transmitted to the Congress pursuant to section 36(c) of the Arms Export Control Act on September 12, 1988) shall continue to be suspended, unless the President makes a report under subsection (b) of this section. Any license for such an export that was issued before the enactment of this Act shall also continue to be suspended unless the President makes a report under subsection (b) of this section.

(b) **PRESIDENT'S REPORT.**—A report referred to in subsection (a) is a report by the President to the Congress—

(1) that the Government of the People's Republic of China has made progress on a program of political reform throughout the country, including Tibet, which includes—

(A) lifting of martial law;

(B) halting of executions and other reprisals against individuals for the nonviolent expression of their political beliefs;

(C) release of political prisoners;

(D) increased respect for internationally recognized human rights, including freedom of expression, the press, assembly, and association; and

(E) permitting a freer flow of information, including an end to the jamming of Voice of America and greater access for foreign journalists; or

(2) that it is in the national security interest of the United States to terminate a suspension under subsection (a).

SEC. 20. LIFE SCIENCES STRATEGIC PLAN.

(a) **FINDINGS.**—The Congress finds that—

(1) the current knowledge base in life sciences is not compatible with the National Aeronautics Space Administration's current objectives in space, and the National Aeronautics Space Administration lacks an adequate strategic plan to acquire this knowledge base;

(2) it is critical to the success of manned missions in space, be they commercial operations of microgravity laboratories or manned missions to Mars, that a realistic appraisal of the influences of the space environment on biological systems is completed and appropriate protective countermeasures developed;

(3) the space station is rapidly approaching design maturity without a corresponding development of the physiological and other human factors knowledge base necessary for long-term manned operations in space; and

(4) space station laboratory hardware specifications are being fixed before fully establishing the objectives and requirements for life sciences research.

(b) **STRATEGIC PLAN.**—The Administrator shall—

(1) review currently proposed manned space flight missions in order to—

(A) identify the physiological and other human factors knowledge base necessary to determine the human capacity to adapt to and perform effectively in the space environment according to mission requirements, including identifying which life sciences parameters must be measured and which technologies, processes, and procedures must be developed; and

(B) develop a schedule indicating when specific components of information, technologies, processes, or procedures identified under subparagraph (A) will need to be acquired or developed in order to verify that human adaptability requirements of manned space flight missions can be achieved;

(2) develop a strategic plan for life sciences research and technology development sufficient to accomplish the life sciences knowledge base acquisition schedule developed under paragraph (1)(B), including—

(A) a crew certification plan setting acceptable crew deconditioning standards for Extended Duration Orbiter operations and verifying countermeasures sufficient to meet those standards before actual Extended Duration Orbiter operations; and

(B) a life sciences implementation plan for the design and development of the space station, to be provided as part of the Preliminary Design Review for the space station, and to include crew adaptability standards; and

(3) verify the physiological and technical feasibility of the life sciences implementation plan developed under paragraph (2)(B), as part of the Critical Design Review for the space station.

SEC. 21. COMMISSION FOR INTERNATIONAL COOPERATION IN PLANETARY EXPLORATION.

(a) **SHORT TITLE.**—This section may be cited as the "Commission for International Cooperation in Planetary Exploration Act".

(b) **FINDINGS.**—The Congress finds that—

(1) the President on January 5, 1988, established the long-range goal of expanding human presence and activity beyond Earth orbit into the solar system in the twenty-first century;

(2) the United States and the Soviet Union, in cooperation with other countries, are currently planning further unmanned missions to the Moon and to Mars with the possible goal of landing a human on Mars;

(3) a series of international missions to expand human presence beyond Earth orbit would further a spirit of, and follow through on the commitment made in, the 1987 agreement between the Soviet Union and the United States for space cooperation, as well as the successful cooperative agreements the United States has pursued with over one hundred countries since its inception, including the agreement with Japan, Canada, and the European countries for Space Station Freedom;

(4) international manned missions beyond Earth orbit could save the individual nations involved tens of billions of dollars over national missions; and

(5) a multilateral effort for manned missions to establish a lunar colony, a Mars mission, and any other missions that have the goal of establishing human presence beyond Earth's orbit and possibly landing a human on Mars would lead to greater understanding of our universe and greater sensitivity to our own planet.

(c) **ESTABLISHMENT.**—There is established a commission to be known as the "Commission for International Cooperation in Planetary Exploration" (hereafter in this section referred to as the "Commission").

(d) **PURPOSE OF COMMISSION.**—The purpose of the Commission is—

(1) to develop an inventory of intentions of all national space agencies with regard to lunar and planetary exploration, both manned and unmanned;

(2) to seek ways to enhance the planning and exchange of information and data among the United States, the Soviet Union, European countries, Canada, Japan, and other interested countries with respect to unmanned projects beyond Earth orbit, in anticipation of later international manned missions to the Moon and to other bodies, including the possible goal of an international manned mission to Mars;

(3) to prepare a detailed proposal that most efficiently uses the resources of the national space agencies in cooperative endeavors to establish human presence beyond Earth orbit;

(4) to develop priority goals that accomplish unmet needs that could not be achieved by any individual country;

(5) to explore the possibilities of international unmanned probes to the Moon and Mars, and the possibilities for international manned missions beyond Earth's orbit; and

(6) to devise strategies for such cooperation that would prevent the unwanted transfer of technology.

(e) **MEMBERSHIP.**—

(1) **NUMBER AND APPOINTMENT.**—The Commission shall be composed of 16 members, appointed from among experts in space policy or space science, as follows:

(A) Eight members shall be appointed by the President, one of whom shall be the Chairman of the National Space Council, who shall serve as Chairman of the Commission.

(B) Four members shall be appointed by the Speaker of the House of Representatives.

(C) Four members shall be appointed by the President Pro Tempore of the Senate.

A vacancy in the Commission shall be filled in the manner in which the original appointment was made.

(2) **BASIC PAY.**—Members of the Commission shall serve without pay.

(f) **DIRECTOR AND STAFF OF COMMISSION.**—

(1) **DIRECTOR.**—The Commission shall, without regard to section 5311(b) of title 5, United States Code, have a Director who shall be appointed by the Commission and who shall be paid at the rate of basic pay payable for GS-15 of the General Schedule.

(2) **STAFF.**—Subject to paragraph (3) and such rules as may be prescribed by the Commission, without regard to section 5311(b) of title 5, United States Code, the Commission may appoint and fix the pay of such additional personnel as the Commission considers appropriate.

(3) **APPLICABILITY OF CERTAIN CIVIL SERVICE LAWS.**—The staff of the Commission shall be appointed subject to the provisions of title 5, United States Code, governing appointments in the competitive service, and shall be paid in accordance with the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates.

(4) **EXPERTS AND CONSULTANTS.**—Subject to such rules as may be prescribed by the Commission, the Commission may procure temporary and intermittent services under section 3109(b) of title 5 of the United States Code.

(5) **STAFF OF FEDERAL AGENCIES.**—Upon request of the Commission, the head of any Federal agency is authorized to detail, on a reimbursable basis, any of the personnel of such agency to the Commission to assist the Commission in carrying out its duties under this section.

(g) **POWERS OF COMMISSION.**—

(1) **HEARINGS AND SESSIONS.**—The Commission may, for the purpose of carrying out this section, hold such hearings, sit and act at such times and places, take such testimony, and receive such evidence, as the Commission considers appropriate.

(2) **POWERS OF MEMBERS AND AGENTS.**—Any member or agent of the Commission may, if so authorized by the Commission, take any action which the Commission is authorized to take by this subsection.

(3) **OBTAINING OFFICIAL DATA.**—The Commission may secure directly from any department or agency of the United States information necessary to enable it to carry out this section. Upon request of the Chairman of the Commission, the head of such department or agency shall furnish such information to the Commission.

(4) **GIFTS.**—The Commission may accept, use, and dispose of gifts or donations of services or property.

(5) **MAILS.**—The Commission may use the United States mails in the same manner and under the same conditions as other departments and agencies of the United States.

(6) **ADMINISTRATIVE SUPPORT SERVICES.**—The Administrator of General Services shall provide to the Commission on a reimbursable basis such administrative support services as the Commission may request.

(h) **REPORT.**—The Commission shall, within one year after the date of the enactment of this Act, prepare and submit to the President and the Congress a report—

(1) outlining a preliminary strategy for cooperation among the United States, the Soviet Union, European countries, Canada, Japan, and other interested countries with respect to unmanned projects beyond Earth orbit, in anticipation of later international manned missions to the Moon and to other bodies, including the possible goal of an international manned mission to Mars;

(2) including an initial proposal outlining a possible international manned mission, in coordination with the preliminary strategy referred to in paragraph (1); and

(3) containing an inventory of planned and anticipated missions, manned and unmanned, that are being considered by national space agencies.

(i) **TERMINATION.**—The Commission shall cease to exist thirty days after submitting its report pursuant to subsection (h), unless the President or the Congress have requested further revisions to the report.

SEC. 22. OFFICE OF SPACE COMMERCE.

(a) **ESTABLISHMENT.**—There is established within the Department of Commerce an Office of Space Commerce.

(b) **FUNCTIONS.**—The Office of Space Commerce shall be the principal unit for the coordination of space related issues, programs, and initiatives within the Department of Commerce. The Office shall—

(1) promote private sector investment in space activities by collecting, analyzing, and disseminating information on space markets, and conducting workshops and seminars to increase awareness of commercial space opportunities;

(2) assist commercial space companies in their efforts to do business with the United States Government, and act as an industry advocate within the Executive Branch to ensure that the Government meets its space related requirements, to the fullest extent feasible, with commercially available space goods and services;

(3) ensure that the U.S. Government does not compete with the private sector in the provision of space hardware and services otherwise available from the private sector;

(4) promote the export of space related goods and services;

(5) represent the Department of Commerce in the development of United States policies and in negotiations with foreign countries to ensure free and fair trade internationally in the area of space commerce; and

(6) seek the removal of legal, policy, and institutional impediments to space commerce.

SEC. 23. UPGRADING HISTORIC LANDMARK FACILITIES.

The National Aeronautics and Space Act of 1958 is amended by adding at the end the following new section:

"UPGRADING HISTORIC LANDMARK FACILITIES

"SEC. 312. The Administrator may take whatever actions are necessary to maintain, modify, upgrade, rehabilitate, and expand facilities designated as National Historic Landmarks under the National Historic Preservation Act without regard to sections 106 and 1100 of such act, unless the proposed actions would alter the basic purposes or elements which were the bases for such designation."

SEC. 24. NATIONAL AERO-SPACE PLANE PROGRAM.

(a) **FINDINGS.**—The Congress finds that—

(1) if the United States is to maintain preeminence in military and commercial aeronautics into the next century, research into technology development and validation of the National Aero-Space Plane (NASP) is vital;

(2) the new and advanced materials being developed for the NASP have numerous applications in the military and the civilian aviation industry, as well as in other industries utilizing high temperature technologies;

(3) the benefits to the military and civilian aviation programs from the new and innovative technologies developed in connection with the NASP program in propulsion systems, aerodynamics, and control systems could be enormous, especially for high speed aeronautical and space flight; and

(4) military and commercial spin-off applications of NASP technologies include future superior military aircraft, space transportation systems, and commercial hypersonic aircraft.

(b) **ESTABLISHMENT OF PROGRAM.**—The Secretary of Defense thereafter in this section referred to as the "Secretary") and the Administrator shall jointly establish a National Aero Space Plane program whose objective shall be exclusively the development and demonstration, by 1995, of a primarily air breathing single-stage-to-orbit and long range hypersonic cruise research flight vehicle. The program shall be a research program, and to the extent practicable technological information developed shall be transferred to the military and to the domestic civil aviation and other private industries.

(c) **RESPONSIBILITIES.**—The Secretary shall have responsibility for procurement, experimental flight vehicles, and overall program administration of the program established under subsection (b). The Administrator shall have responsibility for providing technology development and flight test support and shall have an integral role in the overall program. Representatives of both the Secretary and the Administrator shall participate in all aspects of the program.

(d) MANAGEMENT PLAN.—

(1) The Secretary and the Administrator shall jointly develop a management plan for the program established under subsection (b), which shall include goals, major tasks, anticipated schedules, organizational structure, funding profiles, details of the respective responsibilities of the Secretary and the Administrator, and resource procurement strategies.

(2) The management plan developed pursuant to paragraph (1) shall be submitted to the Congress within 120 days after the date of enactment of this Act.

(e) **FUNDING.**—For fiscal year 1990, the Secretary shall be responsible for not less than two-thirds of the funding for the program established under this section, and the Administrator shall be responsible for not more than one-third of the funding for such program. For fiscal years after 1990, funding responsibilities shall be in accordance with the management plan developed under subsection (d).

INTRODUCTION

The Committee has again provided multiyear authorization for NASA's major programs and has developed guidelines and provided special authority in critical policy areas. The major provisions of the Bill:

- Direct NASA to rededicate itself to the goal of leadership in critical areas of space science, space exploration, and space commercialization.
- Establish a multi-year funding authorization plan with specific authorization levels for fiscal years 1990, 1991, and 1992 for major research and development and operational programs.
- Prevent expenditure of any funds for Aeronautical and Trans-atmospheric Research and Technology unless \$127 million are made available for the National Aero-Space Plane program.
- Authorize the full \$1.6 billion in budget authority for the CRAF/Cassini program of which approximately \$30 million will be spent in fiscal year 1990.
- Authorize funding for the NASA inspector general as a separate line item.
- Authorize the use of appropriations previously made for the replacement orbiter for Shuttle structural space parts.
- Provide special authority and guidelines for agreements for the Space Station neutral buoyancy facility and payload processing facility. These guidelines are intended to develop legitimate management and capitalization roles for the private sector in space commercialization.
- Require NASA to geographically distribute funds.
- Provide guidelines for "Buy American" which are consistent with international agreements.
- Direct NASA to use commercially provided space services and hardware, and to procure space launch services if commercially reasonable.
- Authorize funding for the Department of Transportation's Office of Commercial Space Transportation.
- Authorize operations funding for the National Space Council.
- Endorse the International Space Year in 1992 and call on the President to declare a World Space Congress to focus on cooperative space efforts.
- Provide special authority and guidelines for Advanced Solid Rocket Motor contingent liability, and specify that nothing in the Act should inhibit the development of liquid or hybrid rocket boosters.
- Declare that the export of satellites manufactured in the United States contributes valuably to the balance of trade and that unfair trade practices undermine the viability of the United States launch vehicle industry. On this basis the Act states that the policy of the United States should be to negoti-

- ate fair pricing agreements. U.S. built satellites would be prohibited for export if such agreements cannot be reached.
- Suspend a specific export license previously granted for the launch of a Hughes satellite on the Chinese Long March Vehicle.
- Direct the Administrator to develop a strategic plan for life sciences which specifically addresses crew operations on the Extended Duration Orbiter, and the design and development of the Space Station as part of the preliminary design review.
- Establish an Office of Space Commerce within the Department of Commerce and outline general functions and responsibilities.
- Establish a Commission for International Cooperation in Planetary Exploration study options for cooperative international space exploration initiatives.
- Authorize the Administrator to modify, upgrade, and otherwise make changes in facilities designated as historic landmarks as required to meet the requirements of authorized programs.
- State Unequivocal Congressional support for the National Aero-Space Plane program by authorizing the program through completion of a flight demonstration.

SPACE TRANSPORTATION CAPABILITY DEVELOPMENT

Space Station docking module.—The Committee concludes that the docking module is not a suitable project for commercialization and therefore authorizes funding for FY 1990 to initiate hardware design.

Shuttle-C.—The Committee supports the Shuttle-C program and authorizes funding in FY 1990 to continue studies and analyses of the feasibility and role of this heavy-lift launch vehicle.

PHYSICS AND ASTRONOMY

Space Science data management.—The Committee is concerned over the potential explosive growth in all areas of science data and requires that a strategic plan be developed to solve this problem. A report is requested.

Restore funding for STORE/gravity Probe-B.—The Committee expresses concern over deletion of funds for STORE/GP-B in FY 1990 and fully restores funding. The Committee directs that all identified funding be provided to the principal investigator and contractor team.

LIFE SCIENCES

Overall funding for the life sciences.—The Committee is concerned over the relatively slow growth in life sciences budget and is committed to fully funding the program in FY90-FY92. The Committee is also concerned over the low level of involvement of non-NASA groups in life sciences and directs NASA to increase the participation of the private and academic communities in the program.

Lifesat.—The Committee strongly supports the Lifesat program (a recoverable, reusable satellite launched by rockets) and urges NASA to make Lifesat an FY 1991 new start.

PLANETARY EXPLORATION

The Committee expresses interest in establishing a budget line for the Observer missions and calls on NASA to reassess the strategy for future solar system exploration.

SPACE APPLICATIONS

Advanced Communication Technology Satellite (ACTS).—The Committee restores the funds deleted by the Administration for FY 1990. The program is now 75 percent complete. The Committee also encourages NASA to establish a ground station research program.

ACTS relationship to U.S. interests in High Definition Television (HDTV).—The Committee directs NASA to seek ACTS experiments focusing on HDTV development and recommends that NASA encourage the development of HDTV components and techniques, incorporating them into the space station and other programs.

Global change program—Earth Observation Satellites (EOS) and Earth Probes.—The Committee expresses strong support for earth science projects. The Committee also requests the earth probe program begin in FY 1991 and that the next Total Ozone Measure-

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to the National Aeronautics and Space Administration (NASA) for fiscal years 1990, 1991 and 1992, and to the Department of Transportation Office of Commercial Space Transportation, the Department of Commerce Office of Space Commerce, and the National Space Council within the Executive Office of the President. The bill also sets forth special policy provisions and authorities in order to carry out the activities of the national and civil space programs. In summary, the bill provides the following new budget authorities:

AMOUNT OF NEW BUDGET AUTHORITY

	Fiscal year 1990	Fiscal year 1991	Fiscal year 1992
National Aeronautics and Space Administration	\$12,793,800,000	\$9,271,000,000	\$13,282,950,000
Department of Transportation Office of Commercial Space Transportation	\$4,392,000		
National Space Council	\$1,200,000		

¹ Includes \$1,600,000,000 in multiyear budget authority the CRAF/Cassini mission.
² Includes \$3,494,400,000 in new budget authority for FY 1992 for the Space Station. Budget authority for the Space Station for FY 1990 and FY 1991 was previously provided by Public Law 100 686.

SUMMARY OF COMMITTEE VIEWS

SPACE STATION

Management and integration.—The Committee expresses concern over the management and integration of the Space Station. Of particular concern is the staffing of the program office at Reston. A report on staffing is due with the annual Capital Development Plan.

Polar platform management.—The Committee expresses concern over the management of the polar platform with the spacecraft being managed by the Office of Space Station while the instruments are managed by the Office of Space Science and Applications (OSSA). The Committee recommends NASA reassess this split management at the preliminary design review to see if OSSA's role should be expanded.

Solar dynamic power.—The Committee is concerned that NASA has rejected proposals for accelerating the development of solar dynamic power systems for the space station and directs NASA to report on the technical cost and operating considerations that led to this decision. The Committee also directs NASA to continue the development of solar dynamic power for the Block 1 (initial) space station and is opposed to eliminating it from the program due to funding constraints.

ment Spectrometer (TOMS) be launched as the first in the Earth Probes series.

TECHNOLOGY UTILIZATION

Management of the Sterling engine program.—It is suggested that the sponsorship of the sterling engine program be transferred from the Department of Energy (DOE) to NASA. The Committee is concerned over this transfer and directs NASA to participate in an interagency study (with DOE and others) to determine the sponsor for this program. The study should be submitted by 2/1/90.

COMMERCIAL USE OF SPACE

Office of Commercial Programs—as a focal point for commercial space policy.—The Committee is concerned that the Office of Commercial Programs is not the focal point for commercial programs and policy in NASA and charges NASA to increase the scope of the Office.

Commercial flight opportunities.—It is the Committee's intent that NASA provide more opportunities for small commercial payloads. The Committee also includes language to amend the NASA Act to "seek and encourage to the maximum extent possible the fullest commercial use of space."

Center for Commercial Development of Space (CCDS) in Education.—The Committee recommends that NASA establish a Center for Commercial Development of Space (CCDS) in education.

External tanks.—The Committee commends NASA for working to promote commercial uses of the jettisoned Shuttle external tanks and urges NASA toward an early demonstration of their use in orbit.

AERONAUTICAL RESEARCH AND TECHNOLOGY

Aeronautical materials development.—The Committee directs NASA to coordinate with the Air Force to insure there is no duplication of effort in non-metallic structures technology research as well as directing NASA to manage a balanced program in its new Advanced Composite Technology Initiative.

SPACE RESEARCH AND TECHNOLOGY

Management instability.—The Committee is concerned over the high-level of turnover in the upper levels of management within the Office of Aeronautics and Space Technology.

Expendable launch vehicle research and development.—The Committee provides \$5M for funding for research and development in support of commercial launch vehicle component technology.

Pathfinders.—The Committee increased funding of the Pathfinder program because of a concern that NASA's level of support for basic technology research is inadequate.

SPACE EXPLORATION

Space exploration budget line.—The rationale for a separate budget line for space exploration is given, and the Committee requests NASA to establish such a line in future budget submissions.

International participation in exploration.—The Committee expresses a desire for international participation on the next major manned exploration initiative and recommends that NASA begin studies of candidate cooperative missions.

Moon and Mars initiatives.—The Committee requires that the Administration present to Congress an implementation plan to carry out the recent initiatives (a lunar base followed by a manned Mars mission) proposed by the President. The plan, due 1/15/90, should include milestones, target dates, anticipated costs, opportunities for international participation, and proposed mechanisms to fund the initiatives.

UNIVERSITY SPACE SCIENCE AND TECHNOLOGY ACADEMIC PROGRAMS

The Committee supports the gathering together of university/educational programs within a new budget line and believes this will help expand the commitment of students in space science and technology. The Committee also directs NASA to accelerate the growth of the National Space Grant College and Fellowship Program.

CRAF/CASSINI

The attributes of the Comet Rendezvous Asteroid Flyby (CRAF) and Cassini missions are discussed and, the Committee proposes multiyear funding for this new start.

SPACE SHUTTLE PRODUCTION AND OPERATIONAL CAPABILITY

Orbiter production line.—The Committee expresses concern over the lack of policy regarding future Orbiter production and directs NASA to develop a long-range plan. A report is due 3/1/90.

Production vulnerability of the space program.—The Committee is concerned over the vulnerability of the space program to the loss of a key lower-tier supplier and directs NASA to develop policy and plans to deal with this vulnerability. A report including draft policies and plans is due 7/1/90.

Hardware improvements.—The Committee encourages hardware improvements that increase the safety of the Shuttle and requests that NASA study the feasibility automating the deorbit and landing operations of the Space Shuttle. A report is due 4/15/90.

SPACE SHUTTLE OPERATIONS

Economies within the Space Shuttle Program.—The Committee notes the need to maintain a high quality Shuttle program, but encourages NASA to be vigilant for ways to reduce funding without decreasing quality and safety.

EXPENDABLE LAUNCH VEHICLES

The Committee expresses concern about some of the payloads that have been retained on the Space Shuttle rather than being moved to expendable launch vehicles (ELVs). The Committee also expresses a belief that all future generations of Tracking and Data Relay Satellites should be placed on ELVs. Additionally, the Committee notes the national policy adopted in sec. 3(7) requiring that

Space Station resupply activities be compatible with both expendable launch vehicles as well as the Space Shuttle.

INSPECTOR GENERAL

The Committee discusses its intent that the Inspector General be aggressive and have enough resources to be independent.

DEPARTMENT OF COMMERCE

The Committee authorizes the establishment of an Office of Space Commerce within the Department of Commerce.

LEGISLATIVE REPORTING REQUIREMENTS

REFERENCE AND REQUIREMENT

Section 4—A report summarizing the results for the CRAF/Cassini Mission on the following: (i) Preliminary Design Review, (ii) Critical Design Review, and (iii) Spacecraft Integration and Systems Test.

Section 4—A report on the safety enhancements specified for the Shuttle by September 30, 1990.

Section 5—A report for special reprogramming authority for construction of facilities.

Section 9—A certification regarding non-federal financing of a Neutral Buoyancy Facility and Payload Processing Facility.

Section 11—A report on the nature and number of foreign and domestic contracts awarded under the Buy-American rule.

Section 15—A progress report to Congress by the President concerning the development of International Space Year.

Section 16—A report on the Advanced Solid Rocket Motor Program which: (i) determines the projected cost, (ii) follows interest rate changes on the loan (annual), (iii) determines projected unit cost of flight motors (annual), (iv) determines its role in increasing payload capability (annual), (v) assesses its need to the space program (by September 1, 1990), and (vi) assesses the options available for enhancing its safety and performance by September 1, 1990.

Section 17—A plan detailing the implementation of the Space Shuttle use policy within six months of enactment of this Act.

Section 20—A plan providing for the development of an adequate life sciences knowledge base with respect to human adaptability requirements.

Section 21—A proposal by the Commission for International Cooperation in Planetary Exploration to coordinate most efficiently the resources of the participating nations.

Section 21—A report by the Commission formulating a strategy for unmanned and manned international missions.

Section 24—A management plan developed by the Secretary of Defense and the Administrator of the National Aeronautics and Space Administration describing the major objectives of the National Aerospace Plane Program.

EXPLANATION OF THE BILL AND COMMITTEE VIEWS

SECTION 1: SHORT TITLE

Section 1 designates that the act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1989".

SECTION 2: FINDINGS

Section 2(1) finds that the aeronautics and space program is supported by an overwhelming majority of the American people.

Section 2(2) recognizes that the United States aeronautics and space program reflects our Nation's pioneer heritage, and demonstrates our quest for leadership, economic growth, and human understanding.

Section 2(3) declares that the United States space program is based on a solid record of achievement and encourages international cooperation in the exploration of the Universe.

Section 2(4) recognizes the critical technology breakthrough generated by the United States aeronautics and space program which benefit our economy and greatly improve our standard of living.

Section 2(5) states that the United States aeronautics and space program excites the imagination of every generation and encourages the youth of our Nation to pursue excellence in science and mathematics.

Section 2(6) declares that the United States aeronautics and space program contributes to the Nation's technological competitive advantage.

Section 2(7) expresses the need for sustained commitment of financial and human resources to the aeronautics and space program.

Section 2(8) stresses the need for a robust fleet of Space Shuttle Orbiters and expendable launch vehicles in order to maintain an adequate space transportation system.

Section 2(9) declares that leadership in space will be enhanced by the deployment of a permanently manned space station which should include research, observation, servicing, manufacturing, and staging capabilities.

Section 2(10) states that the United States' preeminence in aviation is due to the United States' aeronautics program;

Section 2(11) stresses the need to maintain a strong transatmospheric research and technology program.

Section 2(12) declares that the National Aeronautics and Space Administration is primarily responsible for formulating and implementing the civil aeronautics and space program of the United States.

SECTION 3: POLICY

Section 3(1) states that the United States must rededicate itself to the goal of leadership in the critical areas of space science, space exploration, and space commercialization.

Section 3(2) directs the United States to increase funding for the space program to reverse the decline in real spending following the Apollo program.

Section 3(3) emphasizes the need for a healthy balance between manned and unmanned space activities recognizing the mutually reinforcing benefits of both.

Section 3(4) states the need to maintain an active fleet of Space Shuttle Orbiters and structural spare parts. The design of the Orbiter should continue evolving to improve safety and performance, and to reduce operational costs.

Section 3(5) states that a mixed fleet must be maintained by utilizing commercial expendable launch vehicles.

Section 3(6) emphasizes the need to develop and deploy a permanently manned space station.

Section 3(7) states that the space station shall be serviced by both space shuttles and commercial expendable launch vehicles.

Section 3(8) directs NASA to continue to seek opportunities for international cooperation in space.

Section 3(9) emphasizes the need to maintain an aggressive program of aeronautical research and technology.

Section 3(10) directs NASA to conduct a program to prove the feasibility of single-stage-to-orbit operation.

SECTION 4: AUTHORIZATION OF APPROPRIATIONS

Section 4 provides a three year authorization of appropriations for the National Aeronautics and Space Administration and related provisions. Sections 4 (1), (2), (3), (4), and (5) contain authorization levels for NASA programs for fiscal years 1990, 1991, and 1992, which are reflected in the chart below.

FISCAL YEARS 1990, 1991, AND 1992 NASA AUTHORIZATION SUMMARY

(In millions of dollars)

	Authorization fiscal year 1990	Authorization fiscal year 1991	Authorization fiscal year 1992
Research and Development:			
Space Station.....	(2,130.2)	(2,912.5)	(3,494.4)
Flight Telerobotic Servicer.....	(15.0)		
Space Station Docking Module.....	(3.7)		
Space Transportation Capability Development.....	651.5	716.0	676.0
Space Science and Applications:			
Physics and Astronomy.....	914.5	1,013.0	1,147.0
Life Science.....	124.2	154.0	151.0
Planetary Exploration.....	361.9	322.0	278.0
Space Applications.....	646.0	552.0	518.0
ACTS Experimenters			
Ground stations.....	(2.0)	(2.0)	(2.0)
Commercial Programs:			
Technology Utilization.....	22.7	23.4	21.2

FISCAL YEARS 1990, 1991, AND 1992 NASA AUTHORIZATION SUMMARY—Continued

(In millions of dollars)

	Authorization fiscal year 1990	Authorization fiscal year 1991	Authorization fiscal year 1992
Commercial Use of Space.....	40.3	59.7	92.45
Aeronautical and Transatmospheric Research and Technology.....	589.8	621.0	603.0
Space Research and Technology.....	358.1	487.0	530.0
Space Exploration.....	20.0	35.0	100.0
Safety, Reliability and Quality Assurance.....	23.3	24.0	24.0
Tracking and Data Advanced Systems.....	19.9	21.0	22.0
University Space Science and Technology.....	35.0	40.0	45.0
CRAF/Cassini.....	1,600.0		
Obligated Funds.....	(30.0)	(148.0)	(313.0)
Space Flight, Control and Data Communications:			
Shuttle Production and Capability Development.....	1,264.5	1,303.0	1,368.0
Safety enhancements to Shuttle Orbiter.....	(90.0)		
Space Shuttle Operations.....	2,500.7	2,491.9	2,667.9
Expendable Launch Vehicles.....	171.5	240.0	308.0
ELV Services, studies, and Spacecraft Modification for the TDRS-G satellite.....	(2.0)	(26.0)	(66.0)
Space and Ground Networks, Communications and Data Systems.....	1,077.1	1,159.0	1,228.0
Construction of Facilities:	(331.8)		
Addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center.....	10.5		
Addition to Mission Control Center, Johnson Space Center.....	17.8		
Addition to Simulator/Training Facility, Johnson Space Center.....	3.8		
Modifications for Expanded Solar Simulation, Johnson Space Center.....	2.0		
Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center.....	4.0		
Replace Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center.....	4.6		
Replace Pad A Chillers and Controls, Launch Complex 39, Kennedy Space Center.....	1.2		
Replace Roofs, Launch Complex 39, Kennedy Space Center.....	11.0		
Replace Vehicle Assembly Building Air Handling Units, Kennedy Space Center.....	1.8		
Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility #3, Kennedy Space Center.....	26.0		
Modification of High Pressure Industrial Water System, Stennis Space Center.....	2.0		

FISCAL YEARS 1990, 1991, AND 1992 NASA AUTHORIZATION
SUMMARY—Continued

(In millions of dollars)

	Authorization fiscal year 1990	Authorization fiscal year 1991	Authorization fiscal year 1992
Replacement of High Pressure Gas Storage Vessels, Stennis Space Center.....	3.0		
Construction of natural resource protection at various locations.....	3.8		
Refurbish bridges, Merritt Island, Kennedy Space Center.....	4.5		
Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center.....	3.5		
Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center.....	2.8		
Construction of Data Operations Facility, Goddard Space Flight Center.....	12.0		
Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center.....	7.5		
Modernization of South Utility Systems, Jet Propulsion Laboratory.....	5.4		
Construction of 40 x 80 Drive Motor Roof, Ames Research Center.....	1.0		
Modifications to Thermo-Physics Facilities, Ames Research Center.....	4.6		
Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center.....	1.0		
Modifications to National Transonic Facility for Productivity, Langley Research Center.....	7.6		
Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center.....	1.9		
Rehabilitation of Central Air Systems, Lewis Research Center.....	2.4		
Rehabilitation of Central Refrigeration Equipment, Lewis Research Center.....	7.2		
Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center.....	6.8		
Rehabilitation of Hypersonic Tunnel, Plum Brook.....	4.1		
Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center.....	27.6		
Construction and Automation Sciences Research Facility, Ames Research Center.....	10.6		
Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center.....	6.9		
Modifications for Seismic Safety, Goldstone, CA, Jet Propulsion Laboratory.....	2.6		

FISCAL YEARS 1990, 1991, AND 1992 NASA AUTHORIZATION
SUMMARY—Continued

(In millions of dollars)

	Authorization fiscal year 1990	Authorization fiscal year 1991	Authorization fiscal year 1992
Repair of facilities at various locations, not exceeding \$750,000 per project.....	28.0		
Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project....	36.0		
Minor Construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project....	10.0		
Environmental compliance and restoration.....	30.0		
Facility planning and design not otherwise provided for.....	26.3		
Construction of Observational Instrument Laboratory.....	14.0		
Research and Program Management.....	2,032.2		
Inspector General.....	8.8	9.0	9.0

SECTION 4 (1) RESEARCH AND DEVELOPMENT

Section 4(1)(A) Space Station Freedom

President's request accompanying fiscal year 1990 budget:

Fiscal year:	
1990.....	\$2,050,200,000
1991.....	2,980,500,000
1992.....	3,494,400,000

Fiscal year 1989 NASA Authorization Act, Public Law 100-685:

Fiscal year:	
1990.....	2,130,200,000
1991.....	2,912,500,000

Committee recommendation:

Fiscal year:	
1990.....	2,130,200,000
1991.....	2,912,500,000

Committee authorization recommendation

Section 4(1)(A) authorizes certain uses of funds previously authorized under Public Law 100-685 for the Space Station Freedom. Public Law 100-685 made available \$2,130,200,000 for FY 1990 and \$2,912,500,000 for FY 1991. Section 4(1)(A) provides authority to obligate \$15,000,000 in FY 1990 for the Flight Telerobotic Servicer (FTS) program. Section 4(1)(A) also provides authority to obligate \$3,700,000 in FY 1990 for the Space Station Docking Module program. Section 4(1)(A) also authorizes the amount of \$3,494,400,000 in FY 1992 for Space Station Freedom.

Program description

The Space Station program will provide an opportunity to gain direct experience in long-term human operations in space, and knowledge essential to future space exploration. The Space Station will uniquely enhance the U.S. space science programs, further the

commercial utilization of space, and stimulate the development and application of advanced technologies of national importance. It is a centerpiece for international cooperation demonstrating the peaceful use of space for the benefit of all mankind.

The basic configuration of the Space Station Freedom and the supporting elements is directly dependent on the anticipated budget and is the result of a lengthy, iterative, three-year process involving NASA centers, U.S. industry, the international partners, and national and international science communities. The Station configuration is comprised of a single horizontal boom structure with 75KW of photovoltaic power, the U.S. laboratory and habitability modules, two international laboratory modules (one European and one Japanese), and a Canadian mobile servicing capability. These elements comprise the manned base, and provide internal and external accommodations for the attachment of science and application payloads. There are also two science and applications platforms, one U.S. and one European, to be launched into polar orbit. A man-tended free-flyer is also under development by ESA as a co-orbiting platform with the manned base. The launch of the first element is planned for March 1995.

The management of U.S. Space Station hardware elements design and development is led by four NASA field centers. The Space Station Program Office (SSPO), located in Reston, Virginia, has the task of managing and integrating the technical development of the entire program. The four "work package" centers are the Marshall Space Flight Center (MSFC) in Huntsville, Alabama; the Johnson Space Center (JSC) in Houston, Texas; the Goddard Space Flight Center (GSFC) in Greenbelt, Maryland; and the Lewis Research Center (LeRC) in Cleveland, Ohio. While not work package centers, the Kennedy Space Center (KSC) at Cape Canaveral, Florida and the Langley Research Center (LaRC) in Hampton, Virginia, have key Space Station responsibilities. KSC has the responsibility for Space Station prelaunch processing and post-landing activities plus a major role in logistics and user integration support while LaRC provides major support in systems engineering and integration. The Jet Propulsion Laboratory (JPL) in Pasadena, California, will also play a central role in defining Space Station program requirements and conducting independent assessments. The work package approach utilizes NASA expertise at the field centers and fosters greater competition among U.S. industry.

During 1988, the program accomplished a Program Requirements Review (PRR), a very thorough and extensive analysis of the program requirements. The purpose of this PRR was to evaluate requirements and to ensure horizontal and vertical consistency in the requirements and in the program documentation. Over six thousand review item discrepancies were surfaced and are being resolved. All of the Space Station program elements, systems, and participants were included.

Committee views

Management and integration

The Committee continues to be concerned over the management and integration efforts of the Space Station program. As noted in

the report accompanying the FY 1989 NASA Authorization Act, the management of the Station program represents a challenge at least as great as the technical challenge. It will be a management challenge to coordinate and integrate to the proposed cost and schedule the activities of at least four NASA field centers, four fully integrated prime contractors, and hundreds of subcontractors to ensure that a Space Station is produced.

Much of the management burden falls on the level II program office in Reston, Virginia. However, while the Reston Center has had a planned civil service complement of 348, the current workforce is under strength at 218 and is especially short of experts in the key discipline of systems engineering and integration. The Committee recognizes that NASA is making a concentrated effort to staff up the level II office in Reston in this discipline. However, the results to date have been marginal.

To better understand the progress made addressing management deficiencies the Committee requests an annual report on the management situation in Reston until the launch of the first element. The report should include information on staffing levels (both civil service and contractors), use of Reston contractors, interfaces/controls with other elements of the program, and any work that is not being accomplished because of personnel shortages. This report may be included as a part of the annual Space Station Capital Development Plan required under Public Law 100-147.

Polar platform management

The polar platform is now being viewed as NASA's contribution to a comprehensive global climate change study. The instrument acquisition will be managed by the Office of Space Science and Applications (OSSA), and the spacecraft development is currently being managed by the Office of Space Station (OSS) because of potential cost savings due to commonality of subsystems between the platform and the manned base.

The Committee is concerned that this split in management could potentially result in a more costly program that delivers less science. OSSA has a long experience in developing and operating unmanned spacecraft and has the technical and management expertise for developing/operating unmanned missions. In addition, despite the potential cost savings due to commonality, the Space Station program's primary intent is to achieve permanent manned presence in space. The Committee believes that under severe budgetary pressures, the unmanned polar platform may not receive adequate management attention in view of this underlying motive.

NASA should revisit the management of the polar platform at the Preliminary Design Review and determine if there is enough commonality to continue the dual management approach. Otherwise, the Committee recommends that OSSA be provided an expanded management role for the polar platform.

Solar dynamic power

The Committee has consistently expressed the view that solar dynamic power is an important element of the Space Station Freedom program for meeting user requirements and ensuring cost-effective operations of the Station over the long-term. In addition,

solar dynamic power will contribute to American technological competitiveness, and should, therefore, be developed and ultimately deployed as an integral part of Space Station Freedom.

The Committee is concerned that NASA has rejected proposals for accelerating development of solar dynamic power. In this regard, the Committee directs NASA to report on the technical cost and operating considerations that led to this decision. Moreover, the Committee firmly states in advance its opposition to any potential future effort to eliminate solar dynamic power from Station as a consequence of overall program funding constraints.

The Committee directs NASA to continue solar dynamic power development as an integral part of Space Station Freedom Block I, and encourages continued review of options for accelerating the full incorporation of solar dynamic power capabilities into the Block I program.

Section 4(1)(B) Space transportation capability development

President's request:	
Fiscal year 1990.....	\$639,000,000
Committee recommendation:	
Fiscal year:	
1990.....	651,500,000
1991.....	716,000,000
1992.....	676,000,000

Committee authorization recommendation

Section 4(1)(B) authorizes appropriations of \$651,500,000 for fiscal year 1990 for Space Transportation Capability Development activities. This is \$12,500,000 above the President's request. This increase is the net result of: a \$6,000,000 increase to restore funding for the upper stage that will be needed to launch the Advanced Communication's Technology Satellite; a \$3,500,000 reduction due to the Administration's decision not to pursue the development of a Commercially Developed Space Facility (CDSF) at this time; a \$15,000,000 increase to fund continuing studies and analysis of the feasibility and role of the Shuttle-C heavy-lift launch vehicle; and a reduction of \$5,000,000 reflecting the transfer of funds in an equal amount to the new Space Exploration line item—Section 4(1)(L).

Section 4(1)(B) also authorizes the appropriation of \$716,000,000 for fiscal year 1991 and \$676,000,000 for fiscal year 1992 for Space Transportation Capability Development activities. The authorization for fiscal year 1991 is based on an Administration baseline of \$693,000,000 and the addition of \$6,000,000 to continue procurement of the upper stage for the Advanced Communications Technology Satellite and \$17,000,000 to continue development of the Space Station Docking Module. The authorization for fiscal year 1992 is based on an Administration baseline of \$649,000,000 and the addition of \$4,000,000 to continue procurement of the upper stage for the Advanced Communications Technology Satellite and \$23,000,000 to continue development of the Space Station Docking Module.

Program description

The principal areas of activity within Space Transportation Capability Development include: the development, procurement, and

operation of Spacelab flight hardware; the development and procurement of the upper stages that are required to place satellites into high altitude orbits; the provision of engineering and technical base support for the manned space flight centers; the provision of the payload operations and support equipment that are required to support payloads that will fly on the Space Shuttle; the study and evaluation of possible advanced programs; research and analysis for the Advanced Launch System (ALS) program; developmental support for the joint Italian/U.S. Tethered Satellite System; and the development and first flight of the Orbital Maneuvering Vehicle (OMV).

Committee views

Space station docking module

During this year's authorization hearings, the Committee devoted a significant amount of attention to the commercialization initiatives that were reflected within the President's fiscal year 1990 budget request for NASA.

The preponderance of testimony at these hearings held that the Space Station Docking Module is not suitable for the type of commercialization that was proposed by the Administration. Accordingly, the Committee has concluded that the Docking Module should be funded through the normal authorization and appropriation process.

Given the importance of the Docking Module to the functioning and success of the Space Station and the significant impact that a delay in the funding of this Module could have on the Space Station program, the Committee has authorized the appropriation of funds in fiscal year 1990 to begin the design and development of the Space Station Docking Module.

Space Shuttle-C

The Committee has followed with interest the progress that is being made in the conceptual design and feasibility studies for using components of the Space Shuttle to build an unmanned, heavy-lift launch vehicle.

For several years, the Committee has recognized the potential usefulness of such a vehicle for carrying payloads that are too large to be handled by the Space Shuttle or existing expendable launch vehicles. The Committee also notes that recent studies have indicated that the Shuttle-C could be of great value in placing elements of the Space Station Freedom into orbit—with 5 Shuttle-C launches being able to take the place of 12 Space Shuttle launches.

During this year's authorization hearings, the NASA Administrator and many other key witnesses emphasized the importance of developing the Shuttle-C. However, these witnesses noted that a "new start" for this program would not be requested before fiscal year 1991.

Given that all near-term funding for the Shuttle-C is scheduled to end during the current fiscal year (1989), the Committee is concerned that valuable momentum and project teams will be lost—substantially hampering the program if a decision is made to begin full scale development in fiscal year 1991. Accordingly, the Com-

mittee has authorized the appropriation of funds in FY 1990 to continue the conceptual development of flight hardware, and the analysis of possible missions for the Shuttle-C heavy-lift launch vehicle. The Committee believes that such an extension of the present study phase will be of great value during the Preliminary Design Review for the Space Station, now scheduled to take place during the fourth quarter of FY 1990.

Section 4(1)(C) Physics and astronomy

President's request:	
Fiscal year 1990.....	\$894,500,000
Committee recommendation:	
Fiscal year:	
1990.....	914,500,000
1991.....	1,013,000,000
1992.....	1,147,000,000

Committee authorization recommendation

Section 4(1)(C) authorizes appropriations of \$914,500,000 for fiscal year 1990 for Physics and Astronomy activities. This is \$20,000,000 above the President's request. This increase is for the purpose of restoring funding to the Shuttle Test of Relativity Experiment/Gravity Probe-B (STORE/GP-B).

The Committee would like to make special note that it fully endorses the \$204,800,000 in funding the Administration has requested for Mission Operations and Data Analysis. This amount represents an increase over earlier projections which reflects a higher priority being placed on the data analysis component of a successful space science initiative. The Committee feels that the data collected on these missions is much like other national resources and should be invested in and preserved for future generations.

Section 4(1)(C) authorizes the appropriations of \$1,013,000,000 for fiscal year 1991 and \$1,147,000,000 for fiscal year 1992 for Physics and Astronomy activities. The authorization for fiscal year 1991 is based on the Administration baseline of \$988,000,000 and the addition of \$25,000,000 to continue the STORE/GP-B program. The authorization for fiscal year 1992 is based on the Administration baseline of \$1,112,000,000 and the addition of \$35,000,000 to perform the STORE flight test and continue the GP-B program. The Committee intends that all of the fiscal year 1990, 1991 and 1992 funds for STORE/GP-B be applied directly and completely to Principal Investigator and Contractor Costs.

Program description

In FY 1990 two out of four Great Observatories will be launched: the Hubble Space Telescope and the Gamma Ray Observatory (GRO). Instrument development for the third great observatory, the Advanced X-ray Astrophysics Facility (AXAF), is planned for FY 1990.

In FY 1990, two major Explorer missions will be under development: the Cosmic Background Explorer and the Extreme Ultraviolet Explorer. A third mission, the X-ray Timing Explorer will be under definition.

Taking advantage of the opportunity of collaboration with other agencies and countries, instruments are being developed to be

placed on the German Roentgen Satellite (ROSAT), and instrument for the DOD CRRES mission, and instruments for the Japanese Solar-A mission and the Japanese Astro-D Spectrographic X-ray Observatory mission.

Under continuing development is the FY 88 new start, the Global Geospace Science (GGSc) mission. This mission is complementary to the Collaborative Solar Terrestrial Research Project (COSTR). Both projects are being developed in cooperation with the European Space Agency (ESA) and the Japanese Institute of Space and Aeronautical Science (ISAS). GGSc will study the dynamics of energy flow and allow the U.S. to take a leadership role in solar-terrestrial physics.

Physicists and engineers in academia and industry have collaborated to create new technologies to perform the Shuttle Test of Relativity (STORE) experiment that will probe the very foundations of space time. Already development of the test prototype has led to technology spin offs, inspired new physics experiments, and contributed to the undergraduate and graduate education of 58 students. Funding in 1990 will be used to prepare for the Shuttle flight test of the prototype hardware in 1993. The free flying science mission, Gravity Probe-B could then take place in 1995.

And finally, the Astrophysics program is continuing its involvement in the Shuttle/Spacelab program with Astro-1, a set of ultraviolet and soft x-ray telescopes and spectrometers, scheduled for launch in FY 1990. Astro-1 will investigate the interstellar medium by following up on discoveries made with the International Ultraviolet Explorer.

Committee views

Space science data management

The Committee notes that the Office of Space Science and Applications (OSSA) has produced a Strategic Plan for Space Science. This type of foresight and organization is a great benefit to the space science community. The Community would like to see a similar effort made to identify requirements for data management in the coming years.

The Committee notes that science missions occurring in the next decade will result in an exponential growth of science data. This data will require enhanced facilities for reception, transmission, processing, analysis, distribution and archiving. It is not clear that there exists an adequate understanding of the implications of this exponential rise nor anticipation of the resources needed to meet the life cycle costs of the data. In particular, the Committee notes that despite NASA's declared intention to improve data management, NASA has budgeted less money per unit of data than it has in the past.

The Committee directs NASA to produce a long-range strategic plan for addressing all aspects of this data management problem for all divisions of space science in OSSA. The plan should include the following:

- a. a determination of the amount of data that will be collected by all currently planned missions and the level of processing desired for that data;

- b. a determination of the cost of data processing per unit volume of data, taken to its desired level of processing;
- c. a determination of the cost of data archiving per unit volume of data at each level of processing;
- d. a determination of the hardware requirements to receive, process, distribute and store this data;
- e. a reassessment of the adequacy of current plans and funding allowances for data centers; and,
- f. a determination of the human requirements to process and research that data. (This should identify the number and size of research grants which will be provided to principal investigators, guest investigators, and archival researchers.)

Without a plan encompassing all of these needs, it is fair to say, based on past performance, that much of the new data will be under-utilized and even lost.

Science missions are growing increasingly ambitious and complex. At the same time universities are playing a smaller role in the development and manufacture of spacecraft. It should be recognized that university participation, from the earliest stages of planning and throughout the development of the mission is critical. In order to see that the data returned from these missions is utilized effectively, the science community must be brought back into the process of outlining the requirements for data management for all phases of the data stream from acquisition, capture, processing, distribution, analysis, archiving, to distribution. Data management strategies that do not reflect the needs of the scientific community, are not strategies that will produce good science.

Committee restores funding for STORE/GP-B

The Committee regrets that this experiment was deleted in the FY 1990 budget request. This experiment is a flight test of the instrumentation that will be used in Gravity Probe-B. Gravity Probe-B is the relativity gyroscope experiment being developed to test two extraordinary and as yet unverified predictions of Einstein's General Theory of Relativity. Gravity Probe-B is potentially one of the most significant contributions to theoretical physics ever undertaken by NASA. Reviews of the program by NASA project managers indicate that it has been consistently rated high for quality, efficiency, and performance. It is bringing together an impressive array of talented scientists and graduate students from NASA, the academic community and industry. Already the research on Gravity Probe-B has led to spin-off developments in astronomy, oceanography, navigation, meteorology, and fundamental physics. Gravity Probe-B is an experiment of great merit that deserves to be completed. This Committee has long supported this project and will continue to do so.

The Committee has restored \$20,000,000 to the FY 1990 budget request for the Shuttle Test of Relativity Experiment (STORE). By this action, the Committee implies a commitment to complete the Gravity Probe B Experiment Program.

Section 4(1A-E) Space life sciences

President's request:	
Fiscal year 1990.....	\$124,200,000

Committee recommendation:

Fiscal year:	
1990.....	124,200,000
1991.....	154,000,000
1992.....	151,000,000

Committee authorization recommendation

Section 4(1)(D) authorizes appropriations of \$124,200,000 for fiscal year 1990 for the Life Sciences program. The Life Sciences program has been reduced in funding in years past and full funding of this program is now essential to support basic operations of the Shuttle/Spacelab and new initiatives on Space Station. Section 4(1)(D) also authorizes the appropriation of \$154,000,000 for fiscal year 1991 and \$151,000,000 for fiscal year 1992 for Space Life Sciences activities. The authorization provides for the full Administration baseline in each of these years.

Program description

Progress by the Space Life Sciences Program is urgently needed to develop medical and biological criteria to qualify human habitation in space. Results from the research program are applied to: the immediate needs of maintaining astronaut health and productivity; understanding the biological effects of weightlessness; the design of controlled ecological life support systems; understanding of the origin, evolution and distribution of life in the universe; and understanding of the processes and rhythms of the earth's biosphere. An aggressive Space Life Sciences program is essential to meet the needs of Shuttle, Spacelab and Space Station operations, as well as to meet the future needs associated with extending the presence of man in the solar system.

In FY 1990, Space Life Sciences will support an active program of space-based and ground-based research. The flight program includes the first dedicated life sciences mission, Spacelab Life Sciences 1 (SLS-1) and additional Spacelab and middeck experiments to prepare for extended duration Shuttle missions. In FY 1990 the definition and development of the centrifuge facility for Spacelab will begin.

Ground-based research and analysis will proceed to define how space biology research will be accommodated on the Space Station. Information will be collected on occupational exposure to microgravity on each Shuttle flight and conduct in-flight testing of countermeasures. New methods will be developed to control the interior environment of manned spacecraft. Models of the early solar system evolution will be investigated. In FY 1990 the definition and design phase of the microwave observing project will be completed which will be used to survey our galaxy for evidence of technologically advanced life. Ground-based measurements will be combined with remote sensing data to model interactions of ecosystems on a global scale. Also in FY 1990, Specialized Centers of Research (SCOR) will be established at universities to support long term, broad-based interdisciplinary research on selected high priority topics.

Committee views

Overall funding for the life sciences

The Committee recognizes that past NASA requests for funding growth in the Space Life Sciences have not been accommodated. In fact, the Space Life Sciences budget has been cut in previous years. The Committee is keenly aware of the need to increase activity in the Space Life Sciences. It is essential that the Space Life Sciences keep pace with the other NASA activities which depend on Life Sciences. For that reason the Committee is committed to fully funding this program area in fiscal years 1990 through 1992.

The Committee expects that the budget growth in the next three years will be accompanied by expanded involvement of the private sector and academic communities with more frequent announcements of opportunity. This type of extramural research is an essential element in obtaining vigorous, competitive, high level of research. The program will profit greatly by increased levels of participation from the private and academic communities. The Committee directs NASA to increase this level of activity and also encourages NASA to give special consideration to techniques which will accommodate and encourage consortia of private and/or academic groups which successfully pool resources that are advantageous to NASA.

Lifesat

The Lifesat program, an ELV launched, 30-60 day on-orbit recoverable satellite, will provide the capability to obtain precursor biological and medical space flight data in preparation for building a permanent presence in space. In addition, Lifesat will provide low cost access to space for micro-gravity experiments and other shuttle secondary payloads when crew presence is not required. The Committee has previously noted its concern about the limited number of near-term space flight opportunities for such payloads (House Report 100-204, p. 113). The Committee strongly supports the need for this capability and urges NASA to make Lifesat a FY 1991 new start.

Planetary exploration

President's request:	
Fiscal year 1990.....	\$396,900,000
Committee recommendation:	
Fiscal year:	
1990.....	361,900,000
1991.....	322,000,000
1992.....	278,000,000

Committee authorization recommendation

Section 4(1)(E) authorizes appropriations of \$361,900,000 for fiscal year 1990 for Planetary Exploration activities. This is \$35,000,000 below the President's request. This reduction is based on the transfer of funds to create two new line items: \$5,000,000 for Space Exploration; and, \$30,000,000 for Comet Rendezvous Asteroid Flyby/Cassini (CRAF/Cassini) program. Authorization for the Space Exploration program provided is in Section 4(1)(L). Multiyear authorization for CRAF/Cassini is provided in Section 4(1)(P). This mul-

tiyear authorization allows for \$30,000,000 in outlays for CRAF/Cassini in fiscal year 1990.

Section 4(1)(E) also authorizes the appropriation of \$332,000,000 for fiscal year 1991 and \$278,000,000 for fiscal year 1992 for Planetary Exploration activities. The authorization for fiscal year 1991 is based on an Administration baseline of \$470,000,000 with a reduction of \$148,000,000 which is transferred into Sec. 4(1)(P) for CRAF/Cassini. Similarly, the authorization for fiscal year 1992 is based on an Administration baseline of \$591,000,000 with a reduction of \$313,000,000 which is transferred into 4(1)(P) for CRAF/Cassini.

Program description

The Planetary Exploration program encompasses the scientific exploration of the solar system including the planets, their satellites, comets, and asteroids and the interplanetary medium. The Committee notes that this program not only increases our understanding of the nature and evolution of other planets in the solar system, but it furthers our understanding of the origin and evolution of life on earth.

In FY 1990 two new planetary missions will be launched. Galileo will be launched on a Shuttle-Inertial Upper Stage (IUS). Ulysses is a joint NASA and European Space Agency (ESA) activity. The mission will carry a package of experiments to investigate the Sun at high solar latitudes that cannot be studied from the Earth's orbit. This comprehensive science payload will extend our knowledge of Jupiter and its system of satellites well beyond the discoveries of the Voyager and Pioneer missions.

Magellan, launched in FY 1989, will arrive at Venus in August 1990 and begin global mapping of the cloud shrouded surface of Venus. A synthetic aperture radar will penetrate the atmosphere and provide sufficient resolution to identify small scale features that will allow us to address fundamental questions about the origin of the planet.

Development continues on the Mars Observer mission which will study the geologic and climatic evolution of the planet Mars after its launch in FY 1992.

FY 1990 will begin a new science start, the Comet Rendezvous Asteroid Flyby (CRAF) and Cassini (the Saturn Orbiter/Titan Probe) missions planned for launch in 1995 and 1996 respectively. Both missions will provide new understanding of the origin of the solar system and may provide new clues to the origin of life as well.

FY 1990 funding will be required for the continued operation and data analysis activities in support of the Pioneer and Magellan missions as well as for Voyager on its interstellar trajectory. FY 1990 funding for the Galileo mission provide for the completion of integration of the spacecraft with the Inertial Upper Stage in preparation for a launch early in FY 1990.

Committee views

The Committee has expressed its disappointment that NASA has been unable to provide a budgetary line item for the Observer program in the same fashion as the highly successful Explorer program in Astrophysics. The Committee maintains that this would

likely bring about a more effective program, one that allows for continuous predictable development which will help to keep costs down while maintaining continuous scientific progress. However, the Committee also recognizes that the current environment for carrying out planetary exploration is far different than that in which the Observer program was originally conceived.

First, as a result of lessons learned in the Mars Observer program, future Observers may profit from a modified approach to procurement and project planning. This should be taken into consideration when reassessing the existing strategy for solar system exploration.

Also, the President has called for expansion of human presence in the solar system. This places a new onus on the Observer program since the call to expand human presence will require information gathered by the Observers to provide a scientifically and technically sound basis for assessing the options for human expansion.

Finally, in order to achieve the expansion of human presence, the Committee believes that this will require a higher level strategy for international cooperation. A contemporary strategy should recognize possible contributions of other nations, and promote a constructive program that will enhance cooperation among space-faring nations.

In view of these factors, the Committee requests that NASA reassess the validity of the strategy for future solar system exploration developed by the Solar System Exploration Committee (SSEC), the advisory group which recommended a comprehensive program of missions to the inner and outer solar system.

The Committee notes that NASA has already committed to undertaking this reassessment of the strategy for solar system exploration. The Committee is looking forward to viewing the results.

Section 4(1)(F) Space applications

President's request:	
Fiscal year 1990.....	\$579,700,000
Committee recommendation:	
Fiscal year:	
1990.....	646,000,000
1991.....	552,000,000
1992.....	518,000,000

Committee authorization recommendation

Section 4(1)(F) authorizes appropriations of \$646,000,000 for fiscal year 1990 for Space Applications activities. This is \$66,300,000 above the President's request. This recommendation reflects the funding commitment to the following program areas:

The Committee authorizes the full baseline amount of \$434,300,000 for the Earth Science program area. The Committee in recognizing the potential serious implications of global change, strongly supports the effort to gather relevant data to support more accurate predictions of global change. The Committee directs the NASA Administrator to ensure that adequate efforts are undertaken in preparation for the Mission to Planet Earth. This initiative will bring together the scientists of many nationalities. It will be a cooperative venture of inter-

est to many different governments. The international character of the preparations will provide an excellent contribution to the 1992 International Space Year.

The Committee authorizes the full amount of \$92,700,000 for the Materials Processing program area.

The Committee authorization of \$84,900,000 for the Space Communications program area reflects an augmentation of \$66,300,000 over the baseline to restore the Advanced Communications Technology Satellite (ACTS) program. This augmentation consists of the following: \$61,500,000 is for the ACTS development which includes one prototype, one master control, and one closed loop link system evaluator terminal; \$2,800,000 for funding of experimenter research; and \$2,000,000 for the purchase of experimental ground station hardware. The availability of the \$2,000,000 is predicated upon matching funds being made available by cosponsors from the private sector.

The Committee authorizes the baseline amount of \$34,100,000 for the Information Systems program area. The Committee is in full support of NASA's recognition of the critical new role information systems will play in our utilization of space science data. The increases the Administration has requested in this area over the request for last year are appropriate and reflect NASA's appreciation of the importance of this space generated data.

Section 4(1)(F) also authorizes the appropriations of \$552,000,000 for fiscal year 1991 and \$518,000,000 for fiscal year 1992 for Space Applications activities. The authorization for fiscal year 1991 is based on the Administration baseline of \$518,000,000, the addition of \$32,000,000 for Communication program area activities and the addition of \$2,000,000 for Information Systems program area activities. The authorization for fiscal year 1992 is based on the Administration baseline of \$500,000,000 the addition of \$14,000,000 for Space Communications program area activities, and the addition of \$4,000,000 for Information Systems program area activities.

In the Space Communications program area for fiscal year 1991, the augmentation over the baseline request consists of the addition of \$28,000,000 to continue the ACTS program, \$2,000,000 to fund experimental ground station research, and \$2,000,000 for the purchase of ground station hardware. For fiscal year 1992, the augmentation over the baseline request consists of the addition of \$10,000,000 to continue the ACTS program, \$2,000,000 to fund experimental ground station research, and \$2,000,000 for the purchase of ground station hardware. The availability of the \$2,000,000 for purchase of ground stations in fiscal years 1991 and 1992 is predicated upon matching funds being made available by cosponsors from the private sector. The Committee estimates that the co-funding, together with this authorization, should provide sufficient funds for approximately 100 ground stations.

In the Information Systems program area for fiscal year 1991, the augmentation over the baseline request consists of the addition of \$2,000,000 and \$4,000,000 for fiscal year 1992. These increases reflect the Committee's recognition that the many new space science missions launched between 1989 and 1992 will place an increased burden on current facilities for the archiving and distribution of

data. Cost estimates for NASA data archiving have been seriously underestimated in the past. The Information Systems program will require additional funding to support the expectations of NASA and the needs of the space science community.

Program description

Space Applications program includes the Earth Science and Applications program, Materials Processing in Space program, Communications program, and the Information Systems program.

Earth Science and Applications will continue the development of various advanced instruments needed to support a wide variety of interdisciplinary studies on atmospheric dynamics, ocean processes, radiation, upper atmosphere/troposphere chemistry and land-based processes. These instruments will provide the urgently needed data to verify models of earth processes and increase our understanding of critical global issues.

The Microgravity Science and Applications program will focus on definition studies for Shuttle and Space Station experiment candidates in areas such as containerless experiments, solidification and crystal growth and processing of biological materials.

In the Advanced Communications program area, special emphasis is being given to technologies with high potential for improving frequency spectrum utilization, satellite switching, and intersatellite link technologies since these technologies are key to the future growth of the communication satellite and terminal markets.

In FY 1990, the Information System program will continue to provide advanced computer and information systems technology to support the OSSA science program. Included in Information Systems program is a new emphasis on space science data management and archival support to provide the OSSA community with a faster, more reliable system to assimilate, archive, and distribute data. With the return of the Shuttle to operational status, the amount of space generated data is increasing tremendously. FY 1990 funds will be used to augment and restructure data management and archival programs.

Committee views

Advanced Communication Technology Satellite (ACTS)

The Advanced Communication Technology Satellite (ACTS) represents the culmination of many years of key technology developments in the field of advanced communication satellite systems. It is critical to our interest in retaining and expanding our competitiveness and protecting our leadership in the world of commercial communications. The ACTS program is critical to demonstrating and nurturing in our universities and private sector research centers, the knowledge base for development of complex electronic architectures needed for tomorrow's state-of-the-art space communications. The Committee fully supports ACTS and was disappointed to find that funding for it was not included in the FY 1990 budget request. The program is over 75 percent complete; nearly \$400,000,000 has been invested in it, and even more is at stake.

Technology development by NASA over the past five years has established the plausibility of ACTS spectrum-conservative technol-

ogy innovations for satellite communication systems of the future. The original idea behind the ACTS program was to place the new technologies in the hands of as many experimenters as possible so that the potential for commercial development could be fully exploited and the process of introducing new technology accelerated. Therefore, it is now appropriate to begin the construction of many experimental ground stations in association with the ACTS flight demonstration. Ground stations should be made available to the researchers who can find matching funds to develop applications for the ACTS system. The Committee encourages the maximum use of private sector infrastructure.

The Committee intends that title to the cosponsored ground terminal equipment, purchased under this section, shall be turned over to the private sector for the purpose of continued utilization.

By providing authorization, as described in Section 4(1)(F), for funding in fiscal years 1990, 1991, and 1992 for the ACTS program, the Committee has signalled its determination to complete the development of this advanced communication system. Furthermore, because it is essential that the implementation of the advanced communications technology requires active participation from the private sector, funding for ground station hardware has been predicated on the cosponsorship by the private sector. It is the intent of the Committee that the ACTS program will foster an active and viable user community which will drive the implementation of ACTS through the development of associated applications. By promoting the Government-private sector partnership in ground station development, the Committee intends that the U.S. will gain a lead in marketing ground station equipment worldwide.

U.S. interests in High Definition Television (HDTV)

A concurrent interest of the Committee is the rapid and competitive development of technologies for High Definition Television (HDTV). The existing technology in communication satellites is not capable of serving HDTV. The ACTS program provides the perfect test bed for developing the distribution medium for HDTV. In order to remain competitive in the commercial world market for HDTV, it is necessary to develop not only the HDTV display technology but also the complete distribution system. This technology will be developed more rapidly if the options made possible by ACTS are available.

It is very clear that the communication system which is meeting our needs today, will not continue to do so in the future. The volume of communications in the very near future will swamp the capacity of available frequency bands. The ACTS technology allows more intensive use of the frequency spectrum. The applications are numerous. Despite the compelling commercial reasons for its development, ACTS technology is beyond the reach of a single private communications corporation. The government must play a role when what is required is an industry wide change of standard.

The Committee, therefore, directs NASA to seek experimental users of ACTS that will focus on HDTV developmental aspects. These efforts will provide a valuable and unique component of the overall Federal effort to maintain a competitive posture in the emerging HDTV market.

The Committee expects high definition television (HDTV) to become a technology which will revolutionize the way people view and use information transmitted from remote locations. The National Aeronautics and Space Act requires public dissemination of information from space, using updated industry standards and practices, which the Committee expects will include HDTV and other forms of advanced television by the mid-1990's. HDTV may also assist in the safe operation of space vehicles, the activities of the Space Station, and medical diagnosis of crew members, where the transmission of accurate remote television images is necessary. Basic HDTV research, and development of HDTV cameras, displays, and methods for digital signal processing and transmission, is important for NASA to carry out its mission. Therefore, the Committee recommends that NASA encourage the development of HDTV components and techniques, and incorporate them into the Space Station and other programs, as these components and techniques become available.

Global change program—Earth Observation Satellites (EOS) and Earth Probes

The Committee believes that it is a vital interest of the United States to carry out comprehensive investigations into the threat of global changes in the earth environment as a result of the activities of man. This is a pursuit which will help us to protect and preserve our environment, it benefits all of mankind, it maintains the U.S. image as a leader in technological issues, and what's more, this activity is fully supported, if not mandated, by the public. No stronger set of reasons could be assembled for any action by the government.

The Committee also believes that NASA has a prominent role to play in this enterprise. The Committee would like to see NASA reserve the highest priority of the FY 1991 budget to earth science projects among all new starts.

The Committee regrets that the first of the Earth probes is not included in the FY 1990 budget submission. This Earth Probe was to have carried the Total Ozone Monitoring Spectrometer into low-earth orbit. Recent discovery of disturbing losses of the ozone in the vicinity of the North and South poles have made it clear that we must continue to monitor this chemistry closely until we fully understand all of the processes which are leading to ozone loss and can fully anticipate the implications to life on earth. Currently, the only source of systematic satellite based ozone monitoring is by the Nimbus 7 satellite. This satellite is expected to fail at any time. Once this satellite is lost we will be without a valuable component to our baseline ozone monitoring capability.

The Committee feels that the omission of the first of the Earth probes in the FY 1990 budget submission, makes little sense in terms of the clear urgency of our need to monitor world ozone levels and our proclaimed intention to study Global Change. Therefore, the Committee requests that NASA initiate an Earth probes program in FY 1991 and launch the next TOMS instrument as soon as possible in order to provide an ozone record for the Global Change program. Meanwhile, the Committee would like to be kept fully abreast of efforts to place a TOMS instrument on a Soviet sat-

ellite and informed of the effectiveness of the transmission of data from that instrument back to U.S. researchers.

In a similar vein, the Committee directs the Administration to preserve and protect all of the launches of earth science projects, especially those like Atlas-1, GOES-1 and -J, LAGEOS-11, POES-D and POES-I, SEAWIFS (on LANDSAT-6), UARS and WAMDI1 which represent an assortment of earth science projects which will play a major role in our readiness for the International Space Year in 1992.

Section 4(1)(G) Technology utilization

President's request:	
Fiscal year 1990.....	\$22,700,000
Committee recommendation:	
Fiscal year:	
1990.....	22,700,000
1991.....	23,400,000
1992.....	21,200,000

Committee authorization recommendation

Section 4(1)(G) authorizes \$22,700,000 for Technology Utilization activities in fiscal year 1990. This is equal to the amount contained within the President's request. Section 4(1)(G) also authorizes the appropriation of \$23,400,000 for fiscal year 1991 and \$21,200,000 for fiscal year 1992 for Technology Utilization activities. These authorization levels are equal to the Administration baseline estimate.

This year, the Committee examined the public benefits resulting from investments made in the civilian space program. Technology spinoffs in the fields of health and medicine, education, agriculture, energy, public safety and transportation were the subjects of a hearing April 13, 1989. The transfer and application of aerospace technology resulting from NASA's R&D programs is accomplished primarily through NASA's technology utilization program. NASA accomplishes this through various technology transfer mechanisms which provide timely access of technology to the public and private sector.

Program description

The specific objectives of the technology utilization program are:

To accelerate and facilitate the application of new technology into the commercial sector, thus shortening the time between the generation of advanced aeronautics and space technologies and their effective use in the economy;

To encourage multiple secondary uses of NASA technology in industry, education, and government, where a wide spectrum of technological problems and needs exist;

To develop applications of NASA's aerospace technology, including its unique facilities, to prioritize non-aerospace needs of the Nation.

Committee view

Management of the Stirling Engine Program

The Stirling engine may eventually contribute to a long-term solution to the nation's emission problems and represents a strategic

alternative for pollution abatement. Research and development in Stirling technology suggest the logical next step for the Stirling is a commercial demonstration of the engine which would place into the hands of end-users multiple Stirling units for field tests. Supporters of the Stirling engine have proposed a government and industry cost-sharing demonstration program.

For the last decade, the federal government has funded a Stirling engine research, development, and demonstration program, with DOE providing \$130 million and NASA only \$0.9 million. Because of its expertise in combustion technology, NASA managed the Stirling program on behalf of DOE. There is a strong consensus that the automotive Stirling engine has matured beyond the R&D stage. Therefore, DOE has decided to terminate its Stirling engine R&D program and has not requested any funding for it in FY 1990.

For the last 4 years, NASA has funded a \$900,000, 3-vehicle demonstration program. It has been suggested that full sponsorship of the Stirling engine program be transferred from DOE to NASA. The Committee is uncertain whether transferring agency sponsorship would be in the best interests of Stirling engine development and commercialization.

To determine the optimal long-term sponsor for the Stirling engine, the Committee directs NASA to participate in an inter-agency study including the Department of Energy, the EPA, and the Air Force, in consultation with other interested agencies, to evaluate potential sponsorship of such a program. The study should include the optimal size and scope of the demonstration fleet, a determination of the private sector contribution, and a mechanism for securing such funds. The Committee encourages NASA to consult with the private sector in developing the study plan. The study should be submitted to the Congress by February 1, 1990.

Section 4(1)(H) Commercial use of space

President's request:	
Fiscal year 1990.....	\$38,300,000
Committee recommendations:	
Fiscal year:	
1990.....	40,300,000
1991.....	59,700,000
1992.....	92,450,000

Committee authorization recommendation

Section 4(1)(H) authorizes \$40,300,000 for commercial use of space activities in FY 1990. The Committee's recommendation reflects an increase of \$2,000,000 over the President's request to be allocated as follows: a down payment of \$1,000,000 leading toward a NASA commitment to lease SPACEHAB modules to provide expanded flight research opportunities for commercial users of the Space Shuttle; and \$1,000,000 authorized to establish the seventeenth new Center for the Commercial Development of Space (CCDS), in Education. Such a Center is intended to facilitate the use of space and communications technology in the field of education.

Section 4(1)(H) also authorizes \$59,700,000 for FY 1991 and \$92,450,000 for FY 1992. The FY 1991 authorization is based on a baseline estimate of \$52,600,000 and the addition of \$6,100,000 for the lease of SPACEHAB and \$1,000,000 for Education CCDS. The

FY 1992 authorization is based on a baseline estimate of \$51,600,000 and the addition of \$39,850,000 for the lease of SPACEHAB and \$1,000,000 for the Education CCDS.

In addition to supporting the President's budget request for commercial use of space, the Committee's authorization recommendation for the next three fiscal years will provide for use of SPACEHAB, a commercially financed facility that will enhance the capability of the Space Shuttle by doubling the existing Orbiter habitation volume and quadrupling the volume available for man-tended space experimentation. Specifically, the Committee's authorization will provide for NASA use of one and one-half flights of SPACEHAB through 1992, to include: one half of the first flight of SPACEHAB in January 1992; all of the second flight of SPACEHAB in September 1992; for 1992 and beyond, funding is provided for NASA use on an average of two SPACEHAB flights per year. Fiscal year 1991 and 1992 funding estimates envision that government payments for integration activities related to SPACEHAB use will be made in advance of launch. Payment for lease will be paid post-launch. Payment plans include barter arrangements whereby SPACEHAB will swap lease costs for Shuttle transportation costs. The Committee has encouraged NASA to utilize barter agreements and other creative means of encouraging the growth of privately developed space hardware and services. Purchase by NASA of commercially provided space products and services to meet NASA requirements or other established needs has been seen as offering distinct advantages to NASA and the nation, including enhanced competition, lower costs and the availability of new and alternative technologies, products and capabilities. As specially recognized in the FY 1989 NASA Authorization Report, (II. Rept. 100-650) barter agreements, whereby launch service costs are waived in exchange for government use of commercially provided hardware or services, is a particularly important means of bringing on line Shuttle associated products and services, such as SPACEHAB, that can provide new capabilities for government and commercial markets.

The Committee's authorization of \$1,000,000 in fiscal years 1990, 1991, and 1992 supports the establishment of the seventeenth new Center for the Commercial Development of Space, in the field of education. Such a Center should facilitate the mobilization of space and communications technologies to address the educational needs of this nation.

Program description

NASA's Commercial Use of Space program is intended to provide a national focus for expanding U.S. private investment and involvement in civil space activities.

The objectives of the Commercial Use of Space program are:

Establish close working relations with the private sector and academia to encourage investment in space technology and the use of the in situ attributes of space—vacuum, microgravity, temperature and radiation for commercial purposes.

Facilitate private sector space activities through improved access to available NASA capabilities and the development of new high technology space ventures and markets.

Encourage an increase in private sector investment in the commercial use of space independent of NASA funding.

Develop and implement commercial space policy NASA-wide.

Committee views

Office of Commercial Programs as focal point for commercial space policy

The National Aeronautics and Space Administration Authorization Act, 1985, Public Law 98-361, amended the National Aeronautics and Space Act of 1958 to require that the agency "seek and encourage, to the maximum extent possible, the fullest commercial use of space". This fundamental change to NASA's mission accompanied a Congressional directive that NASA should aggressively pursue all areas of potential commercialization. Shortly thereafter, the Administrator established and designated the Office of Commercial Programs as the focal point for commercial space programs and policy. These activities are fully consistent with and were intended to address the dynamic competitive environment that has evolved over the past 25 years.

Upon the fifth anniversary of the establishment of the Office of Commercial Programs, NASA has not yet focused commercial space policy within the Office of Commercial Programs. The goal of the program is to engender commercial space activity throughout the agency. However, commercial space policy organization and activities continues to be diffused within the agency. For example, the Office of Commercial Programs was not involved in either the development or explanation of seven "commercialization initiatives" involving private financing in the fiscal year 1990 budget request. Nor has the office been involved in the development of a greater commercial orientation for NASA as a procurer of space launch services and other space related services. This situation will inevitably result in policy inconsistencies that will seriously undermine the confidence of the private sector and discourage long-range investments in space.

The Committee feels that ultimately, the agency cannot be successful in carrying out a commercial mission so long as the purview of the Office of Commercial Programs is limited to a single program whose primary emphasis over the years has been materials processing. The Committee fully expects NASA's commercial orientation and activities to be bolder and more aggressive, ranging from facilitating commercial users of space hardware and services, to fostering the government's evolution as a customer of commercial space services and hardware. In order for this to happen, the budget, authority and responsibility of the Office of Commercial Programs must be substantially increased, and pervade all aspects of the agency's activities. This would place the office in a better position to influence NASA-wide, and government-wide, thinking and acting on commercial space matters. Such a change would also signal an important and needed commitment to NASA's commercial space mission.

Commercial flight opportunities

The Committee views use of SPACEHAB as an important means of providing flight experiment opportunities for commercial users into the next decade. SPACEHAB modules fit into the payload bay of a Shuttle Orbiter, and enhance the capability of the Space Shuttle by doubling the existing Orbiter habitation volume and quadrupling the volume available for man-tended space experimentation. The Committee views committed use of the SPACEHAB module as a valuable and near-term means for providing increased opportunities to the secondary, commercial payload community. Such aggregation of these smaller, commercial microgravity payloads into the SPACEHAB module facilitates commercial flight experimentation through an enhanced status as a primary payload. A particularly attractive feature of SPACEHAB use is the customer's ability to obtain late access to a flight opportunity. Unlike Spacelab, which requires experiment integration three years in advance, SPACEHAB requires customers' hardware integration only 5 months in advance, with some flight integration accommodation possible only 12-15 hours prior to launch.

The Committee views NASA use of SPACEHAB as a means of according flight priority to the commercial payload community which is fully consistent with NASA's mission to foster the commercial use of space.

The Committee fully intends that NASA embark on an aggressive program of commercial research flight opportunities designed to position the industrial sector to utilize flight opportunities presented by permanent manned presence in space in the next decade. To this end, the Committee has included language to amend the National Aeronautics and Space Act to enumerate two new authorities of the NASA Administrator consistent with his responsibilities under the Act to "seek and encourage, to the maximum extent possible, the fullest commercial use of space". Expanding on activities already being undertaken at NASA to promote commercial activity in space, the language directs the Administrator to enhance the Administration's capabilities by procuring space hardware and services from the private sector *as well as* extending their use for government and commercial customers in furtherance of the agency's mission to seek and promote the commercial use of space. The new language clarifies that the Administrator has additional authority to expand commercial activity in space by establishing procedures for the procurement of space hardware and services available from the private sector, and for use of the Administration's facilities and services and associated commercial facilities and services. Further, the language complements the discretion accorded the Administrator pursuant to Title II of the National Aeronautics and Space Administration Authorization Act of 1986, Public Law 99-170, establishing a Shuttle pricing policy for commercial and foreign users. Section 204 of that Act directs the Administrator to establish and implement a pricing system for commercial users of the Space Shuttle in order to achieve the objectives of greatly increased commercial space activity and the enhancement of the international competitive position of the United States. The law further accords the Administrator discretion to set

incentive prices designed to involve commercial users in cooperative research, development and demonstration programs with NASA. The Committee fully intends that these commercial customers will graduate to a full paying status once commercial research activities result in commercial product production. Thus, the new language recommended by the Committee expands on these prior authorities to make plainly clear that NASA use of commercially provided facilities and services, on behalf of government and commercial users, is clearly appropriate and consistent with the commercial mission assigned to it in 1983.

Center for Commercial Development of Space in Education

The Committee enthusiastically recommends an authorization of \$1 million to establish a Center for Commercial Development of Space in Education. Such a center should facilitate the mobilization of space and communications technologies to address the educational needs of this country. NASA currently funds sixteen Centers for the Commercial Development of Space in such areas as space propulsion, biotechnology, materials processing and space remote sensing. These centers, providing a focal point for consortia of industry and universities, are a significant conduit for space commercialization activities. Since the Commercial Development of Space Center concept was initiated by NASA several years ago, industry matching funds have grown to exceed government funding by 3 to 1. A new center in education would tap the talents and technologies of the private sector to be brought to bear on the educational needs of the nation. Schools nationwide would in turn be able to seek information from such a center on new space-based capabilities for teaching and instruction.

The Committee's recommendation for a new, seventeenth center in the field of education reflects its enthusiasm for the Centers for Commercial Development of Space as a model for commercial space development involving minimal government support. NASA grants to support the Centers, and the agency's supporting role of technical and management consultant, is minimal. Universities and industries working together and combining investments and other resources have demonstrated that the development of commercial opportunities in commercial research can be accomplished efficiently with minimal government involvement. For example, on March 29, 1989 the CCDS for Space Materials Development at Huntsville, Alabama successfully launched six CCDS developed payloads on a commercially provided launch vehicle, at a cost of \$1.4 million. The effort involved eight U.S. companies, two other CCDS Centers and three universities. The entire effort, to integrate the payloads and procure the launch services, conduct the launch and recover the payloads, took only 9 months. The Committee intends that the CCDS concept will be continued as a dynamic means of stimulating the commercial development of space.

External tanks

The Committee commends NASA for working with a consortium of universities and the private sector to promote commercial uses of jettisoned shuttle external tanks. As NASA stated in testimony before the House in February of this year and again in April, it has

signed a Memo of Agreement with the University Corporation for Atmospheric Research (UCAR) granting them use of five external tanks on a suborbital basis.

The Committee believes this collaborative effort between government, universities, and the private sector to develop the use of external tanks will improve U.S. productivity and international competitiveness in the years ahead.

The Committee urges NASA to look beyond the suborbital use of jettisoned tanks toward an early demonstration of their use in orbit, thus bringing even greater value to this element of the space shuttle system.

Section 4(X)(I) Aeronautical and Transatmospheric research and technology

President's request:	
Fiscal year 1990.....	\$589,800,000
Committee recommendation:	
Fiscal year:	
1990.....	589,800,000
1991.....	621,000,000
1992.....	603,000,000

Committee authorization recommendation

Section 4(1)(I) authorizes appropriations of \$589,800,000 for fiscal year 1990 for Aeronautical Research and Technology and Transatmospheric Research and Technology. This amount is identical to the amounts in the President's request for these programs. The authorization also provides that none of these funds may be expended until \$127,000,000 is made available for the National Aero-Space Plane program, either as a result of action by the Appropriations Committee or by reprogramming by NASA from any other account.

Section 4(XI) also authorizes the appropriation of \$621,000,000 for fiscal year 1991 and \$603,000,000 for fiscal year 1992. These amounts are identical to the levels in the Administration's baseline estimate.

Program description

The purpose of the aeronautics research and technology program is to address the critical issues associated with the U.S. air transportation system, to enhance American competitiveness in the international marketplace, and preserve the country's preeminence in aviation for national security. Technologies are being pursued which, when fully implemented, could offer major advances in vehicle performance and capabilities and which could provide substantial positive impact on U.S. competitiveness. Research efforts have been expanded in high payoff areas associated with a broad range of future vehicle applications including high-performance aircraft, and high-speed transport aircraft. The demands for NASA's unique wind tunnels are continuing to increase with the emergence of new civil and military aircraft programs. In order to ensure wind tunnel availability to meet these demands, a major five-year revitalization program was initiated to modernize NASA's major wind tunnels for productive use well into the next century. This revitalization program is entering its second year in FY 1990.

The transatmospheric research and technology program is a portion of the joint NASA/Department of Defense (DOD) National Aero-Space Plane (NASP) program. FY 1990 is the last year in the NASP Phase 2 program plan and will establish the technology base for the decision in the last quarter of calendar year 1990 as to whether to proceed to Phase 3 which is the design, construction, and flight testing of the X-30.

Committee views

Aeronautical research and technology

The Committee is pleased that NASA and the Administration have begun to recognize the situation with regard to foreign competition in the world aviation market that has emerged during the 1980's. For example, during the 1970's, the U.S. share of worldwide jet transport orders, the largest component of aerospace exports, was 84 percent. During the 1980's, this measure stood at 76 percent, largely reflecting a strong challenge from European aircraft manufacturers.

This trend clearly indicates the U.S. must run harder if it wishes to remain competitive in the aviation market, one of the few remaining sectors with a net positive balance of trade. Improved technology will be a key element in this effort. Breakthroughs in performance have always been the sought-after goal that could change the outcome in air warfare situations or commercial competitions. The United States is preeminent in both areas today largely because unheralded researchers in NASA and DOD laboratories, working with small amounts of money, have found those breakthroughs. Revolutionary advances such as the area rule for supersonic flight, the tilt rotor and the prop fan have profoundly changed aviation. Yet the basic work that led to the ideas was achieved at very low cost.

The Committee believes the level of basic aeronautical research must be enhanced. The FY 90 request is a positive step in that direction: but greater investments will be needed if the U.S. is to maintain its preeminent position in aviation.

National Aero-Space Plane

The Committee strongly supports the Aero-Space Plane research project as a necessary precursor to potential applications, such as a follow-on to the Space Shuttle, which will be needed in the late 1990's. Furthermore, the Committee believes the scientific fallout, in areas such as high temperature materials and cryogenic fuels production and use, will pay huge dividends, not only in terms of continued U.S. leadership in both space and aeronautics, but in many other fields.

The Committee is concerned that programmatic and budget changes announced by the President may undermine the heretofore substantial commitment of funds by U.S. industry. Without such investment the project is unlikely to be successful. Accordingly the Committee directs NASA to participate with the Air Force in an Armed Services Committee study on the feasibility and cost savings of accelerating the flight vehicle decision by one year from the original schedule.

Furthermore the Committee wishes to emphasize the importance of focusing on the research goals of demonstrating single state-to-orbit operation and hypersonic cruise in the atmosphere. Nice-to-have operational add-ons can only serve to increase program costs and lessen the chances of success.

Construction of facilities

The Committee notes that many of NASA's wind tunnels are old, having been constructed in the 1940's and 50's. Furthermore, the rate of investment in rehabilitation and modernization has been about one percent of the replacement value per year, compared with the industry standard of about five percent. The result is a potentially serious situation involving structural failures, long testing delays, and safety problems. A particularly serious example is the 12-Foot High-Pressure Tunnel at Ames, which has been decertified because of numerous cracks in the pressure shell, a limitation that its many industrial military users find intolerable.

NASA commissioned a special task force to make a comprehensive assessment of the state of health of its major wind tunnels. The task force found a total of 19 wind tunnels that are in need of rehabilitation and modernization, and recommended a 5-year, \$260 million program. The FY 90 request for \$71.1 million represents the second year of this plan, which is directed toward rehabilitating the 12-foot pressure wind tunnel at Ames, the 8x6 Supersonic and 9x15 low-speed wind tunnels at Lewis, the hypersonic tunnels at Plum Brook and Langley, as well as additional wind tunnel rehabilitations at these facilities.

The Committee believes NASA's wind tunnels are a national asset critical to maintaining preeminence in aviation and strongly supports the need to refurbish them. It recommends the full request.

Aviation safety research

The Committee urges the Administrator to work jointly with the Administrator of the Federal Aviation Administration to conduct long-range aviation safety research projects. The Aviation Safety Research Act of 1988, Public Law 100-591, mandates that FAA establish a long-range research program. The Act requires that FAA develop a research plan and include complementary and coordinated research efforts with NASA. The research areas to be explored include aviation fire safety, aircraft maintenance and human factors.

The Aviation Safety Research Act originated in the Committee and was passed without opposition. FAA does not currently have a long-range research program with both the level of effort and the level of funding that NASA does. Consequently, the Committee believes that the two agencies should work jointly, as required in the Act, to resolve aviation safety research issues and to develop a stronger FAA long-term research program.

Assurance assessment

NASA is directed to investigate the feasibility of utilizing assurance assessment technology, and report the results to the Committee on Commerce, Science, and Transportation by January 20, 1990.

Aeronautical materials development

The Committee notes that NASA's Langley Research Center awarded contracts in May, 1989, to 15 applicants that could total \$89.17 million under its five to six year Advanced Composite Technology (ACT) initiative.

The Committee also notes that the Air Force's Research and Development Center at Wright Patterson Air Force Base recently granted two \$13 million-plus contracts for the two-year second phase of its Design and Manufacture of Advanced Thermoplastic Structures (DMATS) program.

As both programs are dedicated to developing advanced non-metallic structures technology, the Committee is concerned that there not be a duplication of effort.

The Committee believes there are new metallurgical opportunities which, if exploited early, would provide benefit to the commercial aviation industry and enhance its position in international competition.

In this regard, the Committee directs NASA to coordinate with the Air Force's R&D Center so as to ensure that unique, original and needed research is done by each.

The Committee also understands that at least \$53 million in ACT funding may be available and directs NASA to provide a balanced share for advanced metallic aeronautical materials technology development and productivity enhancements. By funding composite technology and not metallics technology, the government artificially promotes one material over the other.

Section 4(1)(K) Space research and technology

President's request:	
Fiscal year 1990	\$338,100,000
Committee recommendation:	
Fiscal year:	
1990	358,100,000
1991	487,000,000
1992	530,000,000

Committee authorization recommendation

Section 4(1)(K) authorizes appropriations of \$358,100,000 for fiscal year 1990 for Space Research and Technology activities. This is \$20,000,000 above the President's request. This increase is the net result of: a \$5,000,000 increase to support an aggressive program of research and technology development to enhance the performance and reduce the cost of expendable launch vehicles developed by the private sector; a \$25,000,000 increase in the Pathfinder program; and a reduction of \$10,000,000 reflecting the transfer of funds in an equal amount to the new Space Exploration budget line item—Section 4(1)(L).

Section 4(1)(K) also authorizes the appropriation of \$487,000,000 for fiscal year 1991 and \$530,000,000 for fiscal year 1992 for Space Research and Technology activities. The authorization request for fiscal year 1991 is based on an Administration baseline of \$430,000,000 and the addition of \$7,000,000 for expanded research and technology development in support of the expendable launch vehicles developed by the private sector and \$50,000,000 for enhancement of the Pathfinder program. The authorization request

for fiscal year 1992 is based on an Administration baseline of \$420,000,000 and the addition of \$10,000,000 for expanded research and technology development in support of the expendable launch vehicles developed by the private sector and \$100,000,000 for enhancement of the Pathfinder program.

Program description

The overall goal of the Space Research and Technology is to provide advanced, enabling technologies, validated for user-readiness for future space missions, in order to ensure continued U.S. leadership in space to meet national needs. To achieve this goal, a commitment is required to provide a broad base of advanced technology for vehicle and subsystem concepts, components, devices, and software; to develop technology strengths in the engineering disciplines within NASA, industry, and academia; and to perform critical technology demonstrations that facilitate the transfer of new technology with a high level of confidence to future space missions.

Committee views

Management instability

The Committee is deeply concerned about the extent of instability that has existed for many years within the senior management ranks within the Office of Aeronautics and Space Technology (OAST) at NASA Headquarters. As an example of this instability, one witness told the Committee that during the past 20 years, OAST has been headed by a total of 21 Associate Administrators. This level of turnover is clearly excessive and unacceptable.

The Committee believes that this high level of turnover is part of the reason that the OAST budget has declined so dramatically since the mid-1960s. As evidence of this relationship, the Committee notes that during the most recent period of time that the Space Research and Technology budget was experiencing some growth, OAST was headed by an Associate Administrator who had been in that position for almost three years (one of the longest spans in the history of NASA). When this individual left the Agency, the Space Research and Technology budget again began to slip.

The Committee believes that the activities that are supposed to be conducted within OAST are among the most important in the entire Agency. Indeed, this office is chartered with the responsibility for developing the cutting-edge technologies that are required to keep this country preeminent in space. These technologies, in turn, have been instrumental in providing countless dividends throughout the U.S. economy.

Accordingly, the Committee strongly recommends that current and future NASA Administrators be mindful of these concerns when choosing individuals to serve as the Associate Administrator of OAST. At a minimum, the Committee believes that before the Administrator appoints any individual to the post of Associate Administrator of OAST, the Administrator should obtain a commitment from that individual to stay on the job for at least 3 years.

Expendable launch vehicle research and development

The Committee's authorization includes a \$5,000,000 augmentation in support of a strong NASA research and development effort in launch vehicle component technology. Following the NASA aeronautics research and technology program model, the Committee views such a relationship between NASA and the launch industry as critical to the Nation's efforts to compete in the international market for launch services. The Committee views such cooperation between NASA and industry as a significant means of facilitating the transfer of technology to the commercial sector. The benefits of such cooperation are expected to accrue to both the government and the private sector.

Pathfinder

The adequacy of NASA's investments in basic research and technology have been a matter of growing concern for a number of years. Since the 1960s, the percentage of NASA's budget that is devoted to Space Research and Technology endeavors has declined by about 50 percent.

In 1987, the National Research Council issued a report that was highly critical of NASA. This report stated:

For the last 15 years, NASA's investment in basic research and technology development has been lower than the sustaining level required by most industries. The results are that the United States is losing its competitive lead in space, and new technology is unavailable to offer the nation a selection of future options in space.

In this regard, the Committee was disappointed with the size of the President's request for the Pathfinder program. This program is intended to provide answers during the early 1990s to the sorts of questions that have to be resolved if this country is going to decide to undertake major new missions to the Moon or Mars.

Managers within NASA determined that to meet this schedule, the Pathfinder program would have to be funded at a level of at least \$200 million per year. Last year, the President requested \$100 million to get the Pathfinder program underway, but this amount was subsequently cut by the Congress to \$40 million.

This year, NASA originally sought \$97.5 million in support for the Pathfinder program. However, by the time that the FY90 budget request was submitted to the Congress this amount had been reduced to only \$47.3 million.

Recognizing the importance of this program to the future of the civil space program, the Committee restored half of the funding that had been deleted from the original NASA request.

The Committee strongly encourages NASA to heed the warnings that have been sounded by the National Research Council and others and, over the next five years, to double the percentage of the Agency's overall budget that is allocated to Space Research and Technology.

Section 4(XIX.) Space exploration

President's request:
Fiscal year 1990..... (\$20,000,000)

Committee recommendation:

Fiscal year:	
1990.....	20,000,000
1991.....	35,000,000
1992.....	100,000,000

Committee authorization recommendation

Section 4(XIX.) establishes a new budget line and authorizes appropriations of \$20,000,000 for fiscal year 1990 to support Space Exploration.

The \$20,000,000 identified has been transferred from other accounts namely: \$10M from the Pathfinder program, Space Research and Technology; \$5M from Advanced Programs, Space Transportation Capability and Development; and \$5M from Research and Analysis, Planetary Exploration. The funds are provided in order to continue studies of defining the next major goal of NASA. The transferred funds had already been targeted to support studies for Space Exploration.

Section 4(i)(I.) also authorizes appropriations of \$35,000,000 for fiscal year 1991 and \$100,000,000 for fiscal year 1992 for Space Exploration.

Program description

The Space Exploration program is studying pathways for human exploration on a continuing basis and coordinating this activity among the other NASA programs. By coordinating these near-term activities the appropriate types of investments and programs can be pursued to enable a variety of pathways for potential future human exploration. Further, through the coordination of near-term activities, knowledge bases within the key NASA program areas are also being built which will permit a more informed decision regarding the eventual pathways to human exploration. These key program areas are:

- (1) Space Station Freedom.
- (2) Pathfinder.
- (3) Life Sciences.
- (4) Precursor Missions.
- (5) Earth-to-Orbit Transportation.

The results of the FY 1988 studies are recorded in "Beyond Earth's Boundaries: Human Exploration of the Solar System in the 21st Century." This report gives a top level overview of potential exploration opportunities and options, as well as an assessment of the impact such opportunities might have on other NASA programs.

To organize and systematically examine the full spectrum of options, three strategies, or alternative pathways, were selected for study in 1988.

For each of the three exploration pathways, candidate missions were identified to be systematically examined as "case studies," in order to obtain an understanding of both near- and long-term implications of the potential approaches to exploration.

The strategies range from one-mission expeditions to long-term evolutionary programs. Some mission designs make use of existing technologies or those that will be available in the near future.

Others require highly sophisticated new developments that are only now under study. The strategies are:

Human expeditions, emphasizing a significant, visible, successful effort to establish the first human presence on another planetary body.

A science outpost, emphasizing the advancement of scientific knowledge and gaining operational experience by building and maintaining a permanent observatory beyond the Earth.

Evolutionary expansion, which would sustain a methodical, step-by-step program to open the Solar System for exploration, space science research, extraterrestrial resource development and, ultimately, permanent human presence.

Within the case study framework, detailed mission analyses and system engineering studies were performed to define a full set of concepts and requirements for each option. These analyses included an assessment of required environmental and scientific data, low-Earth orbit space stations, advanced technology, Earth-to-orbit transportation needs, in-orbit vehicles and assembly facilities, number of crew members and requisite life science research, and provisions for systems and activities to be conducted on planetary surfaces. The cases included Human Expedition to Phobos, Human Expeditions to Mars, Lunar Observatory, and Lunar Outpost to Early Mars Evolution.

During FY 1989 a range of case studies were reviewed to test the assumptions concerning the capabilities that are needed in order to ensure that this Nation can pursue the long-range goal of human exploration of the Solar System in the future. The results indicate that the nation must invest in Space Station Freedom, Pathfinder technology, life sciences research, Earth-to-orbit transportation, and precursor robotic missions.

Committee views

Space Exploration Budget Line

A program for Space Exploration was established in 1987 by NASA as a response to America's Future in Space study (Ride Report) and a need recognized by the National Commission on Space (The Paine Commission). Using funds acquired from other NASA offices, this program has begun defining the next major manned goal of the U.S. civil space program. Substantial progress has been made this past year in studying the needs of a range of manned missions, specifically: (1) Human Expedition to Phobos, (2) Human Expedition to Mars, (3) Lunar Outpost, and (4) Lunar Outpost to Early Mars evolution. These studies have driven out generic requirements that are necessary to accomplish these and similar missions; requirements such as (1) heavy-lift launch vehicles, (2) expanded life sciences research, and (3) Mars and Earth Aerocapture. These studies have begun to help define the direction for key program offices at NASA such as (1) unmanned planetary exploration, (2) advanced launch vehicles, and (3) Pathfinder.

These initial results need to be continued and expanded into a long-range, long term activity which would be an integral and identifiable NASA program. Accordingly, the Committee has provided a dedicated budget (i.e., its own line in the NASA budget). This

would give Space Exploration a visibility and credibility to the non-NASA scientific community as well as demonstrate that the development of a manned exploration program is a permanent part of NASA. The latter is necessary to attract talented young scientists, engineers, and managers from NASA's field centers (and Headquarters) into the program by offering them a viable long-term career path.

The Committee requests that in future fiscal years, NASA submit the budget for Space Exploration with its own budget line and include budget estimates so that they can be included in a multiyear authorization.

International participation in exploration

The Committee has long recognized the advantages of international cooperation (using the capabilities of other nations in joint programs) and has encouraged NASA to do so for several years in its authorization acts. The Committee has also aggressively pursued a cooperative dialogue on space programs with the USSR (such as the Committee's delegation to the USSR in October 1985) in part as a means to encourage the peaceful use of outer space. The desire for international collaboration on major programs (especially major exploration efforts) is recognized by a wide spectrum of policy experts as was evident in the testimony of witnesses in the February 8 and 9, 1989 hearings on "Studies and Recommendations Made To The Bush Transition Team." As was also pointed out by a witness in that hearing, "We must have a clear and common purpose for each partnership—they will no longer work simply as a means of leveraging U.S. funding or reducing vulnerability to budget cuts."

To maximize the benefits and reduce the cost to the U.S., NASA must increase international collaboration on major new projects such as the next manned exploratory mission. In the past, international cooperation has begun during and after the development/hardware phase. However, the anticipated magnitude of any next major manned mission may well require cooperation at the exploratory study and/or feasibility study phases. Therefore, to develop closer collaboration and take into account the increasing sophistication and independence of foreign programs, the Committee recommends that NASA utilize FY 1990 funds to initiate preliminary studies of candidate cooperative missions with other space faring entities including the Space Station partners and the USSR.

Moon and Mars initiatives

Human exploration and settlement beyond low Earth orbit will be one of mankind's most profound endeavors of the 21st Century. In this context, the Committee enthusiastically supports the long term goals of President George Bush as articulated in his national address on July 20, 1989 during the 20th anniversary celebration of the Apollo 11 lunar landing.

In his address, the President declared that it was time for "a sustained program of manned exploration of the solar system," leading to "the permanent settlement of space." Toward this end, the President proposed the following long range commitments:

An operational Space Station "Freedom" for the 1990's.

A lunar base to be established after the year 2000.

A manned Mars mission to follow the lunar base.

President Bush assigned the Vice President and the National Space Council to develop specific proposals to accomplish these goals.

The Committee requires that the Administration, through the National Space Council, present to Congress no later than January 15, 1990, such an implementation plan. The plan should include target dates for achieving each milestone, specific funding projections, and opportunities for international cooperation.

The Committee also requires that the Administration's plan provide a detailed accounting of how the initiatives will be paid for within an already tight federal budget. The Committee believes that these new initiatives should not jeopardize the long-term health of unmanned space missions, and should not be paid for at the expense of non-military discretionary programs.

The space activities of the world's spacefaring nations are becoming increasingly interdependent. Space Station "Freedom" is a prime example of international cooperation. In the interest of maximizing the effectiveness of the Moon and Mars initiatives, and in order to minimize associated costs to the U.S., the Administration should invite other nations to share in the program during its earliest development stages. In addition, the Administration should set an upper limit of one-half of the total cost of the Moon/Mars effort as the U.S. contribution. Given the maturity of other nations in space technology, no major initiative in space should be undertaken without significant international participation.

The Committee supports the President's vision to expand human experience into the solar system. We are concerned, however, that the Administration demonstrate the leadership necessary to present a plan as soon as possible, and to show how we can realize these goals in this era of budget austerity. The members of this Committee look forward to working with the Administration toward meeting its objectives in space.

Section 4(1)(M) Safety, reliability, maintainability, and quality assurance

President's request:	
Fiscal year 1990.....	\$23,300,000
Committee recommendation:	
Fiscal year:	
1990.....	23,300,000
1991.....	24,000,000
1992.....	24,300,000

Committee authorization recommendation

Section 4(1)(M) authorizes appropriations of \$23,300,000 for fiscal year 1990 for Safety, Reliability, Maintainability, and Quality Assurance activities. This is equal to the amount contained within the President's request.

Section 4(1)(M) also authorizes appropriation of \$24,000,000 for fiscal year 1991 and \$24,300,000 for fiscal year 1992 for Safety, Reliability, Maintainability, and Quality Assurance activities. These authorization levels are equal to the Administration's baseline estimate.

Program description

The Safety, Reliability, Maintainability, and Quality Assurance program within NASA is intended to reduce the overall level of risk within the agency's projects and activities. This is accomplished through such activities as the conduct of independent assessments, reviews, analyses, studies, and tests; the establishment of standards and guidelines; and the development of new inspection technologies, techniques, and devices.

Section 4(1)(N) Tracking and data advanced systems

President's request:	
Fiscal year 1990.....	\$19,900,000
Committee recommendation:	
Fiscal year:	
1990.....	19,900,000
1991.....	21,000,000
1992.....	22,000,000

Committee authorization recommendation

Section 4(1)(N) authorizes the appropriation of \$19,900,000 for fiscal year 1990 to support Tracking and Data Advanced Systems. This is equal to the amount contained within the President's request.

Section 4(1)(N) also authorizes the appropriation of \$21,000,000 for fiscal year 1991 and \$22,000,000 for fiscal year 1992 for Tracking and Data Advanced Systems. These authorization levels are equal to the Administration's baseline estimate.

Program description

The Advanced Systems program provides for higher performance tracking and data handling capabilities and will address planned future mission requirements. In addition, it supports improved cost-effectiveness and reliability for future mission planning.

Section 4(1)(O) University Space Science and Technology Academic Program

President's request:	
Fiscal year 1990.....	\$35,000,000
Committee recommendation:	
Fiscal year:	
1990.....	35,000,000
1991.....	40,000,000
1992.....	45,000,000

Committee authorization recommendation

Section 4(1)(O) authorizes the appropriation of \$35,000,000 for fiscal year 1990 for the University Space Science and Technology Academic Program. This is equal to the amount contained within the President's request.

Section 4(1)(O) also authorizes the appropriation of \$40,000,000 for fiscal year 1991 and \$45,000,000 for fiscal year 1992 for the University Space Science and Technology Academic Program. This authorization is based on the Administration baseline of \$38,000,000 in fiscal year 1991 and \$41,000,000 in fiscal year 1992 and the addition of \$2,000,000 and \$4,000,000 for fiscal years 1991 and 1992 respectively. The Committee has increased the funding in order to

encourage faster growth in the National Space Grant College and Fellowship program.

Program description

The University Space Science and Technology Academic Program supports research and training of space scientists and creates and maintains strong, mutually beneficial working relations with the academic community.

Fiscal year 1990 funding will provide for the continuation of agency-wide university and minority university programs which were previously budgeted in other NASA programs. Fiscal year 1990 will allow for the continuation and modest increase in the graduate Student Researchers Program, the Summer Faculty Fellowship program, and the Innovative Research Program. Fiscal year 1990 funding will be used to increase Historically Black Colleges and Universities (HBCU) participation in NASA sponsored programs and establish two HBCU Space Science and Engineering Centers of Excellence (SSECE). Fiscal year 1990 funding will also be used to expand relationships with universities other than HBCU which have significant populations of minorities traditionally under-represented in science and engineering. As mandated in NASA's FY 1988 Authorization act, funding is also provided for the National Space Grant College and Fellowship program which will be implemented to broaden still further the base of universities involved in space related research.

Committee view

Previously NASA budgeted for agency-wide university and minority university programs within other NASA programs. In fiscal year 1990 these educational programs have been gathered together within the collective University Space Science and Technology Academic Programs. The Committee welcomes the emphasis NASA has placed on this function by virtue of this budget line item identification.

The Committee is aware that many indicators suggest that it will be difficult to find sufficient numbers of scientists and technicians to support the Nation's needs to remain competitive in science and technology. The number of students seeking advanced degrees in the related sciences is declining, the quality of education in the public school system has, on average, been declining for many years, and the number of college age persons in the population is expected to decline by 25 percent in the next decade. The Committee, in recognizing these disturbing educational and demographic trends, believes that it is essential that educational programs be designed to increase the number of graduate students studying space science or space technology and engineering, and to increase the participation of women and minorities who do not traditionally enter these fields. Without an expanded set of incentives quickly established, NASA may face a manpower crisis in the near future.

The Committee believes that NASA can, through continued implementation of its university and university minority programs, expand the commitment and involvement of students in space science and space technology. In addition, the Committee directs

NASA to accelerate the growth of the National Space Grant College and Fellowship Program. Through this program, NASA will:

- a. Encourage and support Federal funding for graduate fellowships in fields related to space;
- b. Create and maintain stronger and mutually beneficial working relationships with the private sector and university research communities;
- c. Encourage and support the existence of interdisciplinary programs of space research within this Nation's university community where integrated activities of training, research and public service take place; and,
- d. Encourage and support the existence of consortia, made up of university and industry members, which provide collectively greater resources for space science research and training as well as enhanced capabilities to allow for rapid technology transfer to the private sector.

The Committee especially encourages NASA to give adequate and fair consideration to consortia applicants which pool regional assets in education and technology. For example, the successful Challenger Center provides an opportunity for productive and useful regional collaboration.

Educational consortia also provide a means of distributing funds to educational institutions and geographic areas which have been unable to participate in our Nation's space program.

Section 4(1)(P) Comet Rendezvous Asteroid Flyby/Cassini

President's request:	
Fiscal year 1990.....	(\$30,000,000)
Committee recommendation:	
Full multiyear program funding.....	1,600,000,000

Committee authorization recommendation

Section 4(1)(P) authorizes full multiyear funding of \$1,600,000,000 for the combined Comet Rendezvous Asteroid Flyby and Cassini missions. This authorization will provide for a more stable and more economical funding base for the development of these closely related missions, resulting in cost savings to the government and maximization of the science output of the missions. The funding is to be released as NASA accomplishes, to the satisfaction of the Committee, three major programmatic milestones; preliminary design review, critical design review, and systems integration and testing.

Program description

The Comet Rendezvous Asteroid Flyby (CRAF) and Cassini (the Saturn Orbiter/Titan Probe) missions are planned for launch in 1995 and 1996, respectively. The CRAF/Cassini program will build upon the discoveries of the Pioneer and Voyager spacecraft, and will provide unprecedented information on the origin and evolution of our solar system. CRAF will provide the first long-term study of a comet, its active nucleus, and the nature and behavior of its ejected gases. Cassini will provide intensive, long-term observations of Saturn's atmosphere, rings, magnetosphere and moons. Together these missions will help to establish the early evolutionary history of the solar system.

Committee view

The CRAF/Cassini mission is proposed as a new science start for a number of critical reasons. The orientation of the planets is going to be optimal for the missions in 1995 and 1996. Another opportunity to perform these missions will not come for many years. Furthermore, by making use of commonality of design and sharing of spare parts, these two missions can be more economically achieved if the commitment to perform both of them is made at this time. To attain this the Committee has recommended multiyear funding. In this particular case, multiyear funding provides economies of commonality and multi-spacecraft acquisition. It stabilizes the science development and, therefore, optimizes the science output. Lastly, the CRAF/Cassini missions represent an important effort by scientists to understand the origin and evolution of the solar system and critical details about the chemical evolution of molecules formed elsewhere in the universe.

The Committee's authorization approach is intended to provide program planners with known, stable funding and also sufficient flexibility to manage funds consistent with program milestones rather than calendar dates. In addition, the Committee's authorization constitutes an absolute cap which cannot be exceeded without the enactment of subsequent legislation to provide additional budget authority. Such program control is essential in maintaining budget flexibility for other future science new starts. The Committee would only be receptive to requests for such legislation under extraordinary circumstances.

SECTION 4 (2) SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS

Section 4(2)(A) Space shuttle production and operational capability

President's request:	
Fiscal year 1990.....	\$1,305,300,000
Committee recommendation:	
Fiscal year:	
1990.....	1,264,500,000
1991.....	1,303,000,000
1992.....	1,368,000,000

Committee authorization recommendation

Section 4(2)(A) authorizes the appropriation of \$1,264,500,000 for fiscal year 1990 to support Shuttle Production and Operational Capability. This is \$40,800,000 less than the President's request. This decrease reflects the delays that are being experienced in initiating the development program for the Advanced Solid Rocket Motor (ASRM), and the availability of prior-year funds that result from the decision to pursue a private financing option for the purchase of the facilities, tooling, and equipment that will be utilized within the program. The Committee will entertain a request from NASA to reprogram the \$27,000,000 appropriated within the fiscal year 1989 budget for the construction of ASRM facilities. The Committee also anticipates that excess fiscal year 1989 ASRM funds produced by program delays as well as approximately \$10,000,000 in funds that had been earmarked for the purchase of tooling and equipment (no longer necessary because of the private financing decision) will carryover for use in fiscal year 1990.

Section 4(2)(A) also authorizes the appropriation of \$1,303,000,000 for fiscal year 1991 and \$1,368,000,000 for fiscal year 1992 for Shuttle Production and Operational Capability. These authorization levels are equal to the Administration's baseline estimate.

Program description

The objectives of the Shuttle Production and Operational Capability program are to provide the hardware and modifications needed to support the Space Shuttle flight manifest; complete the fleet of Space Shuttle Orbiters, including building a replacement Orbiter for the Challenger; develop improvements in the Space Shuttle Main Engine, Solid Rocket Booster, and External Tank; develop and produce an Advanced Solid Rocket Motor (ASRM); develop enhanced launch site capabilities; and develop an Extended Duration Orbiter (EDO) capability.

Committee views

Orbiter production line

The Committee is becoming increasingly concerned by the lack of a comprehensive long-term policy for how to handle the production line that is used to manufacture Space Shuttle Orbiters. In the past, decisions regarding this production line have generally been made on a year-to-year basis. The time is quickly approaching, however, when NASA must make a longer-term decision regarding whether to build an additional Orbiter or to shutdown this important production line.

The Committee believes that it is imperative that a policy be developed for how to handle this production line over the entire life of the Space Shuttle fleet. Among the options that are available include:

Over the next few years, build at the most efficient rate possible all of the Orbiters that are expected to be needed throughout the life of the Space Shuttle program and then shutdown the production line;

Keep the production line open throughout the life of the Space Shuttle program by continuously building Orbiters at a slow rate that is calculated to provide replacement Orbiters at a pace that will roughly equal the rate at which they will either wear out or be lost in accidents; or,

After building a replacement set of structural spares, shutdown the production line and only reopen it if future accidents occur at a rate that makes this necessary.

It is clear that each of these options carries with them a differing set of costs, risks, and programmatic impacts. It is equally clear that to arrive at a viable long-term policy, the Agency must study available options and their affiliated impacts in a thorough manner.

Accordingly, the Committee directs that NASA undertake whatever studies and analyses are required to provide for a long-range plan for how to handle the production line for Space Shuttle Orbiters throughout the life of the Space Shuttle program. The Committee also directs that the Agency then formulate a draft of such a plan and submit it to the Committee on Science, Space, and Tech-

nology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate by March 1, 1990.

Production vulnerability of the space program

The Committee has become increasingly concerned by the events of the past two years that have demonstrated the vulnerability of the U.S. space program to the loss of a single lower-tier supplier deep within the industrial base of this country. These events have included the explosion at the PEPCON ammonium perchlorate plant in Henderson, Nevada in May of 1988, and the threatened closing of the AVTEX Rayon fiber plant in Virginia in November of 1988.

Witnesses have testified that the Administration is in the process of conducting an extensive survey to determine if there are any other single sources of vulnerability within the U.S. industrial base that could threaten the viability of this country's space program. The Committee directs that NASA (in consultation with the Department of Defense and other relevant Federal agencies) build upon the results of this survey by formulating a draft policy and implementation plan for how to deal with the vulnerabilities that relate to the civil space program. The Committee also directs that NASA submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate by July 1, 1990 a full report on the results of the survey along with a copy of the draft policy and implementation plan that is designed to deal with the civil space vulnerabilities that have been identified.

Hardware improvements

Throughout the life of the Space Shuttle program, engineers and managers at NASA and within its contractor work force have been vigilant for ways in which the flight hardware could be improved. The Committee has always encouraged the Agency to adopt hardware improvements that would enhance the overall safety of the Space Shuttle. In the past, the Committee has also been supportive of developments and modifications that would improve the operating performance of the Shuttle.

As the Space Shuttle begins to mature, however, the Committee believes that improvements should predominantly focus on changes that are required to make the system safe, to fix things that do not work correctly, or to make improvements that are required to enhance the man-related capabilities of the system. Of major importance in the latter category are enhancements that enable the Space Shuttle to increase its duration in orbit.

In the safety area, the Committee believes that NASA should give serious consideration to modifying all of the Orbiters so they can deorbit and land in a fully automated mode (i.e., without interaction by the crew). The Committee requests that NASA study the feasibility, desirability, and cost of making such a modification and report the results of that study to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate by April 15, 1990.

Section 4(2)(B) Space shuttle, operations

President's request:	
Fiscal year 1990.....	\$2,562,700,000
Committee recommendation:	
Fiscal year:	
1990.....	2,500,700,000
1991.....	2,491,900,000
1992.....	2,667,900,000

Committee authorization recommendation

Section 4(2)(B) authorizes the appropriation of \$2,500,700,000 for fiscal year 1990 to support Space Shuttle Operations. This is \$62,000,000 less than the President's request. This decrease partially reflects the cancellation of a Space Shuttle mission in fiscal year 1989, 1992, and 1993, and the addition of a single Space Shuttle mission in fiscal year 1991. The Committee has also chosen not to provide long-lead funding for the first "Flight Opportunity" scheduled for fiscal year 1992. The Committee believes that this mission is more likely to take the form of a replacement for a mission that will be substituted some time during the next three years. Accordingly, this mission will not require the purchase of additional long-lead flight hardware. The Committee will be happy to entertain funding requests for future "Flight Opportunities" if such requests are required to maintain a required flight rate.

Section 4(2)(B) also authorizes the appropriation of \$2,491,900,000 for fiscal year 1991 and \$2,667,900,000 for fiscal year 1992 for Space Shuttle Operations. These authorization levels are less than the Administration's baseline estimate. The committee's recommendation is that TDRS-G be flown on an expendable launch vehicle.

Program description

Space Shuttle Operations provides for Space Shuttle launch services for NASA payloads, and, on a reimbursable basis, for those of the DOI, other civil agencies, and certain commercial and international users. Within this account, flight hardware is produced, refurbished, and repaired; and manpower, propellants, and other materials are furnished to conduct and support both flight and ground operations. Operations funding also provides for replacement spares inventory for both flight and ground support hardware as this hardware is consumed or damaged as a result of flight related activities.

Committee view

Economies within the Space Shuttle Program

Since the *Challenger* accident, the United States has invested billions of dollars in redesigning, recertifying, and purchasing the flight and ground hardware that was required to return the Space Shuttle to safe flight operations. The scope and extent of the activities that were undertaken by NASA and its associated contractors prior to the return to flight was truly impressive.

The Committee also notes that now that the Space Shuttle has begun flying again, the overall Shuttle budget continues at an annual level that is about \$1 billion larger than the pre-accident budget (and more than \$2 billion per year more that had been pro-

jected prior to the accident for this phase of the program). When funding requirements for the Replacement Orbiter, and Shuttle related expenses for the Construction of Facilities and Research and Program Management are included, the expenditures for the Space Shuttle program will exceed \$4.5 billion during FY 1990.

It is clear that maintaining a high level of quality and safety within the Space Shuttle program needs to be the primary goal of government and industry managers throughout the program. It is also clear that this goal should be the preeminent concern of these managers for as long as the Space Shuttle is in operation.

On the other hand, current budget realities emphasize the need for adopting economies within the Space Shuttle program whenever such economies can be implemented with no adverse impact on quality or safety.

Accordingly, the Committee encourages NASA managers to be vigilant for areas such as changes in organization, procedures, operations, staffing, hardware designs, and software design which could result in a reduction in the funds required to support the Space Shuttle program while causing no reduction in quality and safety levels.

The Committee requests NASA to conduct a study to determine what efficiencies the Agency believes could be adopted within the Space Shuttle program during the next five years, and to report the results of that study to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate by March 1, 1990.

Section 4(2)(C) Expendable launch vehicles and services

President's request:	
Fiscal year 1990	\$169,500,000
Committee recommendation:	
Fiscal year:	
1990	171,500,000
1991	240,000,000
1992	308,000,000

Committee authorization recommendation

Section 4(2)(C) authorizes the appropriation of \$171,500,000 for fiscal year 1990 to support Expendable Launch Vehicles and Services. This is above the President's request by \$2,000,000. This increase is due to the authorization of funds for an ELV for the launch of the TDRS-G satellite.

Section 4(2)(C) also authorizes the appropriation of \$240,000,000 for fiscal year 1991 and \$308,000,000 for fiscal year 1992 for Expendable Launch Vehicles and Services. These authorization levels are above the Administration's baseline estimate by, respectively, \$26M and \$66M in order to continue the procurement of an expendable launch vehicle for the TDRS-G satellite.

Program description

Funding for the Expendable Launch Vehicles and Services provides launch services for unmanned civil U.S. government space missions that do not require the Space Shuttle's unique capabilities. Consistent with the Commercial Space Launch Act, expend-

able launch vehicle services are to be acquired from the U.S. private sector whenever possible. The Committee adopted an amendment requiring the TDRS-G satellite to be launched on an ELV. The Committee also adopted policy language requiring all unmanned payloads to be launched by ELVs after five years.

Committee view

The Committee is concerned that some payloads currently manifested on the Space Shuttle do not require the presence of a crew and could readily be moved to expendable launch vehicles. The TDRS series of spacecraft, beginning with TDRS-F, is an example.

The Committee believes that all future generations of Tracking and Data Relay Satellites should be specifically designed and "baselined" for launches on expendable launch vehicles. The Committee will not entertain requests for new program starts for advanced TDRS systems that do not incorporate this philosophy.

Additionally, the Committee adopted language in Section 3(7) which declares as national policy that the logistics and resupply capability for the Space Station will utilize expendable launch vehicles (including commercial services if available) as well as the Space Shuttle. This "dual string" resupply capability is critical for safety as well as optimal use of the Shuttle.

Section 4(2)(D) Space and ground networks, communication and data systems

President's request:	
Fiscal year 1990	\$1,102,100,000
Committee recommendation:	
Fiscal year:	
1990	1,077,100,000
1991	1,159,000,000
1992	1,228,000,000

Committee authorization recommendation

Section 4(2)(D) authorizes the appropriation of \$1,077,100,000 for fiscal year 1990 to support Space and Ground Network, Communications and Data Systems. This is \$25,000,000 less than the President's request.

This decrease is made, in part, in anticipation of revenues from the lease of the TDRS "C-band" transponders. The remainder of the reduction will be taken from general program reserves.

Section 4(2)(D) also authorizes the appropriation of \$1,159,000,000 for fiscal year 1991 and \$1,228,000,000 for fiscal year 1992 for Space and Ground Networks, Communications and Data Systems. These authorization levels are equal to the Administration's baseline estimates.

Program description

This program provides vital tracking, telemetry, command, data acquisition, communications, and data processing 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 (DOD), other Government agencies, commercial firms, and other countries and international organizations.

Support is provided for Earth orbital, planetary and solar system exploration spacecraft missions, launch vehicles, research aircraft, sounding rockets and balloons. Included in Earth orbital support are the Space Shuttle, Spacelabs, and scientific and applications missions. The various types of support provided include: (a) tracking to determine the position and trajectory of vehicles in space; (b) acquisition of science and space applications data from on-board experiments and sensors; (c) acquisition of engineering data on the performance of spacecraft and launch vehicle systems; (d) reception of television transmissions from space vehicles; (e) transmission of commands from ground facilities to spacecraft; (f) voice communications with astronauts; (g) transfer of information between the various ground facilities and control centers; and (h) processing of data acquired from launch vehicles and spacecraft. Such support is essential for achieving the scientific objectives of all flight missions and for executing the critical decisions which must be made to assure the success of these missions.

SECTION 4(3) CONSTRUCTION OF FACILITIES

President's request:	
Fiscal year 1990.....	\$341,800,000
Committee recommendation:	
Fiscal year 1990.....	331,800,000

Committee authorization recommendation

Section 4(3) authorizes the appropriation of \$331,800,000 including \$71,100,000 for aeronautical facilities for fiscal year 1990 to provide contractual services for the repair, rehabilitation and modification of existing facilities; the construction of new facilities and the acquisition of related facility equipment; environmental compliance activities; the design of facilities projects; and advanced planning related to future facilities needs. This is \$10,000,000 less than the President's request. This reduction is made without prejudice and may be applied at NASA's discretion except aeronautical facilities.

Program description

The projects and amounts in the budget estimates reflect time-sensitive initiatives required to support the specific program objectives of the Space Station Freedom and Space Flight activities. Other program requirements for 1990 include: refurbishing bridges at Merritt Island; rehabilitation of the Spacecraft Assembly and Encapsulation Facility II at the Kennedy Space Center; rehabilitation of the central heating/cooling plant at the Johnson Space Center; construction of a Data Operations Facility and a Quality Assurance and Detector Development Laboratory at the Goddard Space Flight Center; construction of an Observational Instrument Laboratory and modernization of the south utility systems at the Jet Propulsion Laboratory; projects to repair, restore, and modernize NASA's aeronautical research and development facilities at Ames, Lewis, Langley, and the Plumb Brook Station; construction of an Automation Sciences Research Facility at the Ames Research Center; construction of a Supersonic/Hypersonic Low Disturbance

Tunnel at the Langley Research Center; and modifications for seismic safety at Goldstone, California.

The FY 1990 program continues to meet the objectives of preserving and enhancing the capabilities and usefulness of existing facilities, and ensuring safe, economical and efficient use of the NASA physical plant. This request continues the necessary rehabilitation and modification program begun in prior years and continues a repair program. The repair program restores facilities to a condition substantially equivalent to their originally designed capability. The minor construction program continues to provide a means to accomplish smaller facility projects which accommodate changes in technical and institutional requirements. The environmental compliance and restoration program ensures that statutory environmental requirements are met and any necessary remedial action is promptly taken.

Funds requested for facility planning and design cover advance planning and design requirements for potential future projects, master planning, facilities studies, engineering reports and studies and the preparation of facility project design drawings and bid specifications.

SECTION 4(4) RESEARCH AND PROGRAM MANAGEMENT

President's request:	
Fiscal year 1990.....	\$2,032,200,000
Committee recommendation:	
Fiscal year 1990.....	2,032,200,000

Committee authorization recommendation

Section 4(4) authorizes the appropriation of \$2,032,200,000 for fiscal year 1990 for Research and Program Management. This is equal to the President's request. The Committee recognizes, however, that this amount is wholly inadequate to meet the future needs of the Nation's space program, especially with the initiation of major new space exploration initiatives. Accordingly, the Committee intends that future requests for new initiatives be accompanied by a long-range plan for human resource development that can support a multiyear authorization.

Program description

The FY 1990 budget provides funding for an increase in the size of NASA's civil service work force. These additional personnel are urgently required: to meet the staffing levels associated with the Space Station; to manage the 85 percent of NASA's work that is contracted to private industry; and to provide an ability to respond quickly to management or technical problems as they occur.

The Research and Program Management appropriation funds the performance and management of research, technology, and test activities at NASA installations, and the planning, management, and support of contractor research and development tasks. This account provides the underpinnings for the successful accomplishment of the nation's aeronautics and space programs.

This account provides for the payment of civil service salaries and expenses, and costs of conducting maintenance on NASA facilities.

SECTION 4(5) INSPECTOR GENERAL

President's request:	
Fiscal year 1990.....	\$8,795,000
Committee recommendation:	
Fiscal year:	
1990.....	8,795,000
1991.....	9,000,000
1992.....	9,000,000

Committee authorization recommendation

Section 4(5) authorizes the appropriation of \$8,795,000 for fiscal year 1990 to support the activities of the Inspector General. This is equal to the amount contained within the President's request.

Section 4(5) also authorizes the appropriation of \$9,000,000 for fiscal year 1991 and \$9,000,000 for fiscal year 1992 to support the activities of the Inspector General. These authorization levels are equal to the Administration's baseline estimate.

Program description

The Office of Inspector General was created in 1978 by Public Law 95-452 as an independent and objective unit within NASA. The purposes and mission of the Office are to: conduct and supervise audits and investigations within the Agency; promote economy, efficiency, and effectiveness in the administration of the Agency's programs and operations; prevent and detect fraud, waste, and abuse within the Agency; and to keep the Administrator and the Congress fully and currently informed about NASA programs, deficiencies relating to the administration of such programs, and the necessity for and progress of corrective actions.

Committee views

The Committee intends that the Office of Inspector General fulfill the intent of P.L. 95-452 to aggressively and thoroughly oversee all Agency activities to ensure the avoidance of waste, fraud, and abuse; and to keep the Congress fully and currently informed about deficiencies that are uncovered and corrective actions that should be applied.

The Committee further intends that the Inspector General be provided adequate resources and personnel, distinct from other program management and contract monitoring activities, in order to maintain an independent posture.

Section 4(6) provides that appropriations authorized for "Research and Development" and Space Flight, Control, and Data Communications" may be used for (1) items of a capital nature (other than acquisitions of land) at non-NASA locations for the performance of research and development contracts and (2) grants to nonprofit organizations for scientific research and purchase or construction of facilities, provided that construction of any facility does not exceed \$500,000 or the Administrator has notified the appropriate authorizing committees in Congress.

Section 4(7) authorizes appropriations made available under this Act and subject to an appropriations Act (except those for "Research and program management") to remain available without

fiscal year limitation. Certain research and program management contracts may be entered into at any time during the fiscal year.

Section 4(8) provides that up to \$35,000 of "Research and program management" funds may be used for scientific consultations or extraordinary expenses.

Section 4(9) allows certain funds designated for "Research and Development", "Space Flight, Control, and Data Communications", and "Research and Program Management" to be used for construction or repair of facilities provided that the cost of each project does not exceed \$100,000. It also allows funds designated for "Research and Development" and "Space Flight, Control, and Data Communications" to be used for unforeseen programmatic facility projects less than \$500,000. Funds for "Research and Program Management" may be used for work on facilities controlled by the General Services Administration provided each project does not exceed \$500,000.

SECTION 5: ADMINISTRATOR'S REPROGRAMMING AUTHORITY

Section 5 authorizes transfers of up to 10 percent of any individual line item among line item accounts 4(3)(A) through 4(3)(L) except that such authority shall not include authority to reduce the amount authorized for the Observational Instrument Laboratory. With that exception, the amounts may be varied up to 25 percent to meet unusual cost variations following a report by the Administrator or the Administrator's designee to the Committee on Science, Space and Technology in the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the circumstances of such action. The total amount authorized for fiscal year 1990 shall not be increased as a result of reprogramming carried out pursuant to this section.

SECTION 6: SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Section 6 allows the transfer of appropriations, not exceeding one-half of 1 percent, from "Research and Development" and "Space Flight, Control, and Data Communications" to "Construction of Facilities" for use on programs not presented to the Congress. The Administrator may also use up to \$10,000,000 from the "Construction of Facilities" authorization for these purposes. Action pursuant to this section may be taken only after a written report has been transmitted to the appropriate authorizing committees of the Congress and 30 days have passed.

SECTION 7: LIMITATIONS ON AUTHORITY

Section 7 prohibits appropriations from this act from being used for any program not authorized, or in excess of amounts authorized, unless a period of 30 days has passed after notice has been given by the Administrator to the appropriate authorizing committees of the Congress.

SECTION 8: PROCUREMENT OF SPACE SHUTTLE STRUCTURAL SPARE PARTS

Section 8 provides the Administrator authority in the amount of up to \$50,000,000 to procure shuttle structural spare parts with

funds appropriated for orbiter production in accordance with "Joint Resolution making continuing appropriations for the fiscal year 1986, and for other purposes."

SECTION 9: NON-FEDERAL FINANCING OF FACILITIES

Section 9(a) limits the Administrator's authority to enter into agreements that provide for non-Federal financing of any facility. That limitation may only be waived upon specific legal authority.

Section 9(b) provides the Administrator authority to enter into agreements providing for a neutral buoyancy facility and a payload processing facility. The Administrator must certify that each agreement is in the best interests of the United States considering the following: (1) net cost savings to the Federal Government over the life of the agreement, (2) the amount of non-Federal revenues the facility anticipates receiving, (3) the amount and nature of the equity investment or other risk assumed by the financing source, (4) the amount of potential exposure to termination liability of the United States under the agreement, (5) the annual burden of guaranteed payments, if any, incurred by the United States under the agreement, and (6) the ways in which such agreement promotes the commercialization of space. Standard accounting practices shall be used for each such certification. Each certification shall be annually updated and resubmitted to the Congress.

Section 9(c), in regards to preferred agreements, directs the Administrator to seek arrangements which would reduce the cost to the United States through (1) private sector operation of the facility, (2) private sector shared use of the facility, (3) innovative design and construction, and (4) shared risk arrangements. No agreement should be entered into if it would impair NASA's program schedule.

Section 9(d) allows the Administrator to provide contingent liability to cover programs pursuant to this section terminated for convenience purposes. The liability agreement shall limit the potential payments by the Federal Government to amounts provided in advance to NASA in appropriations Acts. If funds for this purpose have not already been provided, other unobligated appropriations of NASA may be used. The amounts for contingent liability shall not exceed 80 percent of the costs resulting from any such termination for convenience.

SECTION 10: GEOGRAPHICAL DISTRIBUTION

Section 10 directs the Administrator to distribute funds geographically in order to ensure the broadest practical participation in the space program.

SECTION 11: BUY AMERICAN

Section 11 requires the Administrator to "buy American" for products completely assembled in the United States. When completely assembled, not less than 50 percent of the final product will be domestically produced and the difference between foreign and domestic bids should not exceed 6 percent. This section does not apply where such an acquisition would not be in the public interest, national security considerations would dictate otherwise, or the

U.S. Trade Representative determines that such an award would be inconsistent with international agreements to which the U.S. is a part.

Section 11(e) requires the Administrator to report to Congress the number of contracts entered into with foreign and domestic firms in accordance with this section.

SECTION 12: AMENDMENTS TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Section 12 amends Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) to encourage the use of commercially provided space services and hardware and, in particular, to procure, on a commercially reasonable basis, space launch services and hardware.

SECTION 13: COMMERCIAL SPACE LAUNCH ACT AUTHORIZATION

Section 13 authorizes the appropriation of \$4,392,000 to the Department of Transportation Office of Commercial Space Transportation to carry out this act for fiscal year 1990.

SECTION 14: NATIONAL SPACE COUNCIL

Section 14(a) amends section 501 of the NASA Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471), to provide for up to six individuals to be compensated at a grade of level VI of the Senior Executive Service. This section also allows for the employment with compensation of experts and consultants in accordance with section 3109 of title 5 U.S.C. Finally, this section authorizes \$1,200,000 to carry out the activities of the National Space Council.

Section 14(b) amends section 5314 of title 5, U.S.C. by adding at the end the following: "Executive Secretary, National Space Council".

SECTION 15: INTERNATIONAL SPACE YEAR

Section 15 encourages the President, in consultation with foreign leaders, to develop an International Space Year (ISY) agenda. The President is also encouraged to declare a World Space Congress (to be convened in 1992), to solicit the help of the American public to develop International Space Year Activities, and to direct NASA to continue to develop ISY activities focusing on Mission to Planet Earth. The President is directed to report to Congress no later than January 1, 1990 on the steps taken pursuant to this section.

SECTION 16: ADVANCED SOLID ROCKET MOTOR CONTINGENT LIABILITY

Section 16(a) allows the Administrator to provide contingent liability in the event that the Government for its convenience terminates the Advanced Solid Rocket Motor (ASRM) program. Any action pursuant to this section would necessarily follow the selection of a proposal for a privately financed ASRM production facility to be constructed on a government site. The liability payments are limited to the amounts provided to the ASRM program by the Appropriations Acts. If funds have not been provided, such payments would be made from other unobligated appropriations of NASA.

Section 16(b) notes that nothing in this Act shall inhibit the Administrator from developing liquid or hybrid rocket boosters for the space shuttle.

Section 16(c) requires the Administrator to submit four annual reports—a report on the projected cost of the completion of the design, development, and qualification of the ASRM; a report on interest rate changes; a report on the projected unit costs; and a report on increased payload capability. The subsection also requires assessments from the National Research Council regarding the need for ASRM as well as safety and performance enhancement options.

SECTION 17: SPACE SHUTTLE USE POLICY

Section 17(a) states that it is the policy of the United States to use the space shuttle for purposes that require the presence of man or the unique capabilities of the space shuttle.

Section 17(b) directs the Administrator to submit a report to the Congress within 6 months of the enactment of this Act outlining (1) the details of the implementation plan, (2) a list of the purposes that require the presence of man, (3) a proposed schedule for the implementation of the policy stated in subsection (a), (4) an estimate of the costs to the United States of implementing the policy, and (5) a list of special certifications the Administrator expects to make.

Section 17(c) denotes special certifications for shuttle unique payloads that do not require the presence of man. If special circumstances exist, the Administrator must certify in writing to the appropriate authorizing committees in Congress the need for shuttle launch. Also, if there is available cargo space on a shuttle mission otherwise compliant with this policy, the Administrator may use the space for secondary payloads that do not require the presence of man.

Section 17(d) limits secondary payloads carried on the space shuttle to payloads authorized for research, development, demonstration, scientific, and commercial programs.

SECTION 18: FAIR PRICING AGREEMENT

Section 18 relates to fair pricing agreements for international trade in commercial launch services, especially those offered by Australian firms using launch vehicles built in the Soviet Union.

There are plans underway to construct a commercial launch facility in Cape York, Australia. The Committee has been briefed on this facility on several occasions. The Committee has learned that the developer of this facility, the Cape York Space Agency, is conducting negotiations with the Soviet Union for the purchase of Soviet-built rockets for use at Cape York. Concerns have been raised about the effect this arrangement will have on the U.S. commercial launch industry's ability to compete in the world market.

Australian officials have stated to the Committee that in performing financial analyses for the CYSA facility, it was determined that the economic feasibility of the venture is contingent upon the utilization of Soviet-manufactured launch vehicles, since they would be considerably cheaper than comparable Western-built

rockets. There is a general presumption that such large price differentials may be due to Government subsidization.

Concerns have been raised that such pricing will be disadvantageous for the U.S. commercial launch industry. Under this Committee's leadership, Congress has made the creation and maintenance of a domestic commercial launch industry a national priority. Twice in the past six years legislation has been enacted to promote, encourage and strengthen this infant industry. The premise of these legislative efforts is that guaranteed access to space is essential to any spacefaring nation and also that a viable commercial launch industry enhances the national security of the United States. Both of these may be jeopardized if the Soviet Union gains a foothold in the commercial launch market through unfair pricing strategies.

At the same time, satellite manufacturers have expressed the need to have access to any launch facility offering competitively priced launch services and any launch system not specifically prohibited by Export Control regulations. The export of U.S. satellites and our dominance of the world satellite market not only makes a positive contribution to our balance of trade, it also provides significant foreign policy benefits contributing to the national security.

Two approaches are possible for resolving these conflicting points of interest. First, as in the case of the Ariane launch vehicle, the U.S. Trade Representative could enter into negotiations to establish fair pricing standards for international trade in launch vehicles and launch services. In the case of CYSA, the Government of Australia, as the host government, would necessarily assume the role of negotiating agent. Second, Congress could prohibit the export of U.S.-built satellites to any country utilizing Soviet-built launch vehicles.

Section 18 promulgates a policy which first establishes a negotiated approach. Such negotiation need not be undertaken if the President certifies to Congress that the price of launch services offered by the Australians utilizing Soviet Union-built launch vehicles is not more than 25 percent below the price of a launch service using a comparable launch vehicle built in a market-based economy.

Section 18 further establishes that U.S. policy should prohibit the export of U.S.-built satellites for launch on Soviet-built launch vehicles in the absence of an agreement which achieves and ensures fair pricing of commercial launch services in international trade. This prohibition shall not apply if the President certifies that the price of launch services provided by CYSA utilizing Soviet-built launch vehicles is not more than 25 percent below the price of world launch services which use comparable vehicles built in a market based economy.

SECTION 19: EXPORT OF SATELLITES FOR LAUNCH BY THE PEOPLE'S REPUBLIC OF CHINA

Section 19 would extend the suspension of all licenses for the export of United States satellites intended for launch on launch vehicles owned by the People's Republic of China until the President reports to the Congress. The content of the report is outlined in

this section. Elements which must be reported include a halt of political executions for nonviolent protestors and an increase in respect for human rights. This section would also allow for the termination of the suspension if it is in the best interests of the national security of the United States to do so.

SECTION 20: LIFE SCIENCES STRATEGIC PLAN

Section 20 directs the administrator to undertake a detailed study of life science knowledge base requirements. The study would identify needs in the area of life sciences by evaluating currently proposed manned missions, determine a schedule for the acquisition of knowledge to meet the specific mission needs, and develop a strategic plan for accomplishing the necessary research and technology development to meet the schedule.

SECTION 21: COMMISSION FOR INTERNATIONAL COOPERATION IN PLANETARY EXPLORATION

Section 21 would establish a Commission for International Cooperation in Planetary Exploration in order to develop an inventory of intentions and to seek ways of enhancing the exchange of information with regards to lunar and planetary exploration. The members, staff, and logistical support for the Commission are outlined in this section. After performing an intensive study, the commission shall submit a detailed report of the findings. The report shall be submitted within one year of the enactment of this Act.

SECTION 22: OFFICE OF SPACE COMMERCE

Section 22 would establish an Office of Space Commerce within the Department of Commerce and designate it as the principal unit for the coordination of space related issues, programs, and initiatives within the Department of Commerce. The Office would promote private sector investment in space activities while seeking to remove legal, policy, and institutional impediments to space commerce.

The Committee authorizes the establishment of the Office of Space Commerce within the Department of Commerce. Such an office is needed to coordinate space-related issues, programs, and initiatives within the Department. The Department is instructed to submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a request for funding of the Office within 60 days of enactment of the authorization bill.

SECTION 23: UPGRADING HISTORIC LANDMARK FACILITIES

Section 23 would amend the National Aeronautics and Space Administration Act of 1958 to direct the Administrator to maintain, modify, upgrade, and expand facilities designated as National Historic Landmarks under the National Historic Preservation Act.

SECTION 24: NATIONAL AERO-SPACE PLANE PROGRAM

Background

The National Aero-Space Plane (NASP) program was originally established by President Reagan as a high national priority in the January 1986 State of the Union address. A joint program was immediately established between the Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) in July 1986.

The program was divided into three phases. Phase I was the concept feasibility study (called Copper Canyon) which ran from 1982 to 1985 and was essentially a pre-NASP phase. The study results defined the technical concept for the NASP program which was to be developed in Phases II and III. Both phases have been revised since the first joint agreement. Phase II (1985-1990) is the Concept Validation Program which has as its goal proving the relevant technologies are sufficiently mature to support the development of an experimental flight vehicle, the X-30.

At the completion of Phase II, September 1990, the schedule calls for an assessment of the progress in technology development in order to determine if it is feasible to continue to Phase III. The last phase of the NASP program, calls for the construction and flight of two vehicles with the first flight in 1995. A single-stage-to-orbit flight is called for in late 1996. The X-30 is designed to be an experimental vehicle with no operational missions or requirements.

The technologies that must be developed in order for the X-30 to fly include:

A. a propulsion engine that is primarily an air-breathing scramjet in design. A scramjet engine is one that is air-breathing and can operate on hydrogen fuel from speeds of approximately Mach 4 to 25;

B. advanced materials in the airframe, engine and other parts of the aircraft that can withstand the high temperatures generated at Mach 25 and at the same time be completely reusable;

C. a completely integrated engine and airframe in the X-30 that can operate effectively under the wide variety of speeds, temperatures, altitudes and flight conditions encountered; and

D. Supercomputer technology that will enable predicting of aerodynamics for the integrated X-30 system before the first flight.

Propulsion

Currently, the best airbreathing aircraft operate at speeds well below Mach 4. (Mach 1 is equal to the speed of sound which is 760 m.p.h. at sealevel). Therefore, the adequacy of facilities to test the scramjet engines from Mach 4-25 which have never been tested before have been a subject of concern. Very good progress has been made in addressing this concern. Recently, the agencies and the contractors have constructed two major full-scale engine facilities capable of tests to Mach 8. Moreover, several experimental shock tunnel combination facilities have been modified to simulate Mach 8-24 flow for propulsion component test.

Components of the engine, built to full scale, have been tested up to Mach 7 and the performances have equaled or exceeded the original expectations.

Advanced materials

Some sections of the X-30 are projected to reach the temperatures of 5,000 degrees Fahrenheit or higher during flight. Existing materials used in aircraft cannot withstand this amount of heat, consequently new materials must be developed in the NASP Program with this capability, while at the same time be reusable.

Very good progress is being made by the NASP team, which includes unique management arrangement of a joint research effort by all the NASP contractors.

Integration of engine and airframe

The effective performance of a scramjet will depend on the efficient flow of air into the engine, this, in turn, depends on the shape of the airframe. The underside of the aircraft will be the air inlet to compress air for the engine as well as the engine's exhaust nozzle. Consequently, the engine must be completely integrated with the airframe.

Because of the advances in supercomputer technology, it is possible to predict the integrated performance through computational fluid dynamics (CFD). As a result of the use of CFD, analysis of mixing, combination and engine performance is ahead of schedule. Results, to date, indicate that the propulsions systems for the X-30 are feasible.

Congressional and other related activities

The committee has authorized the NASP program, which is contained in the Administration's NASA budget requests, every year since the creation of the program. The funding history is presented in table one.

TABLE I.—NASP FUNDING

(In millions of dollars)

	fiscal year -		
	1986-88	1989	1990
DOD	318	231	300
NASA	148	84	127
Total	486	315	427

It is estimated that the corporate investment to date is \$500 million and may increase to a total of \$750 million by the end of FY 1990.

The fiscal year 1990 budget request, (Table I) was submitted to Congress by both Presidents Reagan and Bush. However, on April 25, 1989, the Secretary of Defense presented a revised DOD budget to Congress that proposed decreasing the Departments funding level to \$100 million for FY 1990 and transferring the program

management to NASA. This decision prompted a Congressional response in the form of legislation to continue the NASP Program.

During the April 26 hearing on the NASA FY 1990 budget request, several questions were asked by Members about the NASP program. In response to the question of what are the future benefits of the NASP program, the NASA witness replied, "I believe that if the United States is going to maintain overall leadership in aeronautics, . . . we must maintain leadership in hypersonics. The technology that will be incorporated in aircraft that are [to be] produced at the turn of the century is the technology that we are developing right now."

Other questions were raised about the status of a NASP type program in other countries. A General Accounting Office assessment of international programs, concluded that other countries are developing technologies for operational aerospace vehicles.

France is developing the Hermes spaceplane, which is shuttlelike. The \$5 billion program is scheduled for first launch in 1998.

West Germany is involved in the development of a vehicle, Sangeh II, in a joint effort in the European Space Agency. The two stage launch vehicle is not scheduled for flight before 2005.

United Kingdom research and development efforts have been directed toward the HOTOL. However, at this time, no government funds are being spent on the program.

Japan has a goal of developing a spaceplane. A \$6 billion 15 year effort is underway to build a spaceplane. In addition, HOPE-II, a shuttlelike aircraft is currently being tested.

USSR's spaceplane program apparently is underway. A model of a hypersonic cruise airplane was exhibited at the Paris Air Show in 1987. However, few details are known about the level of the USSR effort.

The international effort has a direct impact on the nation's economy, a point stressed by several Members during hearings. The 1989 positive balance of trade in the aerospace industry was over \$18.7 billion, the largest of any United States sector. Witnesses followed up on this point with testimony that new advances in aviation technology usually are the result of long-term, high risk research programs, such as the NASP program.

Explanation

Paragraph (a). Findings

(1) Congress finds that the data, technology and advancements gained from National Aero-Space Plane (NASP) research currently underway are vital.

(2) Congress finds that the materials advancements achieved in the NASP research program will lead to important new and innovative technologies for use in the aerospace industry.

(3) Congress finds the advances in aviation technology that will be gained from propulsion systems, aerodynamics, and control systems that would enable the NASP vehicle to take off from conventional runways and achieve Earth orbit, utilizing a single-stage primarily air breathing aircraft, will lead to new important advances for both military and civilian aviation.

(4) Congress finds that aerospace vehicles that could be derived from the NASP program include hypersonic military aircraft, space transportation systems capable of frequent flight and hypersonic commercial flight.

Paragraph (b). Establishment of Program

The Secretary of the Department of Defense (DOD) and the Administrator of the National Aeronautics and Space Administration (NASA) shall jointly establish a National Aero-Space Plane (NASP) program. The flight vehicle, to be developed by 1995, will be primarily an air breathing single-stage-to-orbit and long range hypersonic cruise aircraft. During the development phases, there have been, and will continue to be, produced innovative technologies that could have immediate applications; therefore, the Secretary and Administrator are required to transfer those technologies to the domestic military, civil aviation and private sectors when it is practical.

Paragraph (c). Responsibilities

The Secretary and the Administrator shall have joint responsibility for the management of the NASP program established in paragraph b. The Secretary shall have responsibility for procurement, experimental flight vehicles and overall program administration. The Administrator shall have the responsibility for providing technology development and flight test support and shall have an integral part in the overall program. Both the Secretary and the Administrator shall participate in all aspects of the program.

Paragraph (d). Management Plan

(1) Development. The Secretary and the Administrator shall jointly develop a management plan for the NASP program. The plan shall establish the program goals, major tasks, anticipated schedules, organizational structure, funding profiles, and the details of the responsibilities of the Secretary and the Administrator. In addition, the plan will include procurement strategies for the NASP program.

(2) Submission to Congress. The management plan developed under subsection (1) shall be submitted to Congress within 120 days of enactment of this legislation.

Paragraph (e). Funding

Both the Secretary and the Administrator shall jointly fund the NASP program.

The Secretary is responsible for not less than two-thirds of the program funding and the Administrator is responsible for not less than one-third of the program funding for fiscal year 1990.

For fiscal years after 1990, funding responsibilities shall be in accordance with the management plan developed under section 4 of title II.

SECTIONAL ANALYSIS

A bill to authorize appropriations to the National Aeronautics and Space Administration for Research and Development; Space, Flight, Control, and Data Communications; Construction of Facilities; Research and Program Management; the Inspector General; and for other purposes.

TITLE I—NATIONAL AERONAUTICS AND SPACE CAPITAL DEVELOPMENT PROGRAM

SECTION 1—SHORT TITLE

Section 1 designates that the act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1989".

SECTION 2—FINDINGS

Section 2 includes a finding that the United States space program contributes to the nation's competitive advantage in technology and expresses the need for a sustained commitment of financial and human resources to the space program.

SECTION 3—POLICY

Section 3 would direct increased funding for the space program, emphasize the need for a healthy balance between manned and unmanned space activities, and maintain a mixed fleet by utilizing commercial expendable launch vehicles.

SECTION 4—AUTHORIZATION OF APPROPRIATIONS

Section 4 authorizes appropriations for fiscal years 1990, 1991, and 1992.

SECTION 5—ADMINISTRATOR'S REPROGRAMMING AUTHORITY

Section 5 provides the Administrator with limited authority to reprogram individual line items.

SECTION 6—SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Section 6 allows the Administrator to transfer some appropriations to programs not presented to Congress provided such transfers are reported in writing to the appropriate authorizing committee.

SECTION 7—LIMITATIONS ON AUTHORITY

Section 7 requires the Administrator to give notice to the appropriate authorizing committee before using appropriations for any

program not authorized or for an amount in excess of that authorized.

SECTION 8—PROCUREMENT OF SPACE SHUTTLE STRUCTURAL SPARE PARTS

Section 8 provides the Administrator with authority to procure shuttle structural spare parts with up to \$50,000,000 in funds appropriated for orbiter production.

SECTION 9—NON-FEDERAL FINANCING OF FACILITIES

Section 9 authorizes the Administrator with limited authority to obtain non-federal financing for a neutral buoyancy facility and a payload processing facility.

SECTION 10—GEOGRAPHICAL DISTRIBUTION

Section 10 directs the Administrator to distribute funds geographically in order to ensure the broadest participation practical in the aeronautics and space programs.

SECTION 11—BUY AMERICAN

Section 11 requires the Administrator to acquire goods and services from domestic firms unless certain exceptions are met.

SECTION 12—AMENDMENTS TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Section 12 amends The Act to encourage the use of commercially provided space goods and services that are acquired on a commercially reasonable basis.

SECTION 13—COMMERCIAL SPACE LAUNCH ACT AUTHORIZATION

Section 13 authorizes the appropriation of \$4,392,000 to the Department of Transportation Office of Commercial Space Transportation for fiscal year 1990.

SECTION 14—NATIONAL SPACE COUNCIL

Section 14 authorizes \$1,200,000 to carry out the activities of the National Space Council and amends the NASA Authorization Act, Fiscal Year 1989 to provide for up to six individuals to be compensated at a grade of level VI of the Senior Executive Service.

SECTION 15—INTERNATIONAL SPACE YEAR

Section 15 encourages the President to develop an International Space Year agenda and to declare a World Space Congress to be convened in 1992.

SECTION 16—ADVANCED SOLID ROCKET MOTOR CONTINGENT LIABILITY

Section 16 provides the Administrator with the authority to provide contingent liability in the event that the Government terminates for convenience the Advanced Solid Rocket Motor program and requires the submission of annual reports on four subjects.

SECTION 17—SPACE SHUTTLE USE POLICY

Section 17 states that it is the policy of the United States to use the space shuttle for purposes that either require the presence of man or the unique capabilities of the space shuttle and limits secondary payloads on the space shuttle to payloads for research, development, demonstration, scientific, and commercial programs.

SECTION 18—FAIR PRICING AGREEMENT

Section 18 prohibits the launching of satellites manufactured in the United States on launch vehicles manufactured by the Soviet Union unless certain circumstances are met.

SECTION 19—EXPORT OF SATELLITES FOR LAUNCH BY THE PEOPLE'S REPUBLIC OF CHINA

Section 19 extends the suspension of all licenses for the export of satellites manufactured in the United States for launch on launch vehicles owned by the People's Republic of China unless either the President reports to Congress or it is in the best interest of the national security of the United States to do so.

SECTION 20—LIFE SCIENCES STRATEGIC PLAN

Section 20 directs the Administrator to undertake a detailed study of life science requirements and knowledge base.

SECTION 21—COMMISSION FOR INTERNATIONAL COOPERATION IN PLANETARY EXPLORATION

Section 21 establishes a Commission for International Cooperation in Planetary Exploration in order to develop an inventory of methods to enhance the exchange of information regarding lunar and planetary exploration.

SECTION 22—OFFICE OF SPACE COMMERCE

Section 22 establishes an Office of Space Commerce within the Department of Commerce.

SECTION 23—UPGRADING HISTORIC LANDMARK FACILITIES

Section 23 directs the Administrator to maintain, modify, upgrade, and expand agency facilities designated as National Historic Landmarks under the National Historic Preservation Act.

SECTION 24—NATIONAL AERO-SPACE PLANE PROGRAM

Section 24 establishes a joint program for the development and demonstration of a primarily air breathing single-stage-to-orbit and long range hypersonic cruise research flight vehicle by 1995.

COMMITTEE RECOMMENDATION

A quorum being present, on July 27, 1989 the Committee favorably reported the bill H.R. 1759 by voice vote and recommends its enactment.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

Pursuant to section 403 of the Congressional Budget Act of 1974 and rule XI, clause 2(1)(3) of the Rules of the House of Representatives, the report of the Congressional Budget Office follows:

1. Bill number: H.R. 1759.
2. Bill title: National Aeronautics and Space Administration Multiyear Authorization Act of 1989.
3. Bill status: As ordered reported by the House Committee on Science, Space, and Technology, August 3, 1989.
4. Bill purpose: H.R. 1759 would provide a multiyear authorization of appropriations for certain National Aeronautics and Space Administration (NASA) programs, and an authorization for 1990 for other NASA programs, the Office of Commercial Space Transportation in the Department of Transportation, and the National Space Council in the Executive Office of the President. The bill would also authorize the establishment of an Office of Space Commerce in the Department of Commerce and a Commission for International Cooperation in Planetary Exploration.

H.R. 1759 would authorize appropriations of \$1.6 billion for the Comet Rendezvous Asteroid Flyby (CRAF/Cassini mission, with the funds to be available for obligation on a phased, multiyear basis. The bill would also authorize 1992 appropriations of \$3.5 billion for the Space Station Freedom. (Public Law 100-685, the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989, authorized appropriations for the space station for fiscal years 1990 and 1991 of \$2.1 billion and \$2.9 billion, respectively.) Other NASA research and development activities would be authorized at \$3.8 billion for fiscal year 1990, \$4.1 billion for 1991, and \$4.2 billion for 1992.

Also receiving a multiyear authorization would be NASA's space flight, control, and data communications (SFCDC) program. For this program, the authorization levels would be \$5.0 billion for 1990, \$5.2 billion for 1991, and \$5.6 billion for 1992.

H.R. 1759 would also authorize NASA to enter into private financing agreements, such as leases or contracts for the development of two facilities—a neutral buoyancy facility and a payload processing facility—if the Administrator certifies that such agreements are in the best interest of the United States. NASA would also be authorized to provide for the payment of contingent termination liability for these projects; this liability would be paid only if either of the private financing arrangements is terminated by NASA for the convenience of the U.S. government.

5. Estimated cost to the Federal Government:

	[By fiscal year, in millions of dollars]				
	1990	1991	1992	1993	1994
Authorization level:					
Specific:					
Estimated:	12,799	9,271	13,283	15	15
Portion applied to debt reduction:	-174	-190	-160		
Net authorization:	12,626	9,081	13,123	15	15

[By fiscal year, in millions of dollars]

	1990	1991	1992	1993	1994
Estimated outlays:	7,200	8,769	11,309	5,604	1,332

The costs of this bill would be in budget functions 250, 400, and 800.

Basis of estimate: This estimate assumes that the full amounts authorized would be appropriated for each fiscal year, and that portions of the amount authorized for space flight, control, and data communications would be used to reduce outstanding debt associated with the tracking and data relay satellite program. For the CRAF/Cassini multiyear authorization, CBO estimates that \$490 million would be available for obligation in 1990, \$370 million in 1992, \$640 million in 1993, and \$100 million in 1994. The estimated authorization level shown for fiscal year 1990 in the table above would cover costs for the establishment of the Office of Space Commerce and the international commission. The estimated authorization level shown for fiscal years 1993 and 1994 represents the annual payments associated with the private financing arrangements authorized by this bill; these arrangements are discussed below. The estimated outlays are based on historical spending patterns. Detailed estimates are shown in the table below.

Private Financing arrangements.—CBO estimates that the annual payments associated with the private financing arrangements authorized by this bill would be around \$15 million annually beginning in fiscal year 1993, assuming the availability of appropriations. As part of these agreements, NASA would be authorized to incur a contingent termination liability, requiring payments to the private parties if the government terminates the contracts for its convenience.

Estimating the cost to the government of these private financing arrangements is difficult because their status is uncertain. The estimate presented here is intended to illustrate the potential budget impact of the private financing arrangements authorized by this bill. The estimated authorization level is NASA's estimated annual payments associated with these agreements. This estimate is based on assumptions that NASA would obtain a 10-year lease-purchase agreement for these facilities with payments beginning in 1993, and that NASA would not be the sole user of the facilities. This estimate assumes a total cost of the facilities of about \$114 million.

ESTIMATED BUDGET IMPACT OF H.R. 1759

[By fiscal year, in millions of dollars]

	1990	1991	1992	1993	1994
NASA programs:					
Research and development (including CRAF/Cassini):					
Authorization level:	5,407	4,068	7,702		
Estimated outlays:	2,149	3,611	5,954	3,831	987
Space flight, control, and data communications:					
Authorization level:	5,014	5,194	5,572		

ESTIMATED BUDGET IMPACT OF H.R. 1759—Continued

(By fiscal year, in millions of dollars)

	1990	1991	1992	1993	1994
Portion applied to debt reduction	174	- 190	- 160		
Net authorization	4,840	5,004	5,412		
Estimated outlays	3,776	4,676	5,271	1,774	314
Construction of facilities:					
Authorization level	332				
Estimated outlays	22	186	75	33	16
Research and program management:					
Authorization level	2,032				
Estimated outlays	1,740	792			
Private financing arrangements:					
Estimated authorization level				15	15
Estimated outlays				15	15
Inspector general:					
Authorization level	9	9	9		
Estimated outlays	6	9	9	1	
Subtotal, NASA:					
Authorization level	12,794	9,271	13,283	15	15
Portion applied to debt reduction	- 174	190	- 160		
Net authorization	12,620	9,081	13,123	15	15
Estimated outlays	7,195	8,768	11,309	5,604	1,332
Other programs:					
Estimated authorization level	6				
Estimated outlays	5	1			
Bill total:					
Authorization level	12,800	9,271	13,283	15	15
Portion applied to debt reduction	- 174	190	- 160		
Net authorization	12,626	9,081	13,123	15	15
Estimated outlays	7,200	8,769	11,309	5,604	1,332

Use of these private financing arrangements is generally more expensive than normal Treasury-financed appropriations because private developers must borrow money at interest rates that are higher than the government's cost of borrowing. In preliminary analyses presented earlier this year, NASA showed that private demand accounting for 20 percent of the use of these facilities would be sufficient to generate a net cost savings on these projects. CBO cannot predict the amount of private demand.

Contingent Termination Liability.—If these agreements are entered into, and if, as is likely, they specify termination payments, NASA could not withdraw from any of them without providing for the payment of contingent termination liability. The contingent termination liability would secure the private party's investment should the government choose to terminate either agreement for its convenience. Under H.R. 1759, NASA would be authorized to make this payment from any available unobligated balances. Nevertheless, we do not expect NASA to terminate either agreement for the convenience of the government, and, therefore, we expect that it would never need to make a termination liability payment.

The amount of contingent liability incurred by the government at any time would be the amount required to pay off any contractual commitments outstanding at that time. Because NASA is still

in the process of negotiating these arrangements, these amounts cannot be determined precisely at this time. Based on the estimated total cost of these arrangements, CBO estimates that the maximum contingent termination liability incurred by NASA would be less than \$150 million.

6. Estimated cost to state and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On August 18, 1989, the Congressional Budget Office prepared a cost estimate for H.R. 1759, as ordered reported by the Committee on Science, Space, and Technology. This estimate supersedes that previous one and incorporates committee amendments that were not reflected in the August 18 version.

9. Estimate prepared by: Michael Sieverts.

10. Estimate approved by: Robert A. Sunshine, for James L. Blum, Assistant Director for Budget Analysis.

EFFECTS OF LEGISLATION ON INFLATION

In accordance with rule XI, clause 2(1)(4) of the Rule of the House of Representatives, this legislation is assessed to have no adverse long-run inflationary effects on prices and cost in the operation of the national economy. NASA expenditures are labor intensive, with approximately 80 percent of spending directly for jobs and the remainder for materials. In fiscal year 1990, NASA will employ 23,700 civil servants and support about 212,000 contractor and support services employees. Assuming a multiplier effect of 2.5, the total short-run employment effect on the United States economy in fiscal year 1990 is about 588,000 jobs. This represents less than one-half of one percent of the total civilian labor force in the United States—too small to have a significant national effect. There could, however, be some specific cases of industrial and regional employment and price changes influenced by NASA expenditures.

The most significant economic effects on NASA spending is the long-term productivity advance from new technologies developed for the space and aeronautics program. Many NASA-sponsored advances in air and space transportation, communications satellites, remote sensing satellites, and other innovations have improved the productive capacity of industry and stimulated the development and growth of many new businesses.

CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of Rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL AERONAUTICS AND SPACE ACT OF 1958

* * * * *

TITLE II—COORDINATION OF AERONAUTICAL AND SPACE
ACTIVITIES

FUNCTIONS OF THE ADMINISTRATION

SEC. 203. (a) The Administration, in order to carry out the purpose of this Act, shall—

- (1) plan, direct, and conduct aeronautical and space activities;
- (2) arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; [and]
- (3) provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof[.];
- (4) seek and encourage, to the maximum extent possible, the fullest commercial use of space; and
- (5) encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government.

(c) In the performance of its functions the Administration is authorized—

- (1)
- (13)(A) to consider, ascertain, adjust, determine, settle, and pay, on behalf of the United States, in full satisfaction thereof, any claim for \$25,000 or less against the United States for bodily injury, death, or damage to or loss of real or personal property resulting from the conduct of the Administration's functions as specified in subsection (a) of this section, where such claim is presented to the Administration in writing within two years after the accident or incident out of which the claim arises; and
- (B) if the Administration considers that a claim in excess of \$5,000 is meritorious and would otherwise be covered by this paragraph, to report the facts and circumstances thereof to the Congress for its consideration; [and]
- (14) to reimburse, to the extent determined by the Administrator or his designee to be fair and reasonable, the owners and tenants of land and interests in land acquired on or after November 1, 1961, by the United States for use by the Administration by purchase, condemnation, or otherwise for expenses and losses and damages incurred by such owners and tenants as a direct result of moving themselves, their families, and their possessions because of said acquisition. Such reimbursement shall be in addition to, but not in duplication of, any payments that may otherwise be authorized by law to be made to such owners and tenants. The total of any such reimbursement to any owner or tenant shall in no event exceed 25 per centum

of the fair value, as determined by the Administrator, of the parcel of land or interest in land to which the reimbursement is related. No payment under this paragraph shall be made unless application therefor, supported by an itemized statement of the expenses, losses, and damages incurred, is submitted to the Administrator within one year from (a) the date upon which the parcel of land or interest in land is to be vacated under agreement with the Government by the owner or tenant or pursuant to law, including but not limited to, an order of a court, or (b) the date upon which the parcel of land or interest in the land involved is vacated, whichever first occurs. The Administrator may perform any and all acts and make such rules and regulations as he deems necessary and proper for the purpose of carrying out this paragraph. All functions performed under this paragraph shall be exempt from the operation of the Act of June 11, 1946, as amended (5 U.S.C. 1001-1011), except as to the requirements of section 3 of said Act. Funds available to the Administration for the acquisition of real property or interests therein shall also be available for carrying out this paragraph[.];

(15) to establish procedures for the procurement on a commercially reasonable basis by the Administration, for itself or other Government agencies, of space launch hardware and services or other space hardware and space services provided by the private sector, on an annual or multiyear basis consistent with Federal Government requirements; and

(16) to seek and promote the commercial use of space by establishing procedures and developing appropriate agreement terms and conditions which facilitate commercial use of the Administration's facilities and services, consistent with Government needs, and associated commercial facilities and services.

TITLE III—MISCELLANEOUS

UPGRADING HISTORIC LANDMARK FACILITIES

SEC. 312. The Administrator may take whatever actions are necessary to maintain, modify, upgrade, rehabilitate, and expand facilities designated as National Historic Landmarks under the National Historic Preservation Act without regard to sections 106 and 110(f) of such Act, unless the proposed actions would alter the basic purposes or elements which were the bases for such designation.

SECTION 24 OF THE COMMERCIAL SPACE LAUNCH ACT

AUTHORIZED APPROPRIATIONS

SEC. 24. There are authorized to be appropriated to the Secretary \$4,000,000 for fiscal year 1985. There is authorized to be appropriated to the Secretary to carry out this Act \$586,000 for fiscal year

1986. There is authorized to be appropriated to the Secretary to carry out this Act \$4,548,000 for fiscal year 1988. There is authorized to be appropriated to the Secretary to carry out this Act \$3,827,000 for fiscal year 1989. *There are authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990.*

SECTION 501 OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ACT, FISCAL YEAR 1989

NATIONAL SPACE COUNCIL

SEC. 501. (a) Effective February 1, 1989, there is established in the Executive Office of the President the National Space Council, which shall be chaired by the Vice President.

(b) By March 1, 1989, the President shall submit to the Congress a report that outlines the composition and functions of the National Space Council.

(c) The Council may employ a staff of not more than seven persons, which is to be headed by a civilian executive secretary, who shall be appointed by the President.

(d) *Not more than 6 individuals may be employed by the National Space Council without regard to any provision of law regulating the employment or compensation of persons in the Government service, at rates not to exceed the rate of pay for Level VI of the Senior Executive Schedule as provided pursuant to section 5382 of title 5, United States Code.*

(e) *The National Space Council may, for purposes of carrying out its functions, employ experts and consultants in accordance with section 3109 of title 5, United States Code, and may compensate individuals so employed for each day they are involved in a business of the National Space Council (including traveltime) at rates not in excess of the daily equivalent of the maximum rate of pay for grade GS-18 as provided pursuant to section 5332 of title 5, United States Code.*

(f) *There are authorized to be appropriated \$1,200,000 to carry out the activities of the National Space Council for fiscal year 1990.*

SECTION 5314 OF TITLE 5, UNITED STATES CODE

§ 5314. Positions at Level III

Level III of the Executive Schedule applies to the following positions, for which the annual rate of basic pay shall be the rate determined with respect to such level under chapter II of title 2, as adjusted by section 5318 of this title:

Solicitor General of the United States.

Executive Secretary, National Space Council.

OVERSIGHT FINDINGS AND RECOMMENDATIONS

Pursuant to rule XI, clause 2(1)(3) of the Rules of the House of Representatives, and under the authority of rule X, clause 2(b)(1) and clause 3(f), the committee has incorporated in the present bill and report its findings and recommendations resulting from the committee's oversight activities.

OVERSIGHT FINDINGS AND RECOMMENDATIONS OF THE COMMITTEE ON GOVERNMENT OPERATIONS

No findings or recommendations on oversight activity undertaken pursuant to rule X, clause 2(b)(2), and rule XI, clause 2(1)(3) of the Rules of the House of Representatives have been submitted by the Committee on Government Operations for inclusion in this report.

ADMINISTRATION RECOMMENDATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
OFFICE OF THE ADMINISTRATOR,
Washington, DC, March 20, 1989.

HON. ROBERT A. ROE,
Chairman, Committee on Science, Space, and Technology, House of
Representatives, Washington, DC.

DEAR MR. CHAIRMAN: Submitted herewith is a draft bill, "To authorize appropriations to the National Aeronautics and Space Administration for research and development; space flight, control and data communications; construction of facilities; and research and program management; and for other purposes," together with the sectional analysis thereof.

Section 4 of the Act of June 15, 1959, 73 Stat. 75 (42 U.S.C. 2460), provides that no appropriation may be made to the National Aeronautics and Space Administration unless previously authorized by legislation. It is a purpose of the enclosed bill to provide such requisite authorization in the amounts and for the purposes recommended in the President's budget plan for FY 1990. For the fiscal year the bill would authorize appropriations totaling \$13,273,995,000, to be made to the National Aeronautics and Space Administration as follows:

- (1) for "Research and development," amounts totaling \$5,751,600,000;
- (2) for "Space flight, control and data communications," \$5,139,600,000;
- (3) for "Construction of facilities," amounts totaling \$341,800,000;
- (4) for "Research and program management," \$2,032,200,000; and
- (5) for "Inspector General," \$8,795,000.

In addition, the bill would authorize appropriations of \$2,980,500,000 for FY 1991 and \$3,494,400,000 for FY 1992 for Space Station Freedom.

The bill includes a number of other provisions including the following:

First, the language in subsection (2) of section 1(g) has been changed to that found in the "Research and program management" section of the NASA appropriations bill in order to clarify the authority and reconcile potential problems resulting from the differing formulations.

Second, there is a new section 2 which provides for multi-year authorizations for FY 1991 and FY 1992 for other than Space Station Freedom.

Third, we have included a new section 6 which was part of our FY 1989 bill but which as deleted by the Congress, which would

amend the Space Act to allow NASA to withhold, from public disclosure, information which is subject to export control.

Fourth, section 7 is a new section on inventions in space which will clarify the applicability of U.S. patent laws to activities in outer space.

Fifth, we have included a new section 8, Privately Financed Facility Projects, which would amend the National Aeronautics and Space Act, as amended, to provide the Administrator with the authority to provide for commercial investment in special purpose facility projects and contingent termination liability for same.

Finally, the last section of the draft bill, section 10, provides that the bill, upon enactment, may be cited as the "National Aeronautics and Space Administration Authorization Act, 1990," rather than "1989."

As you know, NASA has, over the past several years, needed to make changes, modifications, and upgrades to many of its facilities that have been designated as National Historic Landmarks. We have been working within the Administration to develop a Programmatic Agreement which would permit us to take needed facility actions in an efficient and timely fashion while accommodating historic preservation concerns. We believe we are close to obtaining such an agreement, so the enclosed bill does not contain language addressing this issue. However, if the expected agreement is not obtained expeditiously, we plan to transmit to you an amendment to our FY 1990 Authorization Act to accommodate our concerns.

Where required by section 102(2)(c) of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4332(2)(C)), and the implementing regulations of the Council on Environmental Quality, environmental impact statements covering NASA installations and the programs to be funded pursuant to this bill have been or will be furnished to the House Committee on Science, Space and Technology as appropriate.

The Office of Management and Budget advises that there is no objection to the presentation of this proposal to Congress, and that its enactment would be in accordance with the program of the President.

Sincerely,

JAMES C. FLETCHER,
Administrator.

Two enclosures.

A BILL To authorize appropriations to the National Aeronautics and Space Administration for research and development, Space flight, control and data communications, construction of facilities, and research and program management, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SEC. 1. That there is hereby authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989:

(a) For "Research and development," for the following programs:

- (1) Space Station Freedom, \$2,050,200,000; further, for the Space Station Freedom, \$2,980,500,000 to be available

for obligation October 1, 1990 and to remain available until September 30, 1992; and further, for the Space Station Freedom, \$3,494,000,000 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;

(2) Space transportation capability development, \$639,000,000;

(3) Physics and astronomy, \$894,500,000;

(4) Life sciences, \$124,200,000;

(5) Planetary exploration, \$396,900,000;

(6) Space applications, \$579,700,000;

(7) Technology utilization, \$22,700,000;

(8) Commercial use of space, \$38,300,000;

(9) Aeronautical research and technology, \$462,800,000;

(10) Transatmospheric research and technology, \$127,000,000;

(11) Space research and technology, \$338,100,000;

(12) Safety, reliability and quality assurance, \$23,300,000;

(13) Tracking and data advanced systems, \$19,900,000;

(14) University Space Science and Technology Academic Program, \$35,000,000;

(b) For "Space flight, control and data communications," for the following programs:

(1) Space shuttle production and operational capability, \$1,305,300,000;

(2) Space transportation operations, \$2,732,200,000;

(3) Space and ground network, communications and data systems, \$1,102,100,000;

(c) For "Construction of facilities," including land acquisition, as follows:

(1) Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center, \$10,500,000;

(2) Construction of addition to Mission Control Center, Johnson Space Center, \$17,800,000;

(3) Construction of addition to Simulator/Training Facility, Johnson Space Center, \$3,800,000;

(4) Modifications for Expanded Solar Simulation, Johnson Space Center, \$2,000,000;

(5) Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center, \$4,000,000;

(6) Replace Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center, \$4,600,000;

(7) Replace Launch Complex 39, Pad A Chillers and Controls, Kennedy Space Center, \$1,200,000;

(8) Replace Roofs, Launch Complex 39, Kennedy Space Center, \$11,000,000;

(9) Replace Vehicle Assembly Building Air Handling Units, Kennedy Space Center, \$1,800,000;

(10) Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility, #3, Kennedy Space Center, \$26,000,000;

(11) Modification of High Pressure Industrial Water System, Stennis Space Center, \$2,000,000;

(12) Replacement of High Pressure Gas Storage Vessels, Stennis Space Center, \$3,000,000;

(13) Construction of natural resource protection at various locations, \$3,800,000;

(14) Refurbish bridges, Merritt Island, Kennedy Space Center, \$4,500,000;

(15) Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center, \$3,500,000;

(16) Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center, \$2,800,000;

(17) Construction of Data Operations Facility, Goddard Space Flight Center, \$12,000,000;

(18) Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center, \$7,500,000;

(19) Modernization of South Utility Systems, Jet Propulsion Laboratory, \$5,400,000;

(20) Construction of 40 x 80 Drive Motor Roof, Ames Research Center, \$1,000,000;

(21) Modifications to Thermo-Physics Facilities, Ames Research Center, \$4,600,000;

(22) Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center, \$1,000,000;

(23) Modifications to National Transonic Facility for Productivity, Langley Research Center, \$7,600,000;

(24) Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center, \$1,900,000;

(25) Rehabilitation of Central Air Systems, Lewis Research Center, \$2,400,000;

(26) Rehabilitation of Central Refrigeration Equipment, Lewis Research Center, \$7,200,000;

(27) Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center, \$6,800,000;

(28) Rehabilitation of Hypersonic Tunnel, Plum Brook, \$4,100,000;

(29) Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center, \$27,600,000;

(30) Construction of Automation Sciences Research Facility, Ames Research Center, \$10,600,000;

(31) Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center, \$6,900,000;

(32) Modifications for Seismic Safety, Goldstone, CA, Jet Propulsion Laboratory, \$2,600,000;

(33) Repair of facilities at various locations, not in excess of \$750,000 per project, \$28,000,000;

(34) Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project, \$36,000,000;

(35) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project, \$10,000,000;

(36) Environmental compliance and restoration, \$30,000,000;

(37) Facility planning and design not otherwise provided for, \$26,300,000;

(d) For "Research and program management," \$2,032,200,000;

(e) For "Inspector General," \$8,795,000;

(f) Notwithstanding the provisions of subsection 1(i), appropriations hereby authorized for "Research and development" and "Space flight, control and data communications" may be used (1) for any items of a capital nature (other than acquisition of land) which may be required at locations other than installations of the Administration for the performance of research and development contracts, and (2) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conduct of scientific research, for purchase or construction of additional research facilities; and title to such facilities shall be vested in the United States unless the Administrator determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant. None of the funds appropriated for "Research and development" and "Space flight, control and data communications" pursuant to this Act may be used in accordance with this subsection for the construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$500,000, unless the Administrator or the Administrator's designee has notified the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, of the nature, location, and estimated cost of such facility.

(g) When so specified and to the extent provided in an appropriation act, (1) any amount appropriated for "Research and development," for "Space flight, control and data communications" or for "Construction of facilities" may remain available without fiscal year limitation, and (2) contracts may be entered into under "Research and program management" for maintenance and operation of facilities, and for other services to be provided during the next fiscal year.

(h) Appropriations made pursuant to subsection 1(d) may be used, but not to exceed \$35,000, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and his determination shall be final and conclusive upon the accounting officers of the Government.

(i)(1) Funds appropriated pursuant to subsections (1) (a), (b), and (d) may be used for the construction of new facilities and additions to, repair, rehabilitation, or modification of existing

facilities, provided the cost of each such project, including collateral equipment, does not exceed \$100,000.

(2) Funds appropriated pursuant to subsection (1)(a) and (b) may be used for unforeseen programmatic facility project needs, provided the cost of each such project, including collateral equipment, does not exceed \$500,000.

(3) Funds appropriated pursuant to subsection (1)(d) may be used for repair, rehabilitation or modification of facilities controlled by the General Services Administration, provided the cost of each project, including collateral equipment, does not exceed \$500,000.

MULTI-YEAR AUTHORIZATION

SEC. 2. There is authorized to be appropriated to the National Aeronautics and Space Administration, for other than Space Station Freedom, \$11,654,700,000 for fiscal year 1991, and \$12,176,500,000 for fiscal year 1992, for the purpose of carrying out the programs authorized in section 1 of this Act.

ADMINISTRATOR'S REPROGRAMMING AUTHORITY

SEC. 3. Authorization is hereby granted whereby any of the amounts prescribed in paragraphs (1) through (37), inclusive, of subsection 1(c)—

(a) in the discretion of the Administrator or the Administrator's designee, may be varied upward 10 percent, or

(b) following a report by the Administrator or the Administrator's designee to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, on the circumstances of such action, may be varied upward 25 percent, to meet unusual cost variations.

The total cost of all work authorized under paragraphs (a) and (b) shall not exceed the total of the amounts specified in section 1(c).

SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

SEC. 4. Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred; and that such changes require the use of additional funds for the purposes of construction, expansion, or modification of facilities at any location; and that deferral of such action until the enactment of the next authorization act would be inconsistent with the interest of the Nation in aeronautical and space activities; the Administrator may transfer not to exceed ½ of 1 percent of the funds appropriated pursuant to section 1(a) and 1(b) to the "Construction of facilities" appropriation for such purposes. The Administrator may also use up to \$10,000,000 of the amounts authorized under section 1(c) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site reparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30

days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a written report describing the nature of the construction, its cost and the reasons therefore.

LIMITATIONS ON AUTHORITY

SEC. 5. Notwithstanding any other provision of this Act—

(a) no amount appropriated pursuant to this Act may be used for any program deleted by the Congress from requests as originally made to either the House Committee on Science, Space, and Technology or the Senate Committee on Commerce, Science, and Transportation;

(b) no amount appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by subsections 1(a), 1(b) and 1(d);

(c) no amount appropriated pursuant to this Act may be used for any program which has not been presented to either such committee;

unless a period of 30 days has passed after the receipt by each such committee, of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

AMENDMENT TO SPACE ACT—WITHHOLDING OF TECHNICAL DATA

SEC. 6. Section 303 of the National Aeronautics and Space Act of 1958, as amended, is amended, by adding "(a)" after "303," by removing "and" before "(B)," and by adding after "national security" the following: ", and (C) information withheld under subsection (b) below." At the end of section 303(a), add the following new section:

"(b) Notwithstanding any other provision of law, the Administrator may prescribe regulations, in consultation with concerned agencies, under which the Administration is authorized to withhold, or to require the withholding, from public disclosure any technical data in the possession of, or under the control of, the Administration, if such data may not be exported lawfully outside the United States without an authorization or license under the Export Administration Act of 1979 (50 U.S.C. App. 2401-2420) or the Arms Export Control Act (22 U.S.C. 2751 et seq.). However, technical data may not be withheld under this section if regulations promulgated under either such Act authorize the export of such data pursuant to a general, unrestricted license in such regulations."

AMENDMENT TO SPACE ACT—INVENTIONS IN OUTER SPACE

SEC. 7(a). AMENDMENT.—Section 305 of the National Aeronautics and Space Act of 1958, as amended, is amended by adding at the end the following new subsection:

"(m) Any invention made, used or sold in outer space on an aeronautical and space vehicle (as defined in section 103(2)) under the jurisdiction or control of the United States shall be considered to

be made, used or sold within the United States for purposes of this Act, except with respect to any space vehicle or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party."

(b) EFFECTIVE DATE.—

(1) IN GENERAL.—Subject to subsections (2), (3), and (4) of this section, the amendments made by section (a) shall apply to all United States patents granted before, on, or after the date of the enactment of this Act, and to all applications for United States patents pending on or filed on or after such date of enactment.

(2) AMENDMENTS NOT TO AFFECT PRIOR DECISIONS.—The amendments made by section (a) shall not affect any final decision made by a court or the Patent and Trademark Office before the date of the enactment of this Act with respect to a patent or an application for a patent, if no appeal from such decision is pending and the time for filing an appeal has expired.

(3) AMENDMENTS NOT TO AFFECT CERTAIN PENDING CASES.—The amendments made by section (a) shall not affect the right of any party in any case pending in a court on the date of the enactment of this Act to have the party's rights determined on the basis of the substantive law in effect before such date of enactment.

(4) AMENDMENTS TO BE PROSPECTIVE IN APPLICATION.—Subject to subsections (2) and (3) of this section, the amendments made by section (a) shall not apply to any process, machine, article of manufacture, or composition of matter, and embodiment of which was launched prior to the effective date of this Act.

AMENDMENT TO SPACE ACT—PRIVATELY FINANCED FACILITY PROJECTS

SEC. 8. The National Aeronautics and Space Act of 1958, as amended, is amended by adding the following new section:

"PRIVATELY FINANCED FACILITY PROJECTS

"SEC. 313. Notwithstanding the provisions of any other law, the Administration is authorized to enter into contracts, leases or agreements providing for private financing of special purpose facilities, on government or nongovernment sites, for the exclusive or nonexclusive use of the Administration, its contractors or subcontractors: Provided, That such authorization may not be utilized unless the Administrator determines that such privately financed construction or modification is in the best interests of the Government: Provided further, That no project considered for private financing shall be initiated unless it has been submitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives and Committees on Appropriations of the House of Representatives and of the Senate and 30 days have passed after the Administrator's notification of a proposed action hereunder: Provided further, That if, pursuant to the above stated provisions, the Administrator authorizes privately financed construction or modification, the Administration is authorized, not-

withstanding any provision of law to the contrary, to assume in the resultant contract, lease or agreement, contingent liability in excess of available appropriations relating to the Government's potential termination for its convenience of such contract, lease or agreement, if such contract, lease or agreement limits the amount of the payments that the Federal Government is allowed to make under such contract, lease or agreement to amounts to be provided in advance in appropriations Acts."

GEOGRAPHICAL DISTRIBUTION

SEC. 9. It is the sense of the Congress that it is in the national interest that consideration be given to geographical distribution of Federal research funds whenever feasible, and that the National Aeronautics and Space Administration should explore ways and means of distributing its research and development funds whenever feasible.

TITLE

SEC. 10. This Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1990."

SECTIONAL ANALYSIS OF THE BILL.

To authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, and research and program management, and for other purposes

SECTION 1

Subsections (a), (b), (c), (d), and (e), would authorize to be appropriated to the National Aeronautics and Space Administration, funds, in the total amount of \$13,273,995,000, as follows: (a) for "Research and development," a total of 14 program line items aggregating the sum of \$5,751,600,000; (b) for "Space flight, control and data communications," a total of 3 line items aggregating the sum of \$5,139,600,000; (c) for "Construction of facilities," a total of 37 line items aggregating the sum of \$341,800,000; (d) for "Research and program management," \$2,032,200,000; and (e) for "Inspector General," \$8,795,000.

Subsection 1(e) is a new appropriation account for the Inspector General.

Subsection 1(f) would authorize the use of appropriations for "Research and development" and "Space flight, control and data communications" without regard to the provisions of subsection 1(i) for: (1) items of a capital nature (other than the acquisition of land) required at locations other than NASA installations for the performance of research and development contracts; and (2) grants to nonprofit institutions of higher education, or to nonprofit organizations, whose primary purposes is the conduct of scientific research, for purchase or construction of additional research facilities. Title to such facilities shall be vested in the United States unless the Administrator determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Moreover, each such grant

shall be made under such conditions as the Administrator shall find necessary to ensure that the United States will receive benefit therefrom adequate to justify the making of the grant.

In either case, no funds may be used for construction of a facility in accordance with this subsection, the estimated cost of which, including collateral equipment, exceed \$500,000, unless the Administrator notifies the specified committees of the Congress, of the nature, location, and estimated cost of such facility.

Subsections 1(g) would provide that, when so specified and to the extent provided in an appropriation act, any amount appropriated for "Research and development," "Space flight, control and data communications," or for "Construction of facilities" may remain available without fiscal year limitation. Subsection (2) states that amounts appropriated for the "Research and program management" appropriation are available for contracts for maintenance and operation of facilities and for other services for this fiscal year and for the next fiscal year. This language has been changed to that found in the "Research and program management" section of the NASA appropriations bill in order to clarify the authority and reconcile potential problems resulting from the differing formulations.

Subsection 1(h) would authorize the use of not to exceed \$35,000 of the "Research and program management" appropriation for scientific consultation or extraordinary expenses, including representation and official entertainment expenses, upon the authority of the Administrator, whose determination shall be final and conclusive.

Subsection 1(i)(1) would provide that of the funds appropriated for "Research and development," "Space flight, control and data communications," and "Research and program management," not in excess of \$100,000 per project (including collateral equipment) may be used for construction of new facilities and additions to existing facilities, and for repair, rehabilitation, or modification of facilities.

Subsection (2) would provide that not to exceed \$500,000 per project of "Research and development" and "Space flight, control and data communications" funds may be used for facility repair or modification due to unforeseen programmatic needs.

Subsection (3) would provide that not in excess of \$500,000 per project (including collateral equipment) of funds appropriated for "Research and program management" may be used for work on facilities owned or leased by the General Services Administration.

SECTION 2—MULTI-YEAR AUTHORIZATION

Section 104 of Public Law 100-685, the National Aeronautics and Space Administration Authorization Act of 1989, provided that commencing in FY 1990 and every year thereafter, the President submits to Congress a 3-year budget request for NASA. This section authorizes appropriations for FY 1991 and FY 1992 in amounts necessary to carry out the President's FY 1990 budget for all programs other than Space Station Freedom. A three-year authorization of appropriations for Space Station Freedom is included in sec. 1(a) of this bill.

SECTION 3—ADMINISTRATOR'S REPROGRAMMING AUTHORITY

Section 3 would authorize upward variations of the sums authorized for the "Construction of facilities" line items of 10 percent at the discretion of the Administrator or the Administrator's designee, or of 25 percent following a report by the Administrator or the Administrator's designee to the Committee on Science, Space and Technology of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate on the circumstances of such action, for the purposes of meeting unusual cost variations. However, the total cost of all work authorized under these line items may not exceed the total sum authorized for "Construction of facilities" under subsection 1(c).

SECTION 4—SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Section 4 would provide that no more than one-half of 1 percent of the funds appropriated for "Research and development" and "Space flight, control and data communications" may be transferred to and merged with the "Construction of facilities" appropriation, to be available for the construction of facilities and land acquisition at any location if the Administrator determines that new developments or scientific or engineering changes in the national aeronautical and space program have occurred; and that such changes require the use of additional funds for the purpose of construction, expansion or modification of facilities at any location; and that deferral of such action until the next authorization act is enacted would be inconsistent with the interest of the Nation in aeronautical and space activities. Additionally, up to \$10,000,000 of "Construction of facilities" funds may be used for these purposes. However, no such funds may be obligated until 30 days have passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate a written report containing a description of the construction, its cost, and the reasons therefor.

SECTION 5—LIMITATIONS ON AUTHORITY

Section 5 would provide that, notwithstanding any other provision of this Act—

(a) no amount appropriated pursuant to this Act may be used for any program deleted by the Congress from requests as originally made to either the House Committee on Science, Space, and Technology or the Senate Committee on Commerce, Science and Transportation,

(b) no amount appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by subsections 1(a), 1(b) and 1(d), and

(c) no amount appropriated pursuant to this Act may be used for any program which has not been presented to either such committee,

unless a period of 30 days has passed after the receipt by the House Committee on Science, Space and Technology and the Senate Committee on Commerce, Science and Transportation of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

SECTION 6—AMENDMENT TO SPACE ACT—WITHHOLDING OF TECHNICAL DATA

This section would amend the National Aeronautics and Space Act of 1958, as amended, to provide NASA the authority to withhold, or require the withholding, from public disclosure certain technical data that is subject to export control under the Export Administration Act of 1979 (50 U.S.C., App. 2401-2420) or the Arms Export Control Act (22 U.S.C. 2751 et seq.). The technical data subject to this amendment is only that data subject to those Acts and their implementing regulations and procedures. The amendment will provide NASA greater flexibility to manage high technology in its possession or under its control in a manner consistent with national policy regarding the export thereof. The amendment is similar to a provision amending the Freedom of Information Act (FOIA) originally contained in S. 774, the Freedom of Information Reform Act, as introduced in 1983 in the 98th Congress as well as to authority provided to the Department of Defense in section 1217 of the FY 1984 Defense Authorization Act (Public Law 98-84, 10 U.S.C. 140c).

As recognized by the Senate Judiciary Committee in its report (S. Rep. 98-221) accompanying S. 774, an anomaly exists between efforts to restrict the export of certain data important to the United States on the one hand, while allowing its public release under FOIA on the other. This anomaly comes about because nonproprietary technical data of the type that is subject to export control in the possession of any agency may also be subject to release under FOIA. Such release could be unrestricted and thereby obviate the requirement for an export license, or the release could even be to a foreign requester under FOIA. The purpose of this provision is to redress that anomaly.

In removing a similar provision from S. 774 by amendment on the Senate floor in 1984, Senator Orrin Hatch (sponsor of the bill and Chairman of the Judiciary Committee's Subcommittee on the Constitution, which had jurisdiction over the bill) noted that the DOD Authorization bill had been enacted (referring to Public Law 98-84) to address this problem area for the DOD, and then continued:

There remain other areas with the potential of creating a problem, for instance, technical data with military or space application in the possession of NASA. In light of time constraints on this bill, it would be wisest to pursue other potential problem areas at another time. Accordingly, with a major part of the problem addressed by the proposed 10th exemption already enacted, it is the intent of

this amendment to defer other concerns in this technical data area until another time. C.R., Feb. 27, 1984, S. 1797.

This amendment will resolve the matter for NASA, as suggested by Senator Hatch.

In developing its implementing regulations under the proposed amendment, NASA will coordinate its efforts with other agencies (such as the Department of Defense) who have similar authority, as well as with the agencies that administer the export control laws, in an effort to achieve standardized procedures and uniform treatment for technical data subject to the withholding authority to the maximum extent practicable. Such coordination would include identifying categories of technical data that would require continuing interagency coordination prior to release. Also, NASA will assure that its implementing regulations exclude any technical data of another agency, a copy of which may be in the possession of NASA, consistent with present NASA policy set forth in 14 C.F.R. Part 1206. Rather, such data will be treated in accordance with whatever authority such other agency may have.

SECTION 7—AMENDMENT TO SPACE ACT—INVENTIONS IN OUTER SPACE

The purpose of this amendment is to provide clarity and certainty as to the applicability of U.S. patent laws to activities in outer space. This is important to commercial entities who need to know, with certainty, that their activities in space will receive the same patent protection that they would if conducted here on Earth. Removing that element of risk from the decision process of these companies will greatly increase the chances that they will proceed with their plans for activities in space.

This provision is intended to be consistent with U.S. international law obligations, including Article VIII of the Outer Space Treaty, which provides that "[a] State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body." Thus, this provision should not be interpreted to apply to a foreign-registered space object unless there is a specific agreement with the registering State in this regard.

Another aspect is that it will provide flexibility in implementing agreements with foreign partners who will be cooperating with the United States in the development and use of the Space Station Freedom. This is possible by the exception to the strict application of U.S. patent law, for space vehicles that are specifically identified and otherwise provided for by an international agreement to which the United States is a party. Such an exception has been made, for example, regarding the applicability of 35 U.S.C. 184 (concerning filing of [patent] applications in foreign countries) in the international agreement for the Space Station Freedom.

The language of the proposed amendment is identical to that in H.R. 4316 which was passed by the House of Representatives on September 16, 1986, and H.R. 1510 which was passed by the House on October 5, 1988. Prior to such passage the bill was subject to hearings by the Subcommittee on Courts, Civil Liberties and the Administration of Justice, Committee on the Judiciary; and by the

Subcommittee on Space Science and Applications, Committee on Science, Space and Technology. It has also received substantial support from private industry and the private patent bar.

SECTION 8—PRIVATELY FINANCED FACILITY PROJECTS

The National Aeronautics and Space Administration (NASA) recognizes the importance of commercial investment and involvement in the construction and modification of facilities utilized in the United States civil space program. NASA, however, currently lacks the legal authority necessary to fully utilize these important tools. This amendment to the FY 1990 NASA Authorization Bill gives NASA that authority.

This amendment would amend the National Aeronautics and Space Act of 1958 (Public Law 85-568), as amended, providing permanent legislation which would allow NASA, notwithstanding any law to the contrary, to enter into contracts, leases or agreements providing for private financing of such special purpose facility projects, on government or on nongovernment sites, and for the exclusive or nonexclusive use of NASA, its contractors, or subcontractors whenever the Administrator of NASA determines that it is in the best interest of the Government to do so. The amendment would preclude the initiation of such privately financed facility projects until 30 calendar days had passed following the Administrator's notification to the authorizing and appropriation committees of proposed actions.

NASA also currently lacks legal authority to assume, in resultant contracts, leases or agreements, contingent termination liability in excess of available appropriations. Since it is highly improbable that private parties will provide financing for facility projects unless their investment in the projects are protected through Government assumption of contingent liability in the event they are terminated by the Government, it is necessary to the success of these privately financed facility projects that NASA be provided that authority. This amendment gives NASA the necessary authority.

SECTION 9—GEOGRAPHICAL DISTRIBUTION

Section 9 would express the sense of the Congress that it is in the national interest that consideration be given to geographical distribution of Federal research funds whenever feasible.

SECTION 10—TITLE

Section 10 would provide that the Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1990."

DOT REQUEST

THE SECRETARY OF TRANSPORTATION,
Washington, DC, March 24, 1989.

Hon. JIM WRIGHT,
Speaker of the House of Representatives,
Washington, DC.

DEAR MR. SPEAKER: The Department of Transportation is submitting for your consideration and appropriate reference a bill to authorize appropriations for fiscal years 1990 and 1991 for the Office of Commercial Space Transportation of the Department of Transportation, and for other purposes.

In the past year, the Office of Commercial Space Transportation (OCST) has confronted a number of significant challenges associated with its responsibility to facilitate and regulate the U.S. commercial launch industry. Firm establishment and healthy growth of this unique industry relates directly to a full range of critically important national interests—economic and technological well-being, as well as the national security. As just one example of the industry's importance, it is now classified as "a program for space within the definition of 'national defense'", for purposes of the Defense Production Act and the availability of rocket fuel on a priority basis.

Also during the past year, OCST contributed to fashioning a fair approach to addressing one of the major issues associated with the industry's viability—the open-ended risks that commercial launch providers face. The solution, Public Law 100-657, was arrived at after close cooperation between the Executive and Legislative branches.

This legislation assumes OCST will set insurance requirements based on the actual risks associated with proposed launch activities. OCST has committed large portions of its past budgets to extensive research into space launch risks and hazards. The product of this research forms the basis for the risk-based approach to insurance requirements which is now reflected in the statute.

The Department seeks an authorization of \$4,392,000 for continuation of all current activities and to meet the new challenges of heightened launch activity and emerging safety issues such as space debris, proposed commercial launch ranges, new launch concepts and the implementation of Public Law 100-657. As the Commercial Space Launch Manifest indicates, ten commercial launches are scheduled for FY 1990. OCST must also play an active role in the implementation of the commercial space launch services trade agreement recently reached with the Chinese.

The commercial space industry is a new, growing and rapidly changing industry. During the FY 1989 budget consideration, for example, it was not possible to forecast many of the critical issues on which OCST has expended resources. Examples of these issues are: ensuring that the commercial space launch sector receives its fair share of ammonium perchlorate and rayon fiber material, both key ingredients to rocket technology; trade deliberations with the Chinese; and assistance to Hawaii and Florida in development of commercial spaceports.

Consistent policy support during the past several years has had a twofold impact on this emerging industry. First, the companies which previously manufactured launch vehicles under government contract have been willing to take the risks and make the necessary investments to compete in a competitive environment which now exists on an international scale. Second, new companies are proposing new concepts for launch systems. If the United States is going to have a safe and vigorous private launch industry to meet the nation's needs in space, OCST must deal with these and other emerging issues in a time frame that will facilitate and not impede these exciting developments. Our requested authorization for FY 1990 will allow us to do the work, which remains critical to the growth of this important industry.

The appropriations authorizations in this legislative proposal are included in the residual freeze category of the President's FY 1990 budget plan. Final decisions concerning authorization levels in this category are to be determined through negotiations between the Administration and Congress. Accordingly, the authorization levels in this proposal, which as drafted reflects President Reagan's FY 1990 budget request, may need to be revised to reflect the results of such negotiations.

The Office of Management and Budget advises that there is no objection to the presentation of this proposal to Congress.

Sincerely,

SAMUEL K. SKINNER.

A BILL To authorize appropriations for the fiscal years 1990 and 1991 for the Office of Commercial Space Transportation of the Department of Transportation, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Section 24 of the Commercial Space Launch Act (49 U.S.C. 2623) is amended to read as follows:

"Sec. 24. There are authorized to be appropriated for the purpose of carrying out this Act \$4,392,000 for fiscal year 1990 and such sums as are necessary for fiscal year 1991. Sums appropriated for research and development shall remain available until expended."

SECTION-BY-SECTION ANALYSIS

Section 1 of the bill would authorize appropriations for fiscal years 1990 and 1991 for the Department of Transportation's Office of Commercial Space Transportation programs. A total of \$4,392,000 would be authorized for the activities of this Office in fiscal year 1990 and such sums as may be necessary for that purpose would be authorized for fiscal year 1991. Appropriations made for research and development would be available until expended, because these activities typically involve a series of contracts where one cannot begin until an earlier one is completed.

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Calendar No. 284

101st CONGRESS
1st Session

SENATE

REPORT
101-157NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AUTHORIZATION ACT, FISCAL YEAR 1990

OCTOBER 3 (legislative day, SEPTEMBER 18), 1989.—Ordered to be printed

Mr. HOLLINGS, from the Committee on Commerce, Science, and
Transportation, submitted the following

REPORT

[To accompany S. 916]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 916) to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, and research and program management, and for other purposes, having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the bill do pass.

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to the National Aeronautics and Space Administration (NASA) totaling \$13,273,995,000 for fiscal year (FY) 1990 as follows:

	Budget request	Committee authorization
FY 1990:		
Research and development.....	\$5,751,600,000	\$5,786,600,000
Space flight, control and data communications.....	5,139,600,000	5,104,600,000
Construction of facilities.....	341,800,000	341,800,000
Research and program management.....	2,032,200,000	2,032,200,000
Inspector General.....	8,795,000	8,795,000

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

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LEGISLATIVE HISTORY

On March 20, 1989, the Administration submitted its FY 1990-92 budget requests for NASA. On March 24, 1989, the Administration submitted its FY 1990 and FY 1991 budget requests for DOT's Office of Commercial Space Transportation. The Committee considered budget and related policy matters in hearings on February 9, March 8 and 16, April 4 and 11, and May 11 and 17. The hearing on May 17 focused on the requirements of the Office of Commercial Space Transportation. The Committee received testimony from the NASA Administrator and senior NASA officials associated with the major program elements, the Director of the Office of Commercial Space Transportation of the Department of Transportation (DOT), and the space science, space transportation, aeronautics, space station, educational and earth sciences communities.

On May 3, 1989, Senator Gore (for himself, and Senators Hollings, Danforth, and Pressler) introduced S. 916, a bill to authorize appropriations for NASA for FY 1990, FY 1991, and FY 1992. On May 3, 1989, Senator Gore (again with Senators Hollings, Danforth, and Pressler as cosponsors) introduced S. 920, a bill to authorize appropriations for FY 1990 and FY 1991 for DOT's Office of Commercial Space Transportation.

On June 20, 1989, the Committee met in open executive session and considered the budgets for NASA and the Office of Commercial Space Transportation. S. 916 was ordered reported without objection by the Committee, with an amendment in the nature of a substitute. The amendment includes language authorizing appropriations for DOT's Office of Commercial Space Transportation and for the National Space Council.

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION -- NASA BUDGET SPREAD SHEET FOR FISCAL YEAR 1990

(In millions of dollars)

	fiscal year 1989 operating plan	fiscal year 1990 request	Proposed fiscal year 1990 Senate authorization	Comments
1 Research and Development	4,256.6	5,751.6	5,786.6	Reflects general reduction of \$17m to R&D account
1 Space Station	900.0	2,050.2	2,050.2	
2 Space Transportation Capability Development	681.0	639.0	635.5	Assumes absorption of the \$6m required for ACIS upper stage activities
SpaceLab	88.6	98.9		
Upper Stages	133.6	88.6		
Engineering & Tech. Base	160.6	189.8		
Payload Ops & Sup. Equip.	64.7	81.1	3.5	Delete funding for CDSF integration
Advanced Programs	52.7	48.7		
Advanced Launch Systems	81.4	5.0		
Tethered Satellite System	26.4	19.9		
Orbital Maneuvering Vehicle	73.0	107.0		
3 Space Science	1,237.8	1,415.6	1,414.1	
A Physics & Astronomy	742.1	894.5	894.5	Assumes absorption of \$25m for Gravity Probe B
Hubble Space Telescope Dev.	104.9	67.0		
Gamma Ray Observatory Dev.	50.9	26.7		
Global Geospace Science	64.4	112.3		

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION -- NASA BUDGET SPREAD SHEET FOR FISCAL YEAR 1990 -- Continued

(In millions of dollars)

	fiscal year 1989 operating plan	fiscal year 1990 request	Proposed fiscal year 1990 Senate authorization	Comments
Advanced X-Ray Astrophysics Fac.	16.0	44.0		
Payload & Instrument Dev.	71.7	71.4		
Shuttle/Spacelab Payload Mgt.	69.7	86.1		
Sp. Station Integrated Planning and Attached Payloads	8.0	23.0		
Explorer Development	82.1	93.2		
Mission Operation & Data Analysis	143.2	204.8		
Research and Analysis	85.8	112.5		
Suborbital Program	45.4	53.5		
B Life Sciences	79.1	124.2	122.7	General reduction of \$1.5m.
C Planetary Exploration	416.6	396.9	396.9	
Galileo Development	73.4	17.4		
Magellan	43.1			
Ulysses	10.3	14.5		
Mars Observer	102.2	100.5		
Mission Ops & Data Analysis	110.7	155.4		
Research and Analysis	76.9	79.1		
LRAI/Cassini	(*)	30.0		Assumes new start status for the CRAI and Cassini Missions in FY 1990
4 Space Applications	592.4	555.5	625.5	
A Earth Science and Applications	404.7	410.1	420.1	
Geodynamics	32.9	38.0		
Research and Analysis	106.0	124.8		
Mission Operations & Data Analysis	17.6	24.8		
Earth Science Payload Instrument Dev.	46.4	42.3		
Scatterometer	10.6	13.6		
Earth Probe	(*)	0	10.0	Assumes new start for Earth Probe Program + \$10m for Total Ozone Mapping Spectrometer
Upper Atmos. Res. Satellite (UARS)	85.2	73.9		
Ocean Topography Experiment (TOPEX)	83.0	72.8		
Airborne Science & Applications	23.0	19.7		
B Materials Processing in Space	75.6	92.7	90.7	General reduction of \$2m
C Communications	92.2	18.6	80.6	+ \$62m for ACIS
D Information Systems	19.9	34.1	34.1	
5 Mission to Planet Earth Earth Observing System	(*)	24.2	24.2	Assumes FY 1990 New Start Status for Mission to Planet Earth - EOS (Administration assumes a FY 1991 New Start)
6 Commercial Programs	44.7	61.0	61.0	
Technology Utilization	16.5	22.7		
Commercial Use of Space	28.2	38.3		
7 Aeronautical Research and Technology	404.2	462.8	462.8	Includes \$25m to initiate research for a high speed commercial aircraft. Absorb \$10m to initiate a High Performance Computing Initiative
Research & Technology Base	315.6	335.7		
Systems Technology Program	88.6	127.1		

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION—NASA BUDGET SPREAD
SHEET FOR FISCAL YEAR 1990—Continued

(In millions of dollars)

	Fiscal year 1989 operating plan	Fiscal year 1990 request	Proposed fiscal year 1990 Senate authoriza- tion	Comments
8 Translunar Research and Technology	69.4	127.0	127.0	Requires submission of a new management plan within 60 days of enactment
9 Space Research and Technology	285.9	328.1	325.1	General reductions to Pathfinder (\$7m) and In Space Flight Experiments (\$6m)
10 Safety Reliability Maintainability and Quality Assurance	22.4	23.3	23.3	
11 Tracking and Data Advanced Systems	18.8	19.9	19.9	
12 University Space Science and Technology Academic Program	(*)	35.0	35.0	
II Space Flight Control and Data Communications	4,452.6	5,139.6	5,104.6	Reflects general reduction of \$10m to SIC&DC account
1. Space Shuttle Production/Operations Capability	1,121.6	1,305.3	1,305.3	
Orbiter Operational Capability	281.8	237.0		
Launch & Mission Support	257.6	341.0		
Propulsion Systems	582.2	727.3		
2 Space Transportation Operations	2,385.7	2,732.2	2,732.2	
Flight Operations	687.7	772.6		
Flight Hardware	1,121.7	1,236.5		
Launch & Landing Operations	509.8	553.6		
Expendable Launch Vehicles	66.5	169.5		
3 Space Tracking & Data Acquisition	945.3	1,102.1	1,077.1	General reduction of \$25m
Space Network	483.9	582.3		
Ground Network	278.1	269.6		
Communications & Data Systems	233.3	250.2		
III Construction of Facilities	281.7	341.8	341.8	
IV Research and Program Management	1,906.6	2,032.2	2,032.2	
V Inspector General	(*)	8.8	8.8	
Total NASA	* 10,897.5	13,274.0	13,274.0	

* New line items proposed for FY 1990

† The FY 1989 Operating Plan includes \$175 million in funds transferred from DOD to NASA for the Advanced Launch System and Space Shuttle Programs

SUMMARY OF MAJOR PROVISIONS

For FY 1990, the Committee would authorize \$13,273,995,000 for NASA, \$4,392,000 for the Office of Commercial Space Transportation in DOT, \$1,200,000 for the National Space Council. Of the amount authorized for NASA, \$5,786,600,000 is authorized for research and development, \$5,104,600,000 for space flight, control and data communications, \$341,800,000 for construction of facilities, \$2,032,200,000 for research and program management, and \$8,795,000 for the activities of the Inspector General's Office.

A. TITLE I—NASA AUTHORIZATIONS

Space station

The reported bill provides full funding for the space station (known as "Space Station Freedom") in FY 1990, \$2,050,200,000, as a signal of its commitment to the program and to the agreement

with our international partners. There is a concern with the pace of the space station program and with the inability of the Congress to provide adequate funds for this Presidential initiative. Unless the Congress is willing to recognize this program as a national priority and a budget priority, this Committee is concerned that this program will not be successfully implemented and that the United States will be forced to withdraw from this initiative.

The bill, as reported, does not include multi-year funding for the space station program, and it does not put a cap of \$13,300,000,000 on the program as requested by the Administration. The Committee believes that it would be premature to put a cap on the space station program. As for multi-year funding, while there is a need for multi-year funding and Congress should provide full funding for the program and instruct NASA to manage the program to that cost and the associated schedule, the current budget situation makes full funding highly unlikely. Furthermore, multi-year authorizations may not add stability to the NASA budget or its programs, and multi-year authorizations without multi-year appropriations only serve to minimize the role of authorization committees in the annual budgetary and policy deliberations.

Space transportation capability

The Space Transportation Capability Development budget of \$635,500,000 is \$3,500,000 below the President's FY 1990 budget request. This reduction is for activities associated with the integration of the Commercially Developed Space Facility in the space shuttle. The reports of the National Research Council and the National Academy of Public Administration raising questions about this effort compel the Committee to defer any activities associated with the Commercially Developed Space Facility until a later date.

In addition, NASA will be instructed to absorb the cost of development of the upper stage for the Advanced Communications Technology Satellite (ACTS), \$6,000,000, in this account. This should not adversely affect ongoing engineering activities nor should it affect adversely the spacelab or orbital maneuvering vehicle program activities.

Finally, the reported bill assumes authority to NASA to utilize funds transferred from the Department of Defense (DOD) for activities related to the Advanced Launch System program. It is estimated that DOD will transfer \$100 million in FY 1990 to NASA for activities associated with this program.

Space science and applications

For Space Science activities, the substitute authorizes \$1,414,100,000 in FY 1990—Physics and Astronomy, Life Sciences, and Planetary Exploration—which is \$1,500,000 below the level requested in the President's budget request.

The \$894,500,000 provided for Physics and Astronomy will support ongoing activities related to the deployment of the Hubble Space Telescope and the Gamma Ray Observatory and to the development of the Global Geospace Science spacecraft and Advanced X-Ray Astrophysics Facility (AXAF). This level of funding fully supports the FY 1990 request for mission operations and data analysis,

as well as research and analysis—the lifelines of the university research communities.

The \$122,700,000 provided for Life Sciences in FY 1990 is a substantial increase over the FY 1989 baseline of \$79,100,000. The substantial increase recommended for life science activities is consistent with the Committee's strong support of the space station program and development of an extended duration orbiter capability. If the United States is to increase substantially the level of manned activity in space, it is absolutely essential to have a robust life sciences program.

The \$396,900,000 provided in FY 1990 for Planetary Exploration is the full amount requested by the Administration and gives new start status to the CRAF and Cassini missions. The new start approval for the CRAF and Cassini missions is contingent upon the establishment and implementation of a cost containment plan for these two missions. This is intended to ensure that NASA learns to manage projects to cost—the CRAF and Cassini missions offer a unique opportunity to test this new approach. The last space science mission done within cost was *Voyager*, launched in 1977. NASA has agreed that its inability to contain the cost of the CRAF and Cassini missions would result in the termination of the CRAF mission. NASA also has agreed that the cost containment plan would be based on an annualized basis, as well as a total project cost basis.

For Space Applications activities, the substitute authorizes \$625,500,000—\$420,100,000 for Earth Science and Applications, \$90,700,000 for Materials Processing, \$80,600,000 for Communications, and \$34,100,000 for Information Systems.

For Earth Science and Applications, the reported bill provides \$420,100,000 in FY 1990, \$10,000,000 more than the President's request. The additional funding provided is to initiate the Earth Probe program as an FY 1990 new start and as a new line item in the NASA budget. The Earth Probe program will consist of a series of Explorer Class missions that will assess the level of ozone depletion, measure tropical rain forests, and monitor the oceans to understand better global change. The first mission to be funded is the Total Ozone Mapping Spectrometer (TOMS).

The reported bill authorizes \$90,700,000 for Materials Processing in Space in FY 1990, a reduction of \$2,000,000 from the President's request, and \$34,100,000 for Information Systems, the same level as requested by the President. The bill also authorizes \$80,600,000 for Communications in FY 1990, an increase of \$62,000,000 above the President's budget request. The proposed increase in this latter account is to accommodate ACTS, which is strongly endorsed by the Committee. The Committee is concerned that the Administration has failed to fund the ACTS program for the fourth straight year despite Congressional support for this program, which is designed to ensure sustained U.S. leadership in communications technology.

Mission to Planet Earth

After months of review, the reported bill includes a new line item and instructions to NASA to initiate the Mission to Planet Earth, starting with the Earth Observing System (EOS) in FY 1990. The bill provides \$24,200,000 for the initiative, which is the same

amount of funding that the Administration proposed for advanced technology definition activities for EOS in FY 1990. The initiation of a Mission to Planet Earth should be viewed as part of a comprehensive Global Change Research Program and as a high national priority and reflects the hope that the Administration will work with the Congress to expedite implementation of this program as proposed in this bill.

Commercial programs/safety and reliability

The reported bill authorizes \$61,000,000 for Commercial Programs, \$23,300,000 for Safety, Reliability, Maintainability, and Quality Assurance, and \$19,900,000 for Tracking and Data Systems—the same levels as the President's request.

Aeronautical research and technology

The bill reported also includes \$462,800,000 for Aeronautical Research and Technology, including \$25,000,000 to initiate technology efforts related to the development of an environmentally and economically sound high speed commercial transport. This level of funding represents full support for the President's budget request, which assumes funding for a high speed commercial transport and reflects great concern by the Committee about the United States maintaining its lead in aeronautics and a positive balance of trade. However, if a high speed commercial aircraft is to be marketable, it must be environmentally sound. It must be able to meet all existing environmental standards and have enough margin to meet future standards. In light of the growing concern about the ozone layer and other environmental issues, the bill endorses NASA's proposal to focus its technology activities on the critical environmental challenges of a high speed commercial aircraft program.

In the same vein, the bill earmarks \$10,000,000 for a high performance computer initiative that will accelerate the development and application of high performance computing technologies. This initiative should consist of the following program elements:

1. massively-parallel scalable testbed facilities;
2. algorithms and advanced software development; and
3. basic research infrastructure.

National aerospace plane

The bill reported authorizes \$127,000,000 for Transatmospheric Research and Technology, the National Aerospace Plane (NASP) program, in FY 1990.

This level of funding represents full funding of the Administration's request for the NASA portion of this joint NASA-DOD program. The NASP program is calculated to develop the technologies in materials processing, propulsion systems, and other areas needed to produce a plane capable of taking off from a conventional runway, accelerating into low earth orbit, and then landing conventionally. The Committee sees NASP as crucial to our national effort to maintain and enhance competitiveness in the aerospace industry. Some in Congress fully expect NASP to lay the technological groundwork for major improvements in our military aircraft, an alternative launch system to the space shuttle, and eventually hypersonic commercial transports.

Since NASP is a joint program shared by NASA and DOD, DOD's participation is essential if the program is to produce two experimental aircraft, X-30s, for flight test purposes. In that connection, the Committee is aware of the continuing debate within the Administration about the appropriate role of DOD in the NASP program. However, the Committee wants to do its part in advancing aerospace technology by authorizing full funding for NASA's portion of the NASP program.

The authorization of funds in the reported bill is contingent upon the submission of a revised management plan, including goals, objectives, milestones, and proposed budgets, for the NASP program.

Space research and technology

The reported bill authorizes \$325,100,000 for Space Research and Technology in FY 1990. This is \$13,000,000 less than the President's budget request. While there continues to be strong support for NASA's efforts to enhance its technology base, due to the extreme budget pressures that exist and NASA's inability to obtain funding for ongoing programs strongly endorsed by the Committee, it is necessary to reduce the FY 1990 budget request for Space Research and Technology. This figure assumes that the Pathfinder Program would be funded at the FY 1989 level of \$40 million and that the proposed new start for the In-Space Flight Experiments would be funded at \$10,200,000 instead of the \$16,200,000.

Academic programs

The reported bill includes a new line item for the University Space, Science and Technology Academic Programs, which reflects the full-funding Administration budget request for this program of \$35,000,000. An amount of \$5,000,000 is provided in this account for the National Space Grant College and Fellowship Program, which NASA initiated in FY 1989. NASA's efforts to broaden the participation of our Nation's educational institutions in the civil space program are very important.

General reduction/research and development account

To maintain a total level of spending for research and development activities of \$5,786,600,000 in FY 1990, a general reduction of \$17,000,000 has been applied against the account.

Space flight

The reported bill authorizes \$5,104,600,000 for Space Flight, Control and Data Communications in FY 1990. This is \$35,000,000 less than the President's budget request. This reduction represents a \$25,000,000 general reduction to the Space Tracking and Data Acquisition account and a general reduction of \$10,000,000 to the entire Space Flight Control and Data Communications Account. The amount provided for the Space Shuttle Productions and Operations Capability account, as well as the Space Transportation Operations account in FY 1990, should sustain operation of a safe and reliable space shuttle—NASA's highest priority.

The reported bill also provides \$121,300,000 for the advanced solid rocket motor program in this account and gives NASA the authority to use the funds in the Space Shuttle Production and Oper-

ational Capability account as may be necessary to ensure operation of a safe and reliable space shuttle and development of an extended duration orbiter capability.

Construction of facilities

The reported bill fully authorizes the budget request for Construction of Facilities, \$341,800,000, and provides additional legislative authority that permits NASA to secure private sector financing for the space station processing facility at the Kennedy Space Center, the neutral buoyancy laboratory at the Johnson Space Center, and the observational instrument laboratory at the Jet Propulsion Laboratory. The proposed Administration language for such service or lease contracts has been amended by the reported bill to require that such contracts result in net cost savings to NASA and are in the national interest. Some type of shared use agreement or equity investment on the part of the private sector should be required to make such proposals advantageous. While such projects should be funded by the Federal Government in the traditional manner, it is not feasible to provide additional funds for the such activities in the current budget environment.

Research and program management/inspector general

The reported bill authorizes \$2,032,200,000 for research and program management in FY 1990. The value of NASA personnel to the success of the Nation's space program must be recognized, and this account reflects that view.

The reported bill includes \$8,795,000 for the Office of the Inspector General in FY 1990, the level of funding requested by the President. This is the first time that this Office has been identified as a separate line item and as a separate appropriations account.

II. TITLE I—OTHER PROVISIONS

As previously indicated, Section 105 of the reported bill amends the National Aeronautics and Space Act to authorize the Administrator of NASA to enter into contracts, leases, or service agreements providing for private sector financing of the space station processing facility at the Kennedy Space Center, the neutral buoyancy laboratory at the Johnson Space Center, and the observational instrument laboratory at the Jet Propulsion Laboratory, provided that such activities are in the best interest of the government and result in net cost savings. If such contracts are entered into, the Administrator is allowed to use NASA's unobligated balances as a contingent liability in case the Government terminates one of these projects for its convenience. The Administration had requested a generic private financing authority, but the substitute reflects the view that a more limited authority as provided in Section 105, contingent upon specified conditions, is in the best interest of the civil space program.

As has been the case with prior year authorization bills, Section 106 of the reported bill instructs NASA to distribute research funds on a geographical basis where possible. Also, Section 107 directs that the space station may be used only for peaceful purposes.

Section 108 gives the Administrator of NASA the authority to use up to 5 percent of the funds provided for the Small Business Innovation Research Program for program management and promotional activities. This should make NASA's implementation of the program consistent with that of other Federal agencies and promote the transfer of technology to commercial applications.

Section 109 indicates that it is the sense of the Congress that the current prohibition on the export of U.S.-built satellites to the Soviet Union for launch on rockets of the Soviet Union shall continue to be the policy of the United States and that the policy shall be expanded to prohibit the export of U.S.-built satellites to other nations for launch on rockets of the Soviet Union.

C. TITLE II—OTHER AUTHORIZATIONS

The reported bill includes the FY 1990 Authorization for the Office of Commercial Space Transportation at DOT. The bill provides \$4,392,000 for these activities, the full amount requested by the Administration.

D. TITLE III

The reported bill also authorizes the activities of the National Space Council, established by Public Law 100-685 (the FY 1989 NASA Authorization Act. For FY 1990, \$1,200,000 has been provided for these activities, which reflects an assumed 50% reimbursement to Federal agencies for detailees assigned to the National Space Council.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office.

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, July 26, 1989.

Hon. ERNEST F. HOLLINGS,
Chairman, Committee on Commerce, Science, and Transportation,
U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for S. 916, the National Aeronautics and Space Administration Act, Fiscal Year 1990.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

ROBERT D. REISCHAUER,
Director.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: S. 916.
2. Bill title: National Aeronautics and Space Administration Authorization Act, Fiscal Year 1990.

3. Bill status: As ordered reported by the Senate Committee on Commerce, Science, and Transportation, June 20, 1989.

4. Bill purpose: S. 916 would authorize appropriations totaling \$13,279 million for fiscal year 1990; for this total, \$13,274 million would be for the National Aeronautics and Space Administration (NASA), \$4 million would be for the Office of Commercial Space Transportation (OCST) in the Department of Transportation, and \$1 million would be for the National Space Council in the Executive Office of the President. Of the amount authorized for NASA programs, \$5,787 million would be for research and development (including \$2,050 million for the space station), \$5,105 million would be for space flight control and data communications, \$342 million would be for construction of facilities, \$2,032 million would be for research and program management, and \$8.8 million would be for the Office of the Inspector General.

S. 916 would also authorize NASA to enter into private financing arrangements such as leases or contracts for the development of three facilities—the Space Station Processing Facility, the Neutral Buoyancy Laboratory, and the Observational Instrument Laboratory—if such arrangements would result in a net cost savings to the government. S. 916 would effectively waive the requirements of the Anti-Deficiency Act (31 U.S.C. 1341), which would otherwise require NASA to obligate sufficient funds to cover the federal government's maximum current liability. Therefore, under S. 916, NASA would be authorized to enter into these financing arrangements without having funds provided in advance through appropriations. NASA would also be authorized to provide for the payment of termination liability in excess of appropriations for these projects; this liability would be paid only if any of the private financing arrangements are terminated by NASA for the convenience of the U.S. government.

5. Estimated cost to the Federal Government:

	[By fiscal year, in millions of dollars]				
	1990	1991	1992	1993	1994
Direct spending (contract authority):					
Estimated budget authority		200			
Estimated outlays				20	20
Authorizations of appropriations:					
Authorization level		13,279			
Portion applied to debt reduction		174			
Net authorization		13,105			
Estimated outlays		8,005	3,917	936	231
Total budget impact:					
Budget authority/authorization		13,479			
Portion applied to debt reduction		174			
Net budget authority/authorization		13,305			
Estimated outlays		8,005	3,917	936	251

The costs of this bill would be in budget functions 250, 400, and 800.

Basis of estimate: The estimated direct spending authority would result from the private financing arrangements authorized by this

bill, which are discussed below. For the authorizations of appropriations, this estimate assumes that the full amounts authorized would be appropriated for fiscal year 1990, and that \$174 million of the amount authorized for space flight, control, and data communications would be used to reduce outstanding debt associated with the tracking and data relay satellite program. The estimated outlays are based on historical spending patterns. Detailed estimates are shown in the table below.

Private financing arrangements: CBO estimates that the private financing arrangements authorized by this bill would provide roughly \$200 million in budget authority (contract authority) to NASA in fiscal year 1990. This estimate of budget authority is preliminary because NASA has not yet decided whether to proceed with these arrangements or how these arrangements should be structured. Outlays from this budget authority would occur when the payments required by these agreements are made; we assume these payments would begin in 1993. As part of these agreements, NASA would be authorized to incur a contingent termination liability, requiring payments to the private parties if the government terminates the contracts for its convenience.

AUTHORIZATIONS PROVIDED BY S. 916 AND ESTIMATED OUTLAYS

(By fiscal year, in millions of dollars)

	1990	1991	1992	1993	1994
Research and development:					
Authorization level	5,787				
Estimated outlays	2,983	2,124	573	197	
Space flight, control, and data communications:					
Authorization level	5,105				
Portion applied to debt reduction	174				
Net authorization	4,930				
Estimated outlays	3,337	1,307	785		
Construction of facilities:					
Authorization level	342				
Estimated outlays	22	191	77	34	17
Research and program management:					
Authorization level	2,032				
Estimated outlays	1,740	292			
Inspector general:					
Authorization level	9				
Estimated outlays	8	1			
Subtotal, NASA:					
Authorization level	13,274				
Portion applied to debt reduction	174				
Net authorization	13,100				
Estimated outlays	8,000	3,916	936	231	17
Office of Commercial Space Transportation:					
Authorization level	4				
Estimated outlays	4	(¹)			
National Space Council:					
Authorization level	1				
Estimated outlays	1	(¹)			
Total, authorizations of appropriations:					
Authorization level	13,279				
Portion applied to debt reduction	174				
Net authorization	13,105				
Estimated outlays	8,005	3,917	936	231	17

¹ Less than \$500,000

These transactions would ordinarily be subject to the requirements of the Anti-Deficiency Act. CBO believes, however, that the intention of S. 916 is to waive the Anti-Deficiency Act with regard to these private financing arrangements. Thus, NASA would be authorized to enter into the contracts for the financing of these facilities without having funding specifically provided in advance. This authority is called indefinite contract authority and is counted as budget authority.

Estimating the cost to the government of these private financing arrangements is difficult because their status is uncertain. NASA is still studying the merits of such arrangements and has not yet decided to seek private financing for these projects. Furthermore, S. 916 would not specify what types of agreements NASA should enter, though two general types have been discussed. Under the option presented in this estimate, a facility would be privately financed and owned, and then leased to the government, with the government obtaining ownership after expiration of the lease. Another option would allow private investors to both operate and finance construction of a government-owned facility.

Another uncertainty is whether NASA would be the sole user of these facilities. Any level of shared use would reduce the cost to the government, and, if a sufficient level of shared use existed, could result in a net cost savings relative to normal, Treasury-financed appropriations. Use of these private financing arrangements is generally more expensive than normal Treasury financed appropriations because private developers must borrow money at interest rates that are higher than the government's cost of borrowing. In preliminary analysis presented earlier this year, NASA showed that private demand accounting for 20 percent of the use of these facilities would be sufficient to generate a net cost savings on these projects. CBO cannot predict whether this level of private demand would exist.

The estimate presented here is intended to illustrate the potential budget impact of the private financing arrangements authorized by this bill. The estimated budget authority equals the total of the stream of payments associated with these agreements. This estimate is based on assumptions that NASA would obtain a 10-year lease-purchase agreement for these facilities and that lease payments would begin in 1993.

CBO estimates that the construction costs for the three facilities would be about \$128 million—\$84 million for the Space Station Processing Facility, \$30 million for Neutral Buoyancy Facility, and \$14 million for the observational instruments laboratory—assuming these were built between 1990 and 1993. Under the assumed leasing arrangement, government outlays would be deferred until 1993 and spread over 10 years. CBO estimates that expenditures for the leases would be about \$200 million and that the annual payments would be \$20 million; this estimate includes the total cost of the facilities (about \$128 million) plus financing costs of roughly \$70 million.

Contingent termination liability. If these agreements are entered into, and if, as is likely, they specify termination payments, NASA

could not withdraw from any of them without providing for the payment of contingent termination liability. The contingent termination liability would secure the contractor's investment in the projects should the government choose to terminate the contract for its convenience. Under S. 916, NASA would be authorized to incur this contingent liability without having funding for that liability specifically providing in advance through appropriations. Nevertheless, we do not expect NASA to terminate this contract for the convenience of the government, and, therefore, we expect that it would never need to make a termination liability payment.

The amount of contingent liability incurred by the government at any time would be the amount required to pay off any contractual commitments outstanding at that time. Because NASA is still in the process of negotiating these arrangements, these amounts cannot be determined precisely at this time. Based on the estimated contract authority for these arrangements, CBO estimates that the maximum contingent termination liability associated with these arrangements would be less than \$200 million. Should NASA choose to terminate any of these contracts, any payment of this liability would be drawn from the contract authority provided by the bill.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

9. Estimate prepared by: Michael Sieverts.

10. Estimate approved by: James L. Blum, Assistant Director for Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation.

Title I of this bill authorizes the appropriation of funds for the conduct of space and aeronautical research and development activities to carry out the policy and purpose of the National Aeronautics and Space Act of 1958. These activities are conducted in NASA laboratories, by NASA personnel and through contracts with industry, universities, and research institutions for research and development and for supporting scientific and technical services. The Committee has concluded that the nature of these activities is such that there is no significant regulatory effect on individuals and businesses and no effect on individual privacy. The reported bill reauthorizes these existing programs, and will have no additional regulatory, economic, paperwork, or privacy impact than the current programs.

Title II of the bill authorizes the appropriation of funds for the Office of Commercial Space Transportation at DOT. This office licenses and regulates the commercial expendable launch vehicle industry in order to protect the public health and safety and comply with existing U.S. treaty and international law obligations. This office was created to reduce the regulatory burden and paperwork requirements on the industry. The reported bill reauthorizes an existing program.

Title III of the bill authorizes the appropriations of funds for the National Space Council. The Council was created to provide a high level office dedicated to the formulation of space policy. A key role of the Council will be to assist in reducing the regulatory burden of commercial space firms trying to market their services to the U.S. Government and to compete in foreign markets.

Thus, authorization of the Office of Commercial Space Transportation, the National Space Council, and NASA programs in the reported bill is not expected to have any effect on individual privacy, should not have an unacceptable regulatory impact or impose an increased paperwork burden on the individuals or businesses who choose to participate, and will not have any significant additional economic impact than existing programs do.

SECTION-BY-SECTION ANALYSIS

TITLE I

Section 101-104—NASA

Overview

Section 101 (a), (b), (c), (d), and (e) authorizes \$13,273,995,000 for NASA in FY 1990. These monies are distributed in five appropriations accounts:

Subsection (a), relating to research and development.—\$5,786,600,000 for space station, space science and applications, space transportation capability development, commercial programs, aeronautics research and technology development, transatmospheric research and technology, and space research and technology, as well as other programs.

The major assumptions in this area are full funding (\$2,050,200,000) and a strong endorsement of the space station program; restoration of funding for ACTS; initiation of a new space technology initiative—In-Space Flight Experiments—but at a reduced level of funding; approval of the new start requests for the CASSINI mission and for the CRAF mission; endorsement of a new aeronautics research and technology program for high speed commercial transportation; initiation of a new high performance computing program; continued support of the NASP program, contingent upon submission of a new program management plan; sustained support of the Gravity Probe B program; and approval of new start status for two programs at the initiation of the Committee—Earth Probe and Mission to Planet Earth (EOS).

Subsection (b), relating to space flight, control and data communications.—\$5,104,600,000, including funds for space shuttle productions and operations capability (\$1,305,300,000), space transportation operations (\$2,732,200,000), and space tracking and data acquisition (\$1,077,100,000).

The funds provided for these activities reflect this Committee's strong support of this program and its commitment to maintain a safe and reliable transportation system.

The reported bill reflects an endorsement of the initiation of the Advanced Solid Rocket Motor Program in this section. In this connection, the Committee also has agreed to permit private sector financing of the facility portion of this program. That authority has

been granted in a separate bill that the Committee has ordered reported, S. 663.

Subsection (c), relating to construction of facilities.—\$341,800,000 for a variety of repair, rehabilitation, and new construction activities required for a robust civilian space program.

Subsection (d), relating to research and program management.—\$2,032,200,000 for all civil service staff, maintenance of facilities, and support of research and development programs and contract activities, as well as technical and administrative support of research and development programs.

Subsection (e), relating to Inspector General.—\$8,795,000 for the activities of the Office of the Inspector General of NASA. This is a new line item and a new appropriations account.

Section 101 (f), (g), (h), and (i) and Sections 102, 103 and 104 establish strict parameters for the Administrator of NASA concerning the amount of flexibility he or she has with construction of facilities activities, the transfer of funds from one account to another, and the use of funds for activities not approved by the Committee. These provisions are included in the NASA authorization bill every year.

Discussion of specific authorizations

During formulation of the FY 1990 NASA Authorization bill, the Committee decided to provide \$13,274,000,000 for NASA in FY 1990. This is the same level of funding requested by the Administration.

This level of funding is substantially higher than the assumption of the Concurrent Resolution on the Budget for FY 1990, approximately \$12,300,000,000, and higher than the FY 1990 VA-HUD-Independent Agencies Subcommittee Allocation for NASA under section 302(b) of the Congressional Budget Act of 1974. In the past, the Committee has been willing to propose reductions, when justifiable, to the President's budget request for NASA and to bear its share of the congressional deficit reduction burden. However, in FY 1990, reductions to the NASA budget request by the Office of Management and Budget (OMB) during preparation of the budget request were so severe, from \$14,300,000,000 to \$13,300,000,000, that the Committee believes further reductions to the President's request could have the following consequences:

1. slippage in the space station program of at least one year and a substantial cost increase to the program (at least \$1,000,000);
2. termination of the NASP program;
3. further delay in the NASA plan to hire additional employees;
4. reduction to the scale and scope of the NASA technology programs; and
5. elimination of possible new starts in space science and aeronautics, including components of a Global Change Research Program or a High Speed Commercial Transport.

The bill reported by the Committee reflects the belief that such results are neither in the national interest nor the desire of the Congress.

The Committee notes that a constant theme of the NASA budget hearings this year was that the FY 1990 budget request was "marginal to submarginal." Based on the Committee's analysis, the FY 1990 run-out for the ongoing FY 1989 programs is \$14,000,000,000 if no new starts are included. The President's FY 1990 budget request, however, is \$13,300,000,000 with several new starts included. In FY 1990, the President requested an increase of \$2,376,000,000 compared to the FY 1989 Operating Plan or roughly 22 percent. However, approximately 92 percent of the President's proposed increase went to ongoing programs, and the remaining 8 percent went to new starts such as the CRAF and Cassini Missions, the High Speed Commercial Transport, the In-Space Flight Experiment Program, and Voyager Interstellar.

The reported bill reflects the view that NASA must be funded adequately if we are intent upon implementing a balanced and robust civil space program. If the space program is a national priority, it must be a budget priority, and the level of funding proposed by the Committee, \$13,300,000,000, should be provided. If the space program is not a budget priority and fewer funds are provided in FY 1990, the goals and objectives of the program must be reassessed, and if necessary, realigned.

During the course of the next few months, the Committee is well aware that the Congress and the Administration will be required to make some very difficult decisions about the future scope and direction of the civil space program. The bill reported by the Committee reflects the view that the civil space program should be maintained and further developed and that the necessary funds should be provided to support programs such as the space station, the NASP, the High Speed Commercial Transport, and a diversified space science and applications program. The Committee is aware that the NASA budget increase in FY 1990 represents one-third of the entire increase in outlays that can be accommodated under the Gramm-Rudman-Hollings targets for domestic discretionary spending and that this was a factor in the reduction proposed in the Concurrent Resolution on the Budget. However, as the Committee has already indicated, the space program that has been proposed by this and prior Administrations and endorsed by the Congress requires adequate and predictable funding if it is to be implemented. The civil space program cannot be carried out without adequate funding, and the level of funding prescribed in the Committee's bill is the "floor" for FY 1990, not the "ceiling."

A. RESEARCH AND DEVELOPMENT—\$5,786,600,000

The Committee authorizes \$5,786,600,000 for research and development activities in FY 1990. This is \$35,000,000 more than the President's FY 1990 budget request, despite a general reduction of \$17,000,000 to be applied to this program. The Committee has given NASA the authority to make this reduction at its discretion, which thus will affect the Committee's proposed funding levels for certain of NASA's research and development activities in FY 1990.

The objectives of the NASA program of research and development are to extend our knowledge of the Earth, its space environment, and the universe; to expand the technology for practical ap-

plications of space technology; to develop and improve manned and unmanned space vehicles; and to assure continued development of the long-term aeronautics and space research and technology necessary to accomplish national goals. These objectives are achieved through the following elements:

Space station.—A program to develop a U.S. space station to continue the Nation's leadership in space, and to provide for enhancement of science and applications programs and further the commercial utilization of space while stimulating advanced technologies.

Space transportation capability development.—A program to provide for the development and use of capabilities related to the Space Shuttle. The principal areas of activity in Space Transportation Capability Development are efforts related to the development and flight certification of the jointly developed U.S./Italy Tethered Satellite System; development of the Orbital Maneuvering Vehicle; development and operations of the Spacelab systems; the development and procurement of upper stages that place satellites in high altitude orbits; the engineering and technical base support at NASA centers; payload operations and support equipment; advanced launch system technology development and study activities; and advanced programs study and evaluation efforts.

Space science and applications.—A program using space systems, supported by ground-based and airborne observations: (1) to conduct a broad spectrum of scientific investigations to advance our knowledge of the Earth and its space environment, the Sun, the planets, interplanetary and interstellar space, the stars of our galaxy and the universe; and (2) to identify and develop the technology for the useful applications of space techniques in the areas of advanced communications satellite systems technology; materials processing research and experimentation; and remote sensing to acquire information which will assist in the solution of Earth resources and environmental problems.

Technology utilization.—A program that includes activities to accelerate the dissemination to both the public and the private sectors of advances achieved in NASA's research, technology, and development program.

Commercial use of space.—A program to increase private sector awareness of space opportunities and encourage increased industry investment and participation in high technology, space-based research and development.

Aeronautics and space technology.—A program to conduct the fundamental long-term research and to develop the discipline and systems technology required to maintain U.S. leadership in aeronautics and space.

Safety, reliability, maintainability, and quality assurance.—A program to enhance the safety and technical execution of NASA programs.

Tracking and data advanced system.—A program that includes activities to perform studies and provide for the development of systems and techniques leading to improved tracking and data program capabilities.

University space science and technology academic program.—A program that includes activities to support agency-wide university and minority university programs.

1. Space Station—\$2,050,200,000

The Committee authorizes \$2,050,200,000 for the Space Station Freedom (SSF) program. This is the same as the President's FY 1990 request. However, of the funds provided, \$80,000,000 is authorized only for development of the flight telerobotic servicer (FTS). This is an increase of \$65,000,000 when compared to the President's budget request for FTS. This augmentation for the FTS is required because private sector financing of this state of the art technology was not feasible.

Summary of FY 1990 funding levels

Development	\$1,905,200,000
Flight telerobotic services	80,000,000
Operations	25,000,000
Transition definition	25,000,000
Orbital debris radar	15,000,000
Total Space Station	2,050,200,000

Development of the U.S. permanently manned Space Station, as directed by President Reagan, will add new momentum to the civil space program and is essential to preserving U.S. preeminence in science, technology and manned space flight. The SSF program gives us our first opportunity to gain direct experience in long-term human operations in space and knowledge essential to future space exploration. The Space Station will uniquely enhance the U.S. space science programs, further the commercial utilization of space, and stimulate the development and application of advanced technologies of national importance. It is also an avenue of cooperation with our allies, demonstrating the peaceful use of space for the benefit of all mankind.

The SSF will be unique because it will provide the United States with a permanently manned presence in space. It will be versatile because its capabilities will be remarkably diverse. This diversity is reflected in the Space Station's design, which features pressurized laboratories, accommodations for attached payloads, and free-flying unmanned platforms. This new national laboratory, a research center in space, will stimulate new technologies, enhance industrial competitiveness, further commercial space enterprises, and add greatly to our storehouse of scientific knowledge. Perhaps the most significant feature of the Space Station, essential to its utility for science, commerce, and technology, is the continuing presence of its crews. Men and women will be aboard the Space Station base full-time. The potential of humans—their creativity—is unique and essential. The Space Station will be designed to exploit the human capabilities. The Space Station's microgravity environment, high levels of power, and extended time in orbit will enable scientists to make new discoveries in materials research and life sciences. The Space Station's substantive research capabilities include far more than its pressurized volume. Its free-flying platforms will enable truly synergistic studies of the Earth's atmosphere, land masses, and oceans—referred to as Earth system science. These activities

will complement the proposed Mission to Planet Earth which will help us to understand our environment and aid us in learning to conserve its precious resources. Moreover, the Space Station's external structure is designed to be a stable platform that will be available for mounting a number of specialized instruments and telescopes. Scientific instruments, whether in a laboratory or on a boom, require maintenance, upgrading, repair, and replacement. The Space Station will accommodate these servicing functions. The SSF will be designed to evolve, to be capable of growth in its capabilities, so that future needs and challenges can be met.

The SSF will be a multi-purpose, international facility. In 1984, President Reagan invited the full participation of other nations. During the ensuing definition phase, Canada, the member states of the European Space Agency (ESA), and Japan worked closely with the United States to define their participation. These parallel definition and preliminary design studies have resulted in the identification of the Space Station elements to be developed by our partners. Negotiations with these international partners for the development phase of the program were completed in the Fall of 1988. Agreements have been signed with the Canadian government for the development of a mobile servicing system, with the member countries of ESA for the inclusion of a pressurized attached module, a man-tended free flyer, and a polar platform, and with the Japanese government for the development of an attached laboratory module.

Space Station—Committee Comments

The Committee strongly endorses the development of a permanently manned space station in cooperation with our allies. Therefore, the Committee has authorized funding at the level of the President's FY 1990 budget request for this program.

The Committee, however, is very concerned about the budget outlook for the space station program, as well as other science and technology programs funded in the domestic discretionary budget. Since funding for the space station program was cut in the FY 1988 Continuing Resolution (Public Law 100-202), it is apparent that, despite the broad base of support for the program, it is very difficult to get the necessary budget resources to implement the program.

The Committee has provided full funding of the space station program in FY 1990 to signal its strong endorsement of this program and to indicate that further reductions in the space station program budget are not possible without further delays in the deployment date and significant costs increases. The Committee believes that the Congress and the President must come to an agreement in FY 1990 that the space station program is a national priority and a budget priority so that the necessary funds will be provided to keep this program on schedule.

To further complicate this decision, our foreign partners have already made significant investments in their portion of the program—an estimated \$567 million. Our foreign partners' participation in the space station program is estimated to be valued at between \$7 and \$8 billion.

The Committee is convinced that working together with our partners on the permanently manned civil space station will further expand cooperation through the establishment of a long-term and beneficial relationship and will further promote cooperation in the exploration of and peaceful use of outer space. The Committee also is convinced that the termination of the space station program or the introduction of significant delays in this program could adversely affect U.S. foreign policy and could preclude future cooperative activities. In that regard, the Committee notes that, to our foreign partners—Japan, Canada, and the member nations of the ESA—the Space Station Intergovernmental Agreement has the standing of a treaty.

The Committee has provided \$80,000,000 in the space station budget for the FTS. The bill requires NASA to absorb these funds in FY 1990 because OMB's "assumed" private sector financing of this activity proved infeasible. In the FY 1991 budget submission, the Committee expects to see a separate line item for the FTS and to see additional funds provided for this account—it should not be absorbed by the space station program.

The Committee has decided not to include multi-year funding for the space station program or to impose a cap of \$13,300,000,000 on the program as requested by the Administration. The Committee's reluctance to take these two steps is a function of the budgetary instability that confronts the program. While the Committee endorses the concept of multi-year authorizations and appropriations for large-scale programs to add stability to the program and to ensure better management and cost containment, the Committee does not see the necessary conditions of stability in the case of the space station program. The Committee is hopeful that the current situation will be remedied and that these elements of the program can be reassessed in FY 1991.

As stated in section 107 of the bill, the Committee maintains its belief that the space station is a facility that should be used for peaceful purposes in accordance with international law. Accordingly, the Committee has incorporated language in the FY 1990 bill which affirms this position. The same language was included in the FY 1985, 1986, 1987, 1988, and 1989 Senate NASA authorization bills and restates Article IV of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Celestial Bodies. Pursuant to this standard, DOD is perceived to be a user of the space station, and it is recognized that DOD may conduct research and development activities on the space station facilities.

The Committee also notes that it is working with NASA, the Department of State, and the Senate Judiciary Committee to finalize language for a space patent legislative initiative. This legislation is required to implement the Space Station Intergovernmental Agreement.

2. Space Transportation Capability Development—\$635,500,000

The Committee authorizes \$635,500,000 for Space Transportation Capability Development in FY 1990. This is \$3,500,000 below the President's budget request.

The reported bill also includes language that (1) instructs NASA to absorb the \$6,000,000 cost of the upper stage for the ACTS and (2) gives NASA the authority to use funds transferred from DOD for propulsion activities related to the Advanced Launch System program.

Summary of FY 1990 funding levels

Spacelab.....	\$38,900,000
Upper stages.....	88,600,000
Engineering and technical base.....	189,800,000
Payload operations and support equipment.....	77,600,000
Advanced programs.....	48,700,000
Advanced launch systems.....	5,000,000
Tethered satellite system.....	19,900,000
Orbital maneuvering vehicle.....	107,000,000
Total.....	\$635,500,000

¹ Within this amount, NASA must absorb the costs of the ACTS upper stage (\$6,000,000).

The principal areas of activity in Space Transportation Capability Development include the Spacelab; the Upper Stages required to place satellites in high altitude orbits; the Engineering and Technical Base support at the manned space flight centers; Payload Operations and Support Equipment for accommodating NASA payloads; Advanced Programs Study and Evaluation efforts; Advanced Launch Systems efforts; the design and development of the U.S./Italian Tethered Satellite System; and the development and first flight of the Orbital Maneuvering Vehicle.

Space Transportation Capability Development—Committee Comments

For this authorization, the Committee has reduced the President's budget request by \$3,500,000, the amount to cover integration costs associated with the Commercially Developed Space Facility. Based on the findings of the National Research Council and National Academy of Public Administration reports on the Commercially Developed Space Facility, the Committee believes these activities should not be funded at this time.

The Committee also has instructed NASA to absorb the cost of the Transfer Orbit Stage (TOS), the upper stage for the ACTS. The Committee's estimate of this activity is \$6,000,000 in FY 1990.

The Committee has provided legislative authority for NASA to use funds transferred from DOD for propulsion activities related to the development of the Advanced Launch System. This authority is similar to the authority contained in the FY 1989 NASA Authorization Act (Public Law 100-685). The Committee understands that \$100,000,000 will be transferred from DOD to NASA for these activities in FY 1990.

The Committee notes the substantial progress being made on the Orbital Maneuvering Vehicle. It also expects the Spacelab program to remain a high NASA priority.

The Committee strongly endorses the development of an extended duration orbiter for the space shuttle and expects NASA to keep it fully informed of efforts to finance privately this hardware. If for any reason the privatization initiatives are not successful, the Committee has given NASA the authority to use such sums as may

be necessary to ensure the availability of an extended duration orbiter in the space shuttle production and operational capability account.

The Committee is well aware of the current debate on the requirements for a crew emergency rescue vehicle. On this particular issue, the Committee agrees with NASA and the NASA Aerospace Safety Advisory Panel that a crew rescue vehicle or lifeboat should be an essential part of the space station's design.

3. Physics and Astronomy—\$894,500,000

The Committee authorizes \$894,500,000 for Physics and Astronomy in FY 1990. This is the same as the President's budget request. The Committee, however, has instructed NASA to absorb the cost of the Gravity Probe B Mission, \$25,000,000, in that allocation.

Summary of FY 1990 Funding Levels

Hubble space telescope development.....	\$67,000,000
Gamma ray observatory development.....	26,700,000
Global geospace science.....	112,300,000
Advanced x-ray astrophysics facility development (AXAF).....	44,000,000
Payload and instrument development.....	71,400,000
Shuttle/Spacelab payload mission management and integration.....	86,100,000
Space station integrated planning and attached payloads.....	23,000,000
Explorer development.....	93,200,000
Mission operation and data analysis.....	204,800,000
Research and analysis.....	112,500,000
Suborbital program.....	53,500,000
Total.....	\$894,500,000

¹ Within this amount, NASA must absorb the cost of the Gravity Probe B Mission (\$25,000,000).

The goals of the Physics and Astronomy program are to increase our understanding of the origin and evolution of the universe, the fundamental laws of physics, and the formation of stars and planets. Objects studied by the Astrophysics program include distant galaxies and galactic clusters, as well as stars and other structures in nearby galaxies and the interstellar medium in our galaxy. Unusual and exotic phenomena—such as quasars, neutron stars, pulsars, and black holes—are of particular interest to the Astrophysics program, and are the target of many ground-based and space-based research programs. In the Space Physics program, intensive study of our own Sun, with its multitude of time-varying phenomena, provides key answers to a vast range of questions requiring comprehensive research into polar-terrestrial processes and the physics and coupling between the solar wind, magnetosphere, and atmosphere.

The objectives of the Physics and Astronomy program are accomplished with a mixture of large, complex, free-flying space missions, less complex Explorer spacecraft, Shuttle/Spacelab flights, and sub-orbital opportunities. In the future, the Space Station will act as a platform for attached payloads and potentially as a servicing point for major free-flying observatories which require assembly, maintenance, and refurbishment in orbit. Space-based research allows observations in wavelength regions such as the infrared or the ultraviolet which cannot be carried out on the ground due to the obscuring effects of the atmosphere. Also, observations in the visible light

region are vastly improved when conducted above the atmosphere. The entire program rests on a solid basis of supporting research and technology, data analysis, and theory.

Research teams involved in this program are located at universities, industrial laboratories, NASA field centers, and other government laboratories. The scientific information obtained and the technology developed in this program are made available to the scientific communities and the general public for application to the advancement of scientific knowledge, education, and technology.

Physics and Astronomy—Committee Comments

Within the authorization level for Physics and Astronomy NASA is instructed to absorb the cost of the Gravity Probe B mission that was terminated during NASA readjustments of the OMB passback. The Gravity Probe B space shuttle experiment, which will test Einstein's general theory of relativity, requires \$25,000,000 in FY 1990.

The Gravity Probe B mission, started in 1961 and funded by NASA since 1963, is a unique university/industry initiative that is both a scientific and management experiment. To date, the program has spent \$40,000,000 or 35 percent of the total estimated cost of a space shuttle flight experiment, including instrument development. There is Committee support for this mission and its 1994 space shuttle flight.

The Committee is pleased to note that several Physics and Astronomy missions are scheduled for flight in the next 18 months, including the Cosmic Background Explorer (November, 1989), the Hubble Space Telescope (March, 1990) and the Gamma Ray Observatory (June, 1990). The return of the space shuttle to flight status and the implementation of the mixed fleet concept represent significant opportunities for NASA's space science programs. Furthermore, the ongoing activities in the Explorer program, the Global Geospace Science program, and the AXAF point to future accomplishments in the Physics and Astronomy program area. Successful implementation of these missions should help ensure U.S. leadership in physics and astronomy.

However, as noted below in the Planetary section of the Committee report, there are still concerns. Foremost on the Committee's list is a concern about recurring cost increases in the NASA space science programs (concerns which were documented in a series of General Operating Office (GAO) reports compiled at the request of the Committee). The fact that the total estimated cost of the AXAF mission has increased 19 percent in the first year of the project is evidence of the magnitude of the problem. Either NASA must implement cost containment procedures, or the Committee will be forced (1) to reassess the status of programs that experience significant cost overruns and/or (2) to restrict any additional new starts.

The Committee, therefore, directs NASA's Office of Space Science and Applications to submit recommendations on cost containment procedures for its projects in conjunction with the FY 1991 budget. Successful implementation of these procedures will be an important management tool for NASA and will help ensure the availability of funds for additional space science activities.

The Committee notes that it continues to endorse the strategic planning efforts of the Office of Space Science and Applications for Physics and Astronomy and directs NASA to include Gravity Probe B in the plan.

4. Life Sciences—\$122,700,000

The Committee authorizes \$122,700,000 for Life Sciences in FY 1990. This is \$1,500,000 less than the President's budget request.

Summary of FY 1990 funding levels

Human space flight and systems engineering	\$42,800,000
Space biological sciences	27,600,000
Life sciences flight experiments.....	
Research and analysis.....	51,800,000
Total.....	\$122,700,000

¹ Total reflects a general reduction of \$1,500,000 to be applied to NASA's discretion.

The goals of the Space Life Sciences program are to advance knowledge in all areas of space life sciences and to develop medical and biological systems which enable human habitation in space. Results from the research program are applied to: the immediate needs of maintaining astronaut health and productivity; understanding of the response of biological mechanisms to weightlessness; the design of controlled ecological life support systems; understanding of the origin, evolution, and distribution of life in the universe; and understanding of the biosphere of the planet Earth.

Continuing support of the Space Life Sciences program is essential: to understand the basic biological mechanisms of gravitational responsibility; to evolve the critical technologies necessary to enable long-term piloted space flight; and to develop the capability to sustain a permanent manned presence in space. The research program includes ground-based and space research efforts which are mutually supportive and integrated, and the study of fundamental biological processes and space-related medical problems through a variety of disciplines and techniques.

Life Sciences—Committee Comments

The Committee strongly endorses NASA's proposed increase for Life Sciences in FY 1990 over previous years' levels. If the United States is committed to long duration space flight for man, it is essential that NASA have a comprehensive life sciences program. This theme was highlighted in the Robbins Report, "Exploring the Living Universe," and in numerous other reports and journals.

The FY 1990 Life Sciences program proposed by NASA is an effort to establish the priority status of this program element, and this effort is endorsed by the Committee. In this regard, the Committee notes initiation of the 1.8m centrifuge, the Life Sciences Centers of Research, and the Space Biology Initiative. The availability of state of the art facilities and instruments to conduct research and the concentration of resources on interdisciplinary centers of research should greatly enhance the standing and capability of the NASA Life Sciences program.

The Committee also is pleased to see that NASA has initiated the extended duration orbiter medical program to ensure pilot and

crew performance and proficiency during extended space shuttle missions.

Finally, the Committee acknowledges NASA's role in the creation of its Medical Bridge between the United States and the Soviet Union in the aftermath of the Armenian earthquake. Vital medical information was provided via satellite to on-site medical teams and resulted in the application of life-saving medical care. This satellite link also was used in the aftermath of the recent train disaster in the Soviet Union.

The general reduction imposed on this account by the Committee is done so without prejudice by the Committee as to where the reduction should be made.

5. Planetary Exploration—\$396,900,000

The Committee authorizes \$396,900,000 for Planetary Exploration in FY 1990. This is the same as the President's budget request.

Summary of FY 1990 funding levels

Galileo development.....	\$17,400,000
Magellan.....	
Ulysses.....	14,500,000
Mars observer.....	100,500,000
Comet rendezvous asteroid flyby/Cassini.....	30,000,000
Mission operations and data analysis.....	155,400,000
Research and analysis.....	79,100,000
Total.....	396,900,000

The Planetary Exploration program encompasses the scientific exploration of the solar system including the planets and their satellites, comets and asteroids, and the interplanetary medium. The program objectives are: (1) to determine the nature of planets, comets, and asteroids as a means for understanding the origin and evolution of the solar system; (2) to understand better the Earth through comparative studies with the other planets; (3) to understand how the appearance of life in the solar system is related to the chemical history of the solar system; and (4) to provide a scientific basis for the future use of resources available in near-Earth space. Projects undertaken in the past have been highly successful based on a strategy that places a balanced emphasis on the Earth-like inner planets, the giant gaseous outer planets, and the smaller bodies (comets and asteroids). Missions to these bodies start at the level of reconnaissance to achieve a fundamental characterization of the bodies, and then proceed to levels of more detailed study.

The reconnaissance phase of inner planet exploration, which began in the 1960s, is now virtually completed, although we still know little about the nature of the planet Venus' surface. Mars has provided program focus because of its potential as a site of biological activity. The Viking landings in 1976 carried the exploration of Mars forward to a high level of scientific and technological achievement, thereby setting the stage for the next step of detailed study. Analyses of meteorites and the lunar rock samples returned by Apollo continue to be highly productive, producing new insights into the early history of the inner solar system and thus leading to a revision of our previous theoretical concepts. The Pioneer Venus mission is continuing to carry the study of the Earth's nearest

planetary neighbor and closest planetary analog beyond the reconnaissance stage to the point where we have now obtained a basic characterization of Venus' thick, massive atmosphere, as well as fundamental data about the formation of the planet.

The exploration of the giant outer planets began more recently. The Pioneer 10 and -11 missions to Jupiter in 1973 and 1974 were followed by the Voyager-1 and -2 spacecraft encounters with Jupiter in 1979. Voyager-1 then encountered Saturn in November 1980, and Voyager-2 encountered Saturn in August 1981. The Voyager data on these planets, their satellites, and their rings have revolutionized our concepts about the formation and evolution of the solar system. Voyager-2 encountered Uranus in January 1986 and has provided our first look at this giant outer planet. Its trajectory has recently carried it to an encounter with the planet Neptune in August 1989. The Pioneer-10 and -11 and Voyager-1 spacecraft are on trajectories heading out of the solar system as they continue to return scientific data about the outer reaches of the solar system.

The successful launch of the Magellan mission to Venus in May 1989, combined with the schedule launch of the Galileo mission to Jupiter in October 1989, the Ulysses mission to the polar plane of the Sun in October 1990 (this is a joint U.S./ESA Mission), and the Mars Observer mission in September 1992 should firmly reestablish the leadership of the United States in planetary science.

Research and analysis activities will continue to maximize the scientific return from current missions and from such Earth-based activities as lunar sample and meteorite analysis, telescope observations, theoretical and laboratory studies, and instrument definition. This program strives for interdisciplinary coordination among various research groups and for the wide dissemination of scientific results. A close association is also maintained between the research programs and planning activities to define the scientific rationale and technology needed for future missions. The program also supports the growing involvement of U.S. scientists as participants on foreign-sponsored missions.

Planetary Exploration—Committee Comments

As noted above, the Committee is concerned about cost creep in the NASA space science and applications program, as well as about constrained budgets in the outyears due to Government-wide fiscal pressures. Therefore, during its assessment of the proposed new start status for the Comet Rendezvous and Asteroid Flyby mission (CRAF) and the Cassini mission to Saturn, the Committee decided that a cost containment plan had to be implemented by NASA if these missions were to be approved.

S. 916, as reported, authorizes \$30,000,000 for the CRAF and Cassini missions if a cost containment plan is formulated for those missions and submitted to the Committee on Commerce, Science, and Transportation of the Senate, to the Committee on Science, Space, and Technology of the House, and to the Committees on Appropriations of the House and Senate. The Committee expects NASA to initiate formulation of this plan immediately. The Committee expects this plan to contain the annualized and total estimated cost of these two missions. Failure to stay within a set per-

centage of the plan's funding profile would result in the termination of the CRAF mission.

The Committee notes that both the CRAF and Cassini missions have very limited launch opportunities (CRAF must be launched before 1996 and Cassini before 1997) and varying degrees of foreign participation (ESA's contribution to the Cassini mission is estimated to be worth \$200,000,000 and the West German contribution to the CRAF mission is estimated to be worth \$50,000,000). Thus, any program delays could result in loss of launch opportunities for these missions. The Committee, therefore, expects NASA and the contractor teams to give these missions their serious attention.

The Committee also expects NASA to have a "firm" memorandum of agreement in place with the Air Force to ensure the availability of Titan IV's for the CRAF and Cassini missions and for the space station polar platforms. The Committee would like to be apprised of the availability of these launch vehicles and the status of an agreement with the Air Force as soon as possible.

In addition to the CRAF and Cassini missions, the Committee is pleased to see firm launch dates for the Galileo, Ulysses, and Mars Observer missions and notes the successful deployment of the Magellan mission to Venus in May of this year. The Nation's planetary program has been a source of great national pride and scientific inquiry. Perhaps the greatest tribute to this program and to the people in the NASA/contractor/university team was the recent Voyager encounter of the planet Neptune in August 1989. Voyager was launched in 1977 and since that time has encountered Jupiter, Saturn, and Uranus. It has been the source of significant scientific data and information and has helped establish a better understanding of the solar system.

Finally, the Committee continues to endorse the strategic planning efforts of the Office of Space Science and Applications for Planetary Exploration.

6. Space Applications—\$625,500,000

The Committee authorizes \$625,500,000 for Space Applications in FY 1990. This is \$70,000,000 more than the President's budget request. Of this amount, \$420,100,000 is for Earth Science and Applications, \$90,700,000 is for Materials Processing, \$80,600,000 is for Communications, and \$34,100,000 is for Information Systems.

The \$24,200,000 requested by the Administration for the Mission to Planet Earth, in particular the EOS, has been fully authorized in the reported bill but is highlighted as a separate line item by the Committee. This program will be discussed in the next section of this report. This adjustment has been reflected in the report's budget tables.

(a) Earth Science and Applications—\$420,100,000

The Committee authorizes \$420,100,000 for Earth Science and Applications in FY 1990. This is \$10,000,000 more than the President's budget request. The increase is necessary to initiate the Earth Probe program in FY 1990, commencing with the TOMS mission. The Earth Probe program was recommended in a 1988 Space Science Board Study.

Summary of FY 1990 funding levels

Geodynamics.....	\$38,000,000
Research and analysis.....	124,800,000
Mission operations & data analysis.....	24,800,000
Earth science payload instrument dev.....	42,300,000
Scatterometer.....	13,800,000
Earth probe.....	10,000,000
Upper atmos. satellite (UARS).....	73,900,000
Ocean topography experiment (TOPEX).....	72,800,000
Airborne science & applications.....	19,700,000
Total.....	420,100,000

The goals of the Earth Science and Applications program are to improve our understanding of the processes in the atmosphere, oceans, land surface, and interior of the Earth and advance our knowledge of the interactions among these environments. The program will provide space observations of parameters involved in these processes and will extend the national capabilities to predict environmental phenomena, both short- and long-term, and their interaction with human activities. Because many of these phenomena are global or regional, they can be most effectively (and sometimes only) observed from space. NASA's programs include scientific research efforts plus the development of new technology for global and synoptic measurements. NASA's research satellites, Shuttle/Spacelab payload program, and Airborne Science and Applications program provide a unique view of the planet Earth, its physical dynamics, and radiative and chemical processes which affect habitability and the solar-terrestrial environment.

A number of significant objectives have been established for the next decade. These include advancing our understanding of the upper atmosphere through determining the spatial and temporal distribution of ozone and select nitrogen, hydrogen, and chlorine species in the upper atmosphere and their sources in the lower atmosphere; characterizing the current state of the terrestrial landscape, including the biosphere and the hydrosphere; optimizing the use of space-derived measurements in understanding large-scale weather patterns; advancing our knowledge of severe storms and forecasting capabilities, ocean productivity, circulation, and air-sea interactions; and improving the knowledge of seasonal climate variability leading to a long-term strategy for climate observation and prediction. Studies of the cycling of key biogeochemical elements, interactions between the biosphere and the climate system, and the composition and evolution of the Earth's crust and the processes that shape the Earth's crust are essential to our understanding of the global environment.

Effective utilization of remote sensing requires a balanced set of activities including: analytical modeling and simulation; laboratory research of fundamental processes; development of instrumentation, flight of the instruments on the space shuttle, research satellites, and airborne platforms; collection of *in situ* ancillary or validation data; and scientific analysis of data. The approach is to develop a technological capability with a strong scientific base and then collect appropriate data through remote and *in situ* means, which will address specific program objectives.

Earth Science and Applications--Committee Comments

The increase in the authorization for this program, \$10,000,000 more than the President's budget request, is to initiate a new start in FY 1990 for the Earth Probe program, a series of Explorer-class earth science missions. The Committee expects the TOMS to be the first Earth Probe mission and anticipates that follow-on missions will include a Tropical Rain Forest Measurement mission, a Sea-Wide Field Sensor, and a Geopotential Research Experiment mission.

The Committee's support of the Earth Probe program and the Earth Science and Applications budget request is indicative of its interest in a comprehensive global change research program. The Committee also believes that such a program is in the national and international interest and that space-based assets are a critical element of a successful global change research program.

Because of the renewed interest in the environment, in particular global warming and ozone depletion, the Committee sees a broad base of support for the NASA Earth Science and Applications program and expects that many of the already approved missions will attract further interest since they will enhance our knowledge of the planet Earth and its atmosphere. The Upper Atmosphere Research (UARS) scheduled for launch in 1991 and the Ocean Topography Experiment (TOPEX) scheduled for launch in 1992, for example, will significantly enhance our understanding of the stratosphere and the surface topography of the ocean. The Committee believes that all of these missions lend themselves to international cooperation and to an international global change research program. The Earth Probe program, in particular, is ideal for participation by developed and developing nations.

The Committee notes that the Scatterometer will be launched in 1995 on the Japanese ADEOS mission but is concerned about the launch delay experienced by this program due to uncertainty with the Navy N-Ross program. Enhanced knowledge of the oceans has important research and operational purposes and should be a higher priority.

Finally, the Committee is pleased to see NASA's sustained commitment to advanced technology development activities and to new and improved remote sensing instruments. These instruments will play a critical role in a comprehensive global change research program.

(b) Materials Processing--\$90,700,000

The Committee authorizes \$90,700,000 for Materials Processing in FY 1990. This is \$2,000,000 less than the President's budget request. This reduction is a general reduction to be applied at the discretion of NASA.

Summary of FY 1990 funding levels

Research and analysis.....	\$13,000,000
Microgravity shuttle/space station payloads	74,600,000
Commercial microgravity R&D enhancements	5,100,000
Total.....	\$90,700,000

¹ Total reflects a general reduction of \$2,000,000 to be applied at NASA's discretion

The mission of the materials processing Microgravity Science and Applications program is to foster the development of near-Earth space as a natural resource by exploiting microgravity and other unique attributes that may be attained in an orbiting spacecraft. In this environment, we can advance knowledge about the fundamental nature of matter, increase understanding of the role of gravity in various industrial processes, and produce limited quantities of certain exotic high value materials for specialized applications.

Ground-based research will support definition studies for shuttle and Space Station experiment candidates in areas such as containerless experiments, solidification and crystal growth, and processing of biological materials. Experiments will be conducted in drop tubes, towers, and aircraft.

The Microgravity Shuttle/Spacelab Payloads program provides a range of experimental capabilities for all participants in the Materials Processing in Space program. The payloads program currently supports a wide variety of hardware development, from unique flight experiments necessary to conduct basic research into the fundamental nature of matter to the modular, multi-user research facilities that will be the cornerstone of microgravity science and applications research on the Space Station. Experiments will be flown on the space shuttle and Spacelab.

Materials Processing--Committee Comments

The Committee continues to be supportive of the Materials Processing program and believes that the long-term return from this program will be substantial. However, the Committee also realizes, as noted in the National Research Council's "Report of the Committee on a Commercially Developed Space Facility," that "microgravity science is at an immature stage due to the lack of fundamental processes involved in this area of space research. As more experimentation takes place, a data base of results will be acquired, and it will become possible to strategically plan the future microgravity research program."

Based on this assessment, the Committee recognizes the importance of flight opportunities for the microgravity research program and urges NASA to do everything possible to provide frequent flight opportunities. The scheduled Spacelab mission and Secondary Payload opportunities are ideal for microgravity research, as will be extended duration orbiter and Spacelab missions when they become available. Expendable launch vehicles with or without re-entry vehicles also provide research opportunities, as do drop tubes and aircraft. The Committee believes strongly that a well-designed research program must be implemented to ensure effective utilization of the space station and to gain an advantage on foreign competition for commercial markets.

(c) Communications--\$80,600,000

The Committee authorizes \$80,600,000 for Communications in FY 1990. This is \$62,000,000 more than the President's budget request. This increase is required to fulfill the Government's commitment to develop the ACTS.

Summary of FY 1990 funding levels

Advanced communications technology satellite (ACTS).....	\$62,000,000
Advanced communications research.....	12,700,000
Search and rescue.....	1,300,000
Radio science and support studies.....	3,100,000
Communications data analysis.....	1,500,000
Total.....	80,600,000

Advanced communications research continues to provide the development of subsystem component technology required by NASA, other government agencies, and U.S. industry for advanced communications satellite systems. Special emphasis is being given to technologies with high potential for improving spectrum utilization, satellite switching, and intersatellite link technologies, since these technologies are the key future growth of the communication satellite and terminal markets. The mobile communications technology program will complete development of critical enabling technologies needed to ensure growth of a commercial mobile satellite service in the United States.

The Search and Rescue program is an international cooperative program that demonstrates the use of satellite technology to detect and locate aircraft or vessels in distress. The United States, Canada, France, and the Soviet Union developed the system in which Norway, the United Kingdom, Bulgaria, Sweden, Denmark, Switzerland, Brazil, and India also participate.

Radio science and support studies provide the technical basis to support U.S. and specifically NASA interests in international and domestic communications regulatory forums. Propagation studies and measurements are performed in order to understand and account for the effects of propagation in the design and specification of space communications systems. Studies to enable new satellite applications are conducted.

Communications data analysis assists other Federal agencies and public sector organizations in the development of experimental satellite communications for emergency, disaster, and public service applications. The main areas of work will be preparation for future optical communications experiments and operation of the Applications Technology Satellite (ATS-3), launched in 1967.

Communications—Committee Comments

The ACTS program is critical to the future of the United States in the world communications market. At a time when the U.S. suffers from an adverse balance of trade and the Europeans and Japanese are mounting substantial threats to our share of the world communications market, ACTS allows the Government and private sector to cooperate to share the high costs and risks associated with the development of new technologies. The ACTS program is patterned on such a cooperative venture and represents a conscious effort on the part of the Congress to sustain the Nation's leadership in communications.

Accordingly, the Committee instructs NASA to proceed vigorously with the ACTS program in order to have the satellite ready for launch in 1992.

(d) Information Systems—\$34,100,000

The Committee authorizes \$34,100,000 for Information Systems in FY 1990. This is the same as the President's budget request.

Summary of FY 1990 funding levels

Data systems.....	\$18,400,000
Information systems.....	15,700,000
Total.....	34,100,000

The information systems program applies advanced computer and information systems technology to support the Office of Space Science and Applications (OSSA) science program. This includes data management, scientific computing, networking, and other science information needs. The program provides ongoing support to the OSSA research community through the NASA Space and Earth Sciences Computing Center (NSESCC) for supercomputing resources in support of modeling and simulation efforts, and the National Space Data Center (NSDC) for archival and distribution of data acquired from spaceflight experiments and observations.

The data systems element develops and applies advanced capabilities for managing, distributing, and analyzing data and information. This includes development of generic tools and capabilities to enhance the science productivity derived from data acquired from space flight observations and experiments.

The data systems element also incorporates the OSSA computer communications for science network activity. The computer communications for science network will extent scientists' access to space data and computational resources and simplify communications and collaboration among NASA's space science and applications communities. Through FY 1988, the NASA science networks were funded as part of the program support communications network. In FY 1989, the network is funded by OSSA science missions and disciplines. Beginning in FY 1990, computer communications for science network is an element of the data systems budget.

Included in information systems is a new emphasis on science data management and archival systems to provide the OSSA research community with a faster, more reliable system to assimilate, archive, and distribute data. With the return of the shuttle to operational status, a six-fold increase in data holdings is expected, resulting from missions like Cosmic Background Explorer, Roentgen Satellite, Gamma Ray Observatory, International Solar Terrestrial Program, the UARS, and Spacelab missions. OSSA researchers will benefit from automated retrieval of off-line data from large archives, implementation of a master directory for location of distributed data sets by researchers, catalog inter-operability for common searches across distributed data bases, delivery of data on advanced media as requested by users, and utilization of data exchange standards to facilitate automated assimilation of data by user applications. The augmentation will build on the information systems program to emphasize standards, to evolve a unified but distributed system for managing data and information, and to evaluate changing technology options in a system framework.

Information Systems—Committee Comments

The Committee continues to support these programs and believes strongly that NASA must focus increased attention on the issues of data management, data distribution, data archiving, and networking as NASA prepares to enter the information age. News stories with headlines like "What Becomes of Data Sent Back from Space? Not a Lot as a Rule." are very disconcerting to the Committee. There is a "Crush of New Data Knocking at the Door" as described in the "Renewable Resources Journal" article by Ralph Kahn and Henning Leidecker, and NASA must have an efficient and effective system in place to manage, utilize, distribute, and store this data.

The Committee expects NASA to provide the resources required to develop this complex data management system and to formulate a comprehensive strategic plan for this purpose with the other Federal agencies involved.

7. Mission to Planet Earth—Earth Observing System—\$24,200,000

The Committee authorizes \$24,200,000 for the Mission to Planet Earth EOS. This is the same as the President's FY 1990 budget request.

To manifest its strong commitment to the Mission to Planet Earth proposal, the Committee has established a separate line item for this program in the bill as reported and has instructed NASA to complete Phase B activities and initiate Phase C/D activities in FY 1990. This latter provision gives the project new start status.

Summary of FY 1990 funding level

Mission to Planet Earth—Earth Observing System	\$24,200,000
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Mission to Planet Earth consists of both space and ground elements. The space elements include a series of Earth observing platforms, both small and large, in various orbits about the Earth, and instruments attached to the SSF. The purpose of the space elements is to gather long-term, global data sets on the surface and atmosphere of the planet. The principal ground element is a data and information system within which one would gather, process, and archive the data arriving from the space elements. The information archived in the data and information system will be accessible by the entire world-wide scientific community. The information would consist of global maps of surface temperature, precipitation, soil moisture, cloudiness, radiation budget, and other such global data sets required to understand the state of the Earth and any trends for change—just as one now uses weather satellites to understand the state of the weather and trends for change.

The complete vision of Mission to Planet Earth also includes surface science stations underlying satellite ground tracks and various experiments using aircraft, balloons, and rockets underflying the satellites. These surface and suborbital platforms will provide *in-situ* calibration and validation of the remote sensing instruments on the satellites and will conduct process studies on how the Earth works as a system so that scientists will know how to construct predictive models of how the Earth works as a system. Many of these surface and suborbital operations would be conducted by agencies other than NASA, the National Oceanic and Atmospheric

Administration (NOAA), the National Science Foundation (NSF), the U.S. Geological Survey (USGS) and others who currently have roles in Earth research.

Mission to Planet Earth is designed to understand the Earth as a global system, to determine the processes that create global environmental balance, to identify the processes that lead to change in this balance, and ultimately to provide the capability to reliably predict global change. It is, therefore, a mission which responds directly to the needs of both researchers and policymakers on the issue of global change.

The NASA portion of the "Mission to Planet Earth" involves the use of the space observation platforms, data and information systems, Earth process studies, and global Earth system models required to understand the global environmental system and its changes. However, NASA's Mission to Planet Earth is part of the larger U.S. Global Change Research Program, which in turn contributes to an international scientific plan of global research organized by the International Council of Scientific Unions (ICSU) and called the International Geosphere Biosphere Program (IGBP). NASA has a crucial role in the U.S. Global Change Program, which is to provide the long-term, global observations from space and the associated data and information system that is absolutely essential for understanding the Earth, for detecting global change, and for validating a new generation of predictive global change models.

The problems associated with global change are clearly global in nature, and, while the method of choice for studying the problems is observations from space, NASA alone cannot do it. Remote sensing data from space requires complimentary ground-based studies for validation and for focused process studies, and these studies must be conducted in many places around the world. The cooperation of many countries will be required under the auspices of the IGBP. Fundamental studies of physical, chemical, and biological processes of all kinds are required. NSF leads many of these efforts. NOAA will provide important data on the immediate state and short-term behaviour of the global environment using operational weather satellite data. USGS and NSF can provide studies of the Earth's past climate from paleontological studies and from ice sheet cores. These paleoclimatic data are invaluable for testing the validity and robustness of modern global change models. The U.S. Federal agencies have come together under the auspices of the Committee on Earth Science (CES) to define a U.S. Global Change Program together with roles for each of the agencies.

There are many Government agencies and international scientific societies that must work together in the spirit of a Mission to Planet Earth in order to understand our planet and what we are doing to it. However, at the heart of all these efforts—essential to their success—is the global data set on the Earth and how it is changing. This global data set can only be provided from space by NASA and the other spacefaring nations of the world. Some 23 of the national space agencies of countries around the world have formed, under NASA leadership, the Space Agency Forum for the International Space Year (SAFISY) to coordinate International Space Year (ISY) activities with a major theme being Mission to

Planet Earth. It is a fitting theme for the ISY, which was first suggested by Congress and then proclaimed by President Reagan. NASA, which has the responsibility for the ISY in this country, has been encouraging the ISY to give particular emphasis to the study of the Earth—not only space observations but also complimentary ground-based studies by all nations of the world which have space activities. The ISY culminates in 1992 and will provide the lead-in to the era of the 1990's when the IGBP and major national programs in global change will begin.

NASA currently has a strong program in the Earth science that will build to a Mission to Planet Earth in the 1990's. The Earth Science and Applications Division in OSSA has an extensive research and analysis program which primarily funds the university community combined with a suborbital program of experiments using aircraft, balloons, and rockets to study a variety of Earth Processes. In addition to the suborbital platforms, NASA is developing a number of scientific instruments for flight on the space shuttle, SSF, and free-flying satellites. These instruments will conduct focused Earth studies in preparation for the space components of Mission to Planet Earth. Several older spacecraft are still collecting global Earth data including Nimbus-7 and the Earth Radiation Budget Satellite.

NASA currently has under construction three satellite projects which will provide important data on global change up until the time we can begin Mission to Planet Earth. The UARS scheduled for launch in 1991 will provide definitive measures of the chemistry and dynamics of the upper atmosphere and provide for a complete, global set of atmospheric data for the Earth's ozone layer. Topex/Poseidon is a going project with France to measure with great accuracy the height of the world's oceans, from which global ocean circulation can be inferred. It is scheduled for launch in 1992. The results from this mission have a strong relationship to those of the NASA Scatterometer, which has been selected preliminarily for flight on the Japanese ADEOS satellite in 1995, and which will measure wind stress on the ocean surface for determination of ocean currents. These projects address the coupling between the oceans and the atmosphere, which is key to understanding how the two principal systems of the Earth's climate operate together.

Each of these missions attacks a focused problem important to understanding our global environment. They do not, however, deal with the Earth as an integrated system. We need to observe the component parts of the Earth simultaneously to achieve an integrated understanding of how the atmosphere, ocean, ice, and biosphere interact and operate as a system. These are the objectives of Mission to Planet Earth.

Global changes in the atmosphere and on the surface of the Earth have already been observed, and the impact of these changes in uncertain. We now have the ability to observe the Earth from space as a system, and we have the technology and scientific expertise to tackle Earth system science. There is a world-wide awareness of the problem of global change, and international and inter-agency cooperation is growing. There is a growing public awareness of changes in the global environment that demand attention, which

creates the opportunity to demonstrate U.S. leadership in an area where citizen of the world will ultimately benefit.

Mission to Planet Earth consists of four major types of space components:

1. Earth Observing System/Polar Platforms (EOS),
2. Space Station Attached Payloads,
3. Earth Probes, and
4. Geostationary Platforms.

However, the central component of Mission to Planet Earth is the Earth Observing System Data and Information System (EOSDIS). This system provides for central receiving, processing, and archiving of the data from the space elements of Mission to Planet Earth. Its initial implementation will be completed for EOS, the first space element. There are two competitive Phase B studies funded for the design of the EOSDIS.

The information resident in the EOSDIS will be used by scientists all over the world to conduct research on Earth system science and global change. Global-scale Earth system models will be constructed, the descendants of today's global change models, and will be tested against the long-term, global data sets in the EOSDIS. These models will incorporate information on Earth system processes that result from Mission to Planet Earth research and analysis programs. The ultimate product of Mission to Planet Earth will be validated global, interactive Earth system models with the ability to predict future global change to an accuracy sufficient for future policymakers.

Mission to Planet Earth will be the largest scientific undertaking in the history of NASA. Due to the global nature of the problem this mission addresses and the interest of most of the world in the goals of the mission, Mission to Planet Earth will involve cooperation and cost-sharing by most of the major spacefaring nations of the world under the leadership of the United States. Even so, the cost to this country for the full complement of this mission during the peak years in the late 1990's could be more than \$2,000,000,000 per year. This is five times the present amount spent on Earth science programs in NASA. These costs are large enough to require strong leadership and commitment to the issue of global change. The benefits, however, are many:

1. a critical investment in preserving the global environment and in providing the information required to cope with the potential for future global change;
2. utilization of the U.S. investment in space research for a purpose which everyone can see and appreciate and for providing direct benefit to the citizens of the United States;
3. an international effort in space demonstrating U.S. leadership and with the potential to motivate additional commitments to this effort by both our economic summit partners and the Soviet Union;
4. demonstration of U.S. commitment to investment in a better global future with benefits which accrue to everyone, in particular the next generation; and
5. an idea which stirs popular ideals, continuing the inspirational tradition of space activities.

Mission to Planet Earth--Earth Observing--Committee Comments

For nearly 20 years, since the first American left his footprints in the dust of the moon, this Nation has been in search of major goals for its civil space program. Many goals have been proposed, but the mission to Planet Earth has succeeded in capturing the imagination of the American people, the world community, and the Congress.

Maybe that is because of the renewed worldwide interest in global change and our fragile planet Earth, or maybe it is because of our basic desire to know more about ourselves and the planet we inhabit. Whatever the reason, the concept of a Mission to Planet Earth has been recognized by the Committee as a goal worthy of pursuit and as a priority within the civil space program's agenda.

In light of growing world interest in global change issues, a comprehensive, international study aimed at understanding our planet and the changes which are taking place should be a high priority in the FY 1990 NASA Authorization Bill. The guiding principle behind the Mission to Planet Earth initiative endorsed by the Committee is an integrated approach to observing our planet and how its various components function, interact, and will evolve over time. Eventually, the Committee assumes that such an approach should give us the capability to predict changes that might occur—either naturally or as the result of human activity.

The proposed integrated system endorsed by the Committee would establish and maintain a global observation system in space consisting of free-flying platforms in polar, low inclination, and geostationary orbits that are coordinated with ground-based measurements. The data from all of these observations would be integrated by a versatile, state-of-the-art information management system—an essential element of the data analysis and numerical modeling capabilities of the proposed system.

Developed independently from other global change research proposals, Mission to Planet Earth shares many of the same research elements and objectives. The proposed integrated system would measure the full complement of the planet's characteristics, including: global cloud cover, vegetation cover, and ice cover; global rainfall and moisture; ocean chlorophyll content and ocean topography; motions and deformations of Earth's tectonic plates; and atmospheric concentration of gases such as carbon dioxide, methane, and ozone. As such, this system would be a principal component of an international, interdisciplinary global change research program.

Because of the complexity of this system and the requirement for a broad range of scientific activities, the Mission to Planet Earth will require the support and involvement of several U.S. Government agencies--NASA, NOAA, DOD, Office of Science and Technology Policy (OSTP) within the White House, and USGS—as well as our international partners. The roles and responsibilities of these Federal agencies in such a program have been examined in detail by CES of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET). FCCSET recently released a detailed Global Change Research Plan.

To ensure that the measurements of the proposed system are globally complete, simultaneous, and continuous, significant inter-

national participation and cooperation will be required. International participation is needed to support space observing systems and to deploy and operate in situ measuring devices. Site selection, standardization of equipment, data rates and formats, and data exchange protocols are examples of the issues that must be resolved to ensure the success of Mission to Planet Earth.

An excellent record of international cooperation in large-scale earth sciences projects has already been established. Examples include the International Geophysical Year of 1957, the Geodynamics Program, the Global Atmospheric Research Program, the International Lithosphere Project, the Ocean Drilling Programs, the World Climate Research Program, and the Man and the Biosphere Program. In addition, the member nations of the IGBP, which is aimed at an understanding of global change, are making steady progress and should be ready for implementation of a comprehensive research program in the early 1990's.

Finally, the U.S. ISY Association has made the Mission to Planet Earth a major theme of the ISY which is scheduled for 1992. Senior space officials from 23 nations are now working with the U.S. ISY Association to encourage Mission to Planet Earth activities.

At present, there is not a precise cost estimate of the Mission to Planet Earth. This lack of specificity stems from the fact that the program has not been formally defined, nor has the potential for international participation and financial contributions been thoroughly assessed.

However, the Committee believes strongly that the Mission to Planet Earth can be designed to cost. The Committee instructs NASA to submit a cost estimate for its portion of the Mission to Planet Earth program in conjunction with the FY 1991 Budget Submission.

In the reported bill, the Committee has endorsed the first two elements of a comprehensive Mission to Planet Earth—the EOS, or the space station polar platforms, and the Earth Probes program—and has given both programs "new start" status. The Committee realizes that the scope of the EOS system has not been fully defined as of yet. The Committee, therefore, recommends that NASA properly balance the science and hardware elements of the EOS program in the Phase B definition period. The primary goal of the EOS program is the long-term acquisition of the scientific data related to global environment. To the extent the EOS program pushes technology development, the Committee would recommend that the focus the data management, information systems, and instrumentation. In this regard, the Committee notes with interest the recent decision by the ESA, concerning their proposed space station polar platform, to proceed with a smaller, less complex system.

The Committee is concerned that the broad base of support for the Mission to Planet Earth could be misinterpreted by some parties to be a blank check. The Committee expects NASA to understand that cost containment will be a critical element of this program and that NASA's ability to manage to cost will be a critical factor in determining the scope of this program and the number of platforms included in the final configuration.

The Committee also notes that NASA is but one player in a comprehensive Mission to Planet Earth. NOAA, NSF, USGS, and DOD also will play critical roles in a fully integrated system as will our international partners—developed and developing nations. Although NASA's space-based assets are a critical element of the program, the Committee realizes that the requirements of the other players also must be addressed. Effective and efficient utilization of the data generated by this program will require a well-designed supercomputer network and a cadre of skilled and dedicated scientists, engineers, climate modelers, and technicians. The goal of the program is not to collect data but to be able to interpret data and to predict changes that might occur either naturally or as the result of human activity. The Committee, therefore, is very supportive of making the assembly of professional talent a key element of the R&D program.

8. Commercial Programs—\$61,000,000

The Committee authorizes \$61,000,000 for Commercial Programs in FY 1990. This is the same as the President's budget request.

Summary of FY 1990 funding levels

Technology utilization.....	\$22,700,000
Commercial use of space.....	38,300,000
Total.....	61,000,000

The Technology Utilization program promotes the transfer of technology developed in NASA's R&D programs to the public and private sectors of the U.S. economy. A network of Industrial Applications Centers, Technology Counselors, and NASA Installation Technology Utilization Officers form the core of the Agency's technology transfer efforts. Technologies developed for the Nation's aerospace program are reused or reengineered to provide new products and processes in the areas of transportation, energy, medicine, public safety, and consumer goods. The goals of the program are to broaden and accelerate the technology transfer process, to realize additional dividends on the national investment in aerospace research, and to ensure that the United States maintains its competitive position in the international marketplace.

NASA's goal of expanding opportunities for U.S. private sector investment and involvement in civil space and space-related activities is pursued through a variety of interrelated programs. Through cooperative agreements such as Joint Endeavor Agreements (JEAs) and through support to the Centers for the Commercial Development of Space (CCDS), NASA will increase the amount of space-related research conducted by the private sector, the number and type of NASA and private sector facilities available for space use, and the private sector awareness of the opportunity to use NASA's terrestrial and space-based facilities for commercial research.

Resources will be made available to obtain flight support experimentation hardware required by industrial researchers. This may include across-the-bay carriers, such as Materials Science Laboratories, as well as middeck augmentation racks of derivatives thereof, and the possible leasing of private sector hardware developed to ex-

plot commercial research and development in space. The use of ground-based research facilities, aircraft, and sounding rockets for commercial experimentation will be given emphasis in order to provide limited access to the microgravity environment for appropriate commercial experiments.

In order to maintain momentum in commercial use of space activities and to encourage an increase in private sector investment in space, NASA will continue to develop methods to facilitate private sector agreements and commitments to develop commercial opportunities in space. The development of agreements for the use of the shuttle external tanks and private sector use of U.S. launch facilities reflect this effort. The use of Space System Development Agreements (SSDAs) will continue.

Commercial Programs—Committee Comments

The Committee strongly endorses NASA's initiatives to formulate JEAs, memoranda of understanding and agreement, and modified launch services agreements to stimulate interest in space commercialization in the private sector and university community. The Committee also believes that the Congress and Administration should work together to foster the conditions necessary to facilitate implementation of these innovative programs.

Despite expressions of support from many corners concerning space commercialization, there are still many obstacles to the commercialization of space, including economic, regulatory, institutional, and insurance barriers, not to mention stiff foreign competition. During the course of the next year, the Committee intends to work closely with the various parties to try to establish conditions conducive to eliminating these barriers.

Last year, the Committee worked closely with the expendable launch vehicle (ELV) industry to establish an indemnification regime that would put domestic ELV operators on an equal footing with their foreign competition. The Committee is continuing to work with the ELV industry, NASA, DOT, and the Air Force to formulate a model launch service agreement and request for proposal for government procurement of launch services. The Committee also intends to work with firms and university consortia that have memoranda of understanding, memoranda of agreement, and JEAs to reduce barriers that impede implementation of their projects.

The Committee is pleased about the response to the NASA Commerce Business Daily announcement concerning the use of jettisoned external tanks and the progress NASA is making in negotiating memoranda of understanding as a result of this announcement. NASA already has one such agreement with a university consortium, the University Corporation for Atmospheric Research, for suborbital applications and is negotiating three additional memoranda of understanding for orbital use of the external tank. The use of this existing space hardware presents some interesting opportunities for government, university, and private sector applications.

The Committee also is pleased to see the detailed set of findings and recommendations formulated by the NASA Commercial Pro-

grams Advisory Committee. The Committee intends to review closely these recommendations and where necessary to consider legislation.

The Committee continues to support NASA's efforts in this area and strongly supports the CCDS. NASA's efforts to get flight opportunities for the CCDSs using commercial launch operators and streamlined regulatory processes are laudable. The Committee hopes NASA continues to pursue these initiatives and that NASA will avail itself of Spacelab to help provide flight opportunities for the CCDSs and JEAs. As noted in other sections of this report, every effort must be made to increase flight opportunities for basic and applied research and commercial applications.

9. Aeronautical Research and Technology—\$462,800,000

The Committee authorizes \$462,800,000 for Aeronautical Research and Technology in FY 1990. This is the same as the President's budget request. However, the Committee has instructed NASA to initiate a \$10,000,000 High Performance Computing Initiative in the FY 1990 budget and to absorb the cost of this program. The Committee has also endorsed the President's request for \$25,000,000 to initiate technology efforts related to the development of an environmentally and economically sound high speed commercial transport.

Summary of FY 1990 funding levels

Research and technology base	\$335,700,000
Systems technology programs	127,100,000
Total	\$462,800,000

¹ Within this amount, NASA must absorb the cost of the High Performance Computing Initiative (\$10,000,000).

The goal of the NASA aeronautics program is to conduct research and develop technology to strengthen U.S. leadership in civil and military aviation. This goal is supported by five comprehensive program objectives: (1) to emphasize emerging technologies with potential for major advances in capacity and performance; (2) to maintain NASA's laboratory strength by repairing and modernizing critical aging national facilities, providing advanced scientific computational capabilities and enhancing staff technical excellence; (3) to ensure timely transfer of research results to the U.S. aeronautics community through reports, conferences, workshops, and cooperative research programs with industry; (4) to ensure strong university involvement to broaden the Nation's base of technical expertise and innovation; and (5) to provide technical expertise and facility support to DOD, other government agencies, and U.S. industry for major aeronautical programs. The program is based on a strong commitment to revitalize American competitiveness in the world aviation marketplace, enhance the safety and capacity of the national airspace system, and assure U.S. superiority for national security.

In order to continue to meet the international challenge in aeronautics, the aeronautical research and technology program needs to address critical barriers and strengthen generic technology development in selected high payoff areas that are vital to our long-

term leadership in aviation. NASA's FY 1990 aeronautics program is focused on achieving the objectives established in the report, "National Aeronautical R&D Goals: Technology for America's Future," by OSTP, and in its sequel report, "Agenda for Achievement."

There are many important elements of the research and technology base and systems technology programs. Fluid and thermal physics research will continue to focus on developing faster and more efficient algorithms for numerical simulation of aerothermodynamic phenomena. In applied aerodynamics, the augmented research program in FY 1990 will emphasize improved fundamental understanding of stationary and rotating turbomachinery flowfields through development of advanced computational analysis methods and their applications at the component and subsystem level. Materials and structures research will continue to develop advanced materials and innovative structural concepts aimed at reducing aircraft weight and cost. Research in information sciences will continue to investigate concurrent processing architectures and algorithms for application to increasingly complex aerospace computational problems and will emphasize advanced software engineering for complex, highly reliable applications. Controls and guidance research will continue to provide a technology foundation in advanced systems for application to future aerospace vehicles, with emphasis on guidance and control for highly agile aircraft. Human factors research will continue development of methodologies required for safe and effective crew/cockpit interfaces with particular emphasis on highly automated aircraft operating in the future national airspace system. Flight systems research will be augmented to increase emphasis on high angle-of-attack technologies through simulation, wind tunnel tests, and flight evaluation.

Systems analysis studies will continue to focus on defining the research and technology needs for advanced high speed transport aircraft, high speed rotorcraft, and supersonic short takeoff and vertical landing fighter aircraft. In materials and structures systems technology, advanced composite materials research will continue in high-temperature materials while expanding its focus on application of composites to primary aircraft structures. Rotorcraft systems technology research will continue the FY 1989 effort in noise prediction, code validation, and envelope expansion of the XV-15 tiltrotor with advanced technology blades. In high performance aircraft systems technology, flight system research will start a new focus on high speed flight, addressing environmental issues such as ozone depletion, airport noise, and sonic boom. Advanced propulsion systems technology will focus primarily on high speed turboprops with specific emphasis on improved understanding, modeling, and code validation of flowfields, structural response, noise characteristics, and installation effects. The numerical aerodynamic simulation capability will be enhanced with the acquisition of the third high speed processor.

Aeronautical Research and Technology—Committee Comments

During the 101st Congress, the Committee has been exploring a variety of ways to stimulate technology development activities in

Federal civil agencies, in particular activities that will permit the United States to maintain a competitive advantage in the world's high technology marketplace. The Committee believes that the High Performance Computing Initiative, which will advance the development of the next generation of computers, is one of the technologies essential to progress in science and engineering, to the national security and industrial productivity of the United States, and to the future competitiveness of the aerospace industry.

The Committee is concerned that the lead in high performance computing the United States has enjoyed is being challenged from abroad. The Committee believes that needed progress in computing can be accelerated through an increased emphasis on the pioneering of multidisciplinary applications, systems software, peripheral systems, networks, high speed architecture technologies, and the effective commercialization of these technologies, and that an initiative incorporating these elements is required. The basic elements of such a program were outlined in the OSTP report entitled "A Research and Development Strategy for High Performance Computing," published on November 20, 1987, which serves as the basis for the Committee's High Performance Computing Initiative.

Semiconductor technology will now permit a new generation of large-scale parallel architectures. The challenge is to stimulate high performance computer technology so that commercial systems can be developed which will permit NASA to meet its grand challenges in a timely and competitive manner and that will permit the United States to maintain its leadership posture. Current semiconductor technology and the speed of light limit single-processor supercomputers to approximately one billion floating point operations per second (1 gigaFLOPS). The objective of the Committee's initiative is to achieve a thousand-fold increase in performance. The timing of this initiative is such that the proposed NASA program can build on recent advances in parallel and distributed processing which have demonstrated the potential for advancing computational capabilities by orders of magnitude. In order to exploit massive parallelism, many separate, yet interconnected processors must be effectively coordinated to work concurrently on a single problem. Innovations in computing systems (hardware and software) are required as well as advances in applications and algorithms. The Committee's initiative is intended to address both hardware and software challenges to achieve fully operational parallel and distributed systems that deliver high performance and provide programming and operating environments that allow scientific and engineering users to work effectively. As importantly, the Committee's initiative is meant to stimulate government/industry research activities that will enhance the competitiveness of the United States in the world marketplace.

The Committee expects NASA to formulate an implementation plan for the High Performance Computing Initiative and to submit this plan to the Committee by October 1, 1989.

Overall, the Committee continues to support strongly the NASA aeronautical research and technology program and sees this program as a critical element of the success of the U.S. aerospace industry in the world marketplace. The Committee is pleased, therefore, in light of the language contained in the Committee's FY 1989

NASA authorization report, to see a high speed commercial transport initiative in the FY 1990 budget request. The Committee strongly endorses this initiative. The Committee realizes the potential market for long-range trans-Pacific aircraft—cargo and passenger aircraft—is significant and will profoundly impact the airline and aircraft industry in the next century.

Although the "economics viability" of any new high speed commercial aircraft will be a significant factor in assessing marketability, the Committee also realizes that "environmental acceptability" will be a significant factor. The Committee, therefore, supports the high speed commercial transport research and technology program's focus on key environmental concerns—sonic boom, airport noise, and ozone depletion—and NASA's creation of a High Speed Civil Transport Atmospheric Advisory Committee to assess the key environmental issues. NASA has properly identified environmental concerns as a high priority and as a focal point of a successful engineering and research program.

10. Transatmospheric Research and Technology—\$127,000,000

The Committee authorizes \$127,000,000 for Transatmospheric Research and Technology in FY 1990. This is the same as the President's budget request and manifests the Committee's strong support of the NASP program.

Summary of FY 1990 funding levels

Transatmospheric research and technology	\$127,000,000
Total	127,000,000

The NASP program is a joint effort between NASA and DOD to accelerate the development of critical enabling technologies for a revolutionary class of hypersonic-transatmospheric vehicles. Such vehicles could be capable of taking off from and landing on conventional runways, using airbreathing propulsion up to, or near, orbital speed, and providing rapid and lower cost access to space. The program will accelerate the development and validation of key technologies through application of analytical prediction methods coupled with testing in ground-based facilities. The critical technologies being pursued in the current phase of the program include efficient airbreathing propulsion systems, with emphasis on scramjet performance that provides the necessary thrust from takeoff to near orbital speeds; reusable thermal structures that can withstand repeated combinations of extreme peak heating and significant long duration heat loads; and complete integration of the propulsion system with the airframe for a minimum weight system with good performance throughout a broad range of accelerating, cruising, and maneuvering flight conditions. A necessary precursor or to the development and flight validation of an experimental vehicle (X-30), these technologies will form the critical data base required for design and integration of complex propulsion and structural systems into a vehicle configuration capable of transatmospheric flight.

The FY 1990 NASP activities are expected to emphasize extensive detailed design, component fabrication, and tests by the engine and airframe contractors, as well as continued refinement of the

supporting technology maturation effort in preparation for the decision on whether to proceed with development of the X-30 research vehicle. The technology maturation activities will concentrate on four key objectives: (a) an airbreathing propulsion system with high specific impulse; (b) vehicle structural weight improvement with reusability and durability over a wide temperature range; (c) integrated systems and subsystems in aeropropulsion, thermal management controls, and others; and (d) sound design and analysis tools based on advanced computational methods fully verified by test.

Transatmospheric Research and Technology—Committee Comments

In authorizing the full \$127,000,000 requested by the President for Transatmospheric Research and Technology in FY 1990, the Committee underscores its strong support of the NASP program. While the focus of the program is restricted to the development of the supporting technologies and the subsequent design and construction of an experimental plane with which to test those technologies, the potential NASP spinoffs cannot be ignored. NASP may well lead to commercial transports capable of reaching virtually any destination in the world in several hours or less. NASP also may eventually emerge as a less expensive and more efficient substitute or alternative to the space shuttle and ELVs as a means for placing payloads in space. Equally promising are the military applications.

Because of the importance of NASP to the U.S. economy and the future of aeronautics, the Committee was very concerned when the President's original budget request was amended by the Secretary of Defense and the proposed funding for NASP of \$300,000,000 in the FY 1990 DOD budget was deleted. The Committee was pleased that the Administration showed its commitment to NASP by directing the National Space Council to reassess the DOD proposal and to assess the proper scope and timetable for the program and the appropriate division of responsibilities between NASA and DOD.

Based on that review, the Space Council strongly recommended to the President that the NASP program be continued and urged a funding scheme whereby NAS and DOD would each contribute \$127,000,000 in FY 1990 to the program. Because the proposed \$254,000,000 funding level is still less than optimal and significantly below the original NASA/DOD FY 1990 request of \$427,000,000, NASP, under the Space Council plan, would be restricted to a technology-oriented project and the time frame for the decision on whether to build an X-30 experimental aircraft would be moved down from September 1990 to March 1992. Nevertheless, even this scaled from and stretched out version of NASP is certain to produce numerous significant breakthroughs for the United States in the field of aeronautics. For that reason, the Committee is pleased to authorize the full \$127,000,000 requested by the President to fulfill NASA's duties under the program.

In light of the National Space Council's decision to reduce the level of effort of the technology program and to stretch out the program schedule, the Committee directs NASA to submit a revised

management plan for NASP including the goals, objectives, milestones, and proposed budgets for the program. This plan is to be submitted to the Committee within 60 days of the date of enactment of this bill. The FY 1990 authorization of appropriations for NASP is contingent upon submission of this plan.

11. Space Research and Technology—\$325,100,000

The Committee authorizes \$325,100,000 for Space Research and Technology in FY 1990. This is \$13,000,000 less than the President's budget request.

Summary of FY 1990 funding levels

Research and technology base.....	\$130,100,000
Civil space technology initiative (CSTI) program	144,500,000
Pathfinder program.....	40,300,000
In-space experiments technology program	10,200,000
Total.....	325,100,000

The overall goal of the space research and technology program is to provide advanced, enabling technologies, validated at a level suitable for user readiness, for future space missions in order to ensure continued U.S. leadership in space to meet national needs. To achieve the goal, a commitment is required to provide a broad base of advanced technology for vehicle and subsystem concepts, components, devices, and software; to develop technology strengths in the engineering disciplines within NASA, industry, and academia; and to perform critical technology demonstrations that facilitate the transfer of new technology with a high level of confidence to future space missions.

The space research and technology program consists of two basic program areas, the research and technology base and focused programs. The objective of the research and technology base program is to gain a fuller knowledge and understanding of the fundamental aspects of phenomena and observables in critical disciplines. Within the research and technology base program, high-leverage technological advances and concepts are brought to the level of demonstrating proof of principle. The base program is the seedbed for generating the more highly mission-focused technology program.

Focused programs, designed and implemented based on requirements provided by the potential users of the technology, develop technology for specific applications and deliver products in the form of proven hardware, software, and design techniques and data. Two focused programs are currently under way, the Civil Space Technology Initiative (CSTI) and Pathfinder. The CSTI program is a positive first step to strengthen the agency's technical base and provide options for future low Earth orbit high priority civil space goals. CSTI is developing technologies to enable efficient, reliable access to Earth orbit; enhance operations in low Earth orbit; and increase the effectiveness of science missions from low Earth orbit. The Pathfinder program, an element of the new national space policy, is developing critical capabilities to enable potential future missions, both human and robotic, to expand human presence and activities beyond Earth's orbit into the solar system. It will push U.S. technology forward through a strong part-

nership between NASA, industry, and universities. Proof-of-concept testing for mission-critical engineering designs will be an important product of the CSTI and Pathfinder programs and will directly support the continuing evolution and maturation of mission plans.

The In-Space Experiments Technology program is an important new program designed to provide validated, advanced space technologies to the designers for improving the effectiveness and efficiency of current space systems and to provide major advancements for future systems. Previous efforts over the past few years have identified advanced, highly innovative technology concepts that require testing or validation in the actual space environment in order to reduce the risk to the potential users, to increase the rate of transfer of advanced technologies into future space missions, and to begin to prepare for conducting technology experiments using SSF.

Space Research and Technology—Committee Comments

In FY 1990, the Committee has reduced the budget request for the Pathfinder program by \$7,000,000 to \$40,300,000, the FY 1989 level of funding. The Committee assumes that all elements of the Pathfinder Program will be frozen at the FY 1989 level, including the SP-100 program.

In January, the Committee received from NASA a report that outlined a variety of human exploration, unmanned exploration, and Earth-oriented applications for nuclear powered reactors—"NASA's Need for Advanced Nuclear Powered Reactors." Pursuant to that report, it is clear that Phase II of this technology program is to extend from 1988 to 1994 and is to include the engineering development and ground testing of major subsystems for space reactor power systems. The Committee supports these ground-based activities and reserves judgment on Phase III of the program—space-based testing—until a later date and a more thorough assessment of the requirements for space-based reactors.

The Committee understands that the Memorandum of Understanding between NASA, the Department of Energy (DOE), and DOD for the SP-100 Program is being renegotiated and updated. The Committee expects to be provided a copy of this agreement as soon as it is completed.

In the FY 1990 authorization bill, the Committee has supported NASA's new initiative for the In-Space Experiments Technology Initiative. However, due to budget pressures, the Committee has reduced this new initiative by \$6,000,000 in FY 1990, to \$10,200,000.

The Committee continues to support space research and technology and sees them as vital to implementation of the proposed civil space program.

12. Safety, Reliability, Maintainability and Quality Assurance—\$23,300,000

The Committee authorizes \$23,300,000 for Safety, Reliability, Maintainability, and Quality Assurance. This is the same as the President's budget request and manifests the Committee's support of this critical element of NASA.

Summary of FY 1990 funding levels

Safety, reliability, maintainability, and quality assurance	\$23,300,000
Total	23,300,000

The Safety, Reliability, Maintainability, and Quality Assurance (SRM&QA) program supports NASA's overall goals through activities in safety, reliability, quality assurance, maintainability, systems engineering, and program practices. It includes independent assessment activities which reduce program risk.

The SRM&QA program will continue to provide leadership to all operational, programmatic, and institutional activities of NASA. The key ingredient of this leadership is the continued integration of top level SRM&QA policies, procedures, and standards into each NASA program area. In the past year, key reliability requirements have been revised and expanded and deficiencies identified. Preferred techniques for implementing these new requirements will now be developed, and additional research will be initiated to develop the technology to eliminate the deficiencies. These techniques will ensure that the most current and effective methods in reliability engineering will be applied to all NASA programs, thus optimizing reliability, reducing risk, and enhancing mission effectiveness. The non-destructive evaluation (NDE) measurement assurance program will continue to provide state-of-the-art, quantitative, advanced inspection techniques for solid rocket motors, composites, and ceramics. The program will also explore advanced inspection techniques such as microfocus x-ray, fiber optics, acoustic emission, computer tomography, and laser thermography. The Systems Assessment program will continue to provide independent "second look" assessments of major Space Transportation System flight hardware issues.

Safety, Reliability, Maintainability, and Quality Assurance—Committee Comments

This authorization reflects the commitment of the Committee to this element of the NASA program and to the reestablishment of safety, reliability, maintainability and quality assurance as the hallmarks of NASA.

It has been nearly three years since the Office of Safety, Reliability, Maintainability, and Quality Assurance was established in the aftermath of the Challenger accident. While the Committee has been in contact with this Office, it has never asked it to issue a status report on NASA's efforts to reestablish safety and quality as the hallmarks of NASA. The Committee, therefore, requests the Associate Administrator of the Office of Safety, Reliability, Maintainability, and Quality Assurance to issue such a status report to the Committee by November 1, 1989.

13. Tracking and Data Advanced Systems—\$19,900,000

The Committee authorizes \$19,900,000 for Tracking and Data Advanced Systems in FY 1990. This is the same as the President's budget request.

Summary of FY 1990 funding levels

Tracking and data advanced systems	\$19,900,000
Total	19,900,000

The Advanced Systems program is designed to study and develop new higher performance tracking and data handling capabilities which will address planned future mission requirements and will provide improved cost effectiveness and reliability for overall support of the total mission mix. Advanced Systems programs continue to focus on assessing and employing technological advances in telecommunications, electronic microcentricity, and computer sciences. Such effort is essential for the cost-effective application of new technology and for planning future mission support capabilities. Ongoing work includes the investigation of the total data transfer and processing needs of upcoming missions and studies of ground systems and telecommunications links to determine design approaches and overall tradeoffs for the lowest life cycle costs to support future space missions.

Future high-rate image data storage and processing requirements for Earth-orbital missions such as the Mission to Planet Earth's EOS are expected to increase from a current peak use of 85 megabits per second to 300 megabits per second in the Space Station era. These requirements result from high-resolution sensors, such as multispectral scanners and synthetic aperture radars, which will be transmitting more data than previous instruments. New techniques and systems will be studied and developed for the storage, processing, and transmission of these high data rates. These studies and developments include new techniques for signal coding and decoding, optical disk buffering and storage, automated distribution and processing of high volume data, improved man-machine interfaces, high speed modulators/demodulators, and a communications network using an optimal mix of fiber optics, satellites, and local area networks to distribute data to processing centers and users.

Investigations will continue on developing more efficient mission operations control center facilities and providing for the necessary real time interaction between the ground-based experimenters and their spaceborne experiments. Other investigations are being carried out in the area of expert system applications, greater use of distributed command terminals, and the performance of orbit and attitude computations onboard the spacecraft.

Tracking and Data Advanced Systems—Committee Comments

As noted previously in the discussion of information systems, projects such as the Space Station and the Mission to Planet Earth will dramatically increase the data processing, storage, networking, and dissemination requirements of NASA and other Federal agencies. Efforts to address these requirements and to develop the required technologies to assist in the effective utilization of this newfound wealth of data are critical elements of these programs and should be high NASA priorities. The Committee, therefore, strongly supports the Tracking and Data Advanced Systems program.

14. University Space Science and Technology Academic Programs—\$35,000,000

The Committee authorizes \$35,000,000 for the University Space Science and Technology Academic Programs in FY 1990. This is the same as the President's budget request and reflects the Committee's strong support of these academic programs.

Summary of FY 1990 funding levels

University affairs	\$15,900,000
Minority university research	14,100,000
Space grant college and fellowship	5,000,000
Total	35,000,000

The University Affairs programs and the Minority University Research program together are proposed as a new budget line item this year in order to focus and enhance the resources and management devoted to university programs. FY 1990 funding will provide for continuation of agency-wide university and minority university programs which were previously budgeted in other NASA programs. As mandated in NASA's FY 1988 Authorization Act, funding is also provided for the National Space Grant College and Fellowship Program.

The goal of the NASA University Affairs program is to create and maintain strong and mutually productive working relationships with the Nation's university community. In order to accomplish this goal, the Office of External Relations and OSSA manage certain unique university programs that are agency-wide in scope and interest but are not within the direct responsibility of NASA program offices.

The specific objectives of the University Affairs program are:

- (1) To significantly increase the number of highly trained scientists and engineers in aeronautics, space science, space applications, and space technology to meet the continuing needs of the national aerospace effort;
- (2) To facilitate the direct interaction, further the professional knowledge, and stimulate the exchange of ideas between university faculty members and NASA scientists and engineers;
- (3) To support innovative research at U.S. institutions of higher learning, research which is in the formulative or embryonic stage and which would appear to have significant potential to advance space science and applications programs; and
- (4) To provide for the development and use of a core, long-term U.S. national university capability to conduct multiyear, Earth science discipline oriented applied research and remote sensing.

The goals of the NASA Minority University Research program are to continue to implement aggressively the initiative for Historically Black Colleges and Universities (HBCUs); develop closer relationships with minority universities other than HBCUs; maintain the Graduate Student Research program with an (underrepresented minority focus); and introduce an Undergraduate Researchers program with an (underrepresented minority focus). The Office of

Equal Opportunity Programs has the responsibility for the management of these programs.

NASA's HBCU initiative is mandated by Executive Order 12320 (issued September 1981) which requires Federal agencies to increase significantly the involvement of HBCUs in federally sponsored programs. NASA has implemented this initiative primarily through research and training grants. In FY 1990, NASA is proposing the establishment of HBCU Space Science and Engineering Centers of Excellence (SSECE) in order to be further responsive to the spirit of Executive Order 12320 and to help strengthen the research capabilities of selected HBCUs.

*University Space Science and Technology Academic Programs—
Committee Comments*

The Committee is pleased to see a new line item in the FY 1990 NASA budget request for these academic programs and is hopeful that this visibility will enhance the base of support for these activities.

During the course of the last year, the Committee has worked closely with NASA to initiate the National Space Grant College and Fellowship Program. The Committee notes with interest that NASA has provided \$900,000 in FY 1989 to initiate this program and that proposals for Space Grant Colleges/Consortia were submitted to NASA on or before June 30, 1989.

The Committee strongly endorses the National Space Grant College and Fellowship Program and the other NASA academic programs and notes the professional manner in which the NASA Office of Educational Affairs initiated the National Space Grant College and Fellowship Program. The Committee believes these programs are sound investments in the civil space program and in our Nation's youth. The Committee is encouraged by the progress NASA has made in this area during the last year and hopes to see these initiatives enhanced and expanded.

**B. SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS—
\$5,104,600,000**

The Committee authorizes \$5,104,600,000 for Space Flight, Control and Data Communications activities in FY 1990. This is \$35,000,000 less than the President's budget request. This reduction reflects a general reduction of \$25,000,000 to the Space Tracking and Data Acquisition program and a general reduction of \$10,000,000 to the Space Flight, Control and Data Communications account. These reductions are to be applied at the discretion of NASA, and the general reduction of \$10,000,000 will affect the Committee's proposed funding for NASA's Space Flight, Control and Data Communications activities in FY 1990.

The objective of the NASA program of space flight, control and data communications is to provide for the operational activities of the Space Transportation System and tracking and communication system support to all NASA flight projects. The objective is achieved through the following elements:

Shuttle production and operational capability.—A program to provide a fully capable fleet of space shuttle orbiters, main engines, launch site and mission operations control requirements, spares inventory, production tooling, and related supporting activities.

Space transportation operations.—A program to provide the standard operational support services for the space shuttle and the ELVs. Within shuttle operations, external tank and solid rocket booster flight hardware is produced; operational spare hardware is provisioned, overhauled and repaired; and manpower, propellants, and other materials are furnished to conduct both flight and ground (launch and landing) operations.

Space and ground network, communications and data systems.—A program to provide vital tracking, telemetry, command, and data acquisition support to meet the requirements of all NASA flight projects using ground-based and satellite (Tracking and Data Relay Satellite System) components.

**1. Space Shuttle Production and Operational Capability—
\$1,305,300,000**

The Committee authorizes \$1,305,300,000 for Space Shuttle Production and Operational Capability in FY 1990. This is the same as the President's budget request and reflects the Committee's strong desire to maintain the safety and reliability of the Nation's space transportation system. Of this level of funding (1) \$121,300,000 is authorized only for the development of an advanced solid rocket motor (ASRM) and (2) such sums as may be necessary are authorized to ensure a safe, reliable space shuttle and an extended duration orbiter (EDO) capability.

<i>Summary of FY 1990 funding levels</i>	
Orbiter operational capability.....	\$237,000,000
Propulsion systems.....	727,300,000
Launch and mission support.....	341,000,000
Changes and systems upgrading.....	
Total.....	\$ 1,305,300,000

¹ This amount could be further reduced if NASA decides to apply any part of the \$10,000,000 general reduction to the Space Flight, Control and Data Communications account to this line item.

Now that the space shuttle has safely returned to flight, the primary program objective of the current activity in the Space Transportation System is to conduct all future flights in a safe and reliable manner and to ensure the establishment of necessary capabilities to meet the manifested flight rate.

Shuttle Production and Operational Capability provides for the national fleet of shuttle orbiters, including the replacement orbiter, which was fully funded in FY 1987. This budget element also provides for equipment to outfit launch site and flight operations facilities, production tooling, development of an ASRM, and related support activities necessary to provide the capability to safely increase and sustain a shuttle flight rate up to 14 per year. Shuttle production also provides for the establishment of a logistics system, including an inventory of spare parts and assemblies, to support the operations flights at the 14 per year rate. The objectives of this program are to provide for the hardware and modifications needed to support the Space Transportation System flight manifest; the

completion of the national fleet of shuttle orbiters, including building a replacement orbiter for the Challenger; the development and production of an ASRM and other propulsion systems; development of launch site capabilities; and an EDO capability.

With the loss of Challenger in January 1986, the orbiter fleet was reduced to three vehicles pending delivery of a replacement orbiter. The current orbiter fleet includes Columbia, the orbiter developed and flown on four test and evaluation flights, and two orbiters of a lighter weight configuration, Discovery and Atlantis. The budget provides funding for necessary improvements, hardware fixes, and mission kits for the orbiter fleet to satisfy flight requirements. In addition, the Kennedy Space Center is managing the completion of the orbiter logistics capability and is continuing the procurement of spares needed to support the flight rate building. The EDO development is also included to increase on-orbit stay time in order to improve the shuttle capability to support payload requirements. Current planning is to explore potential sources of private financing for development of selected elements of this program.

Propulsion systems provide for the production of the Space Shuttle Main Engines (SSMEs), the development of the capability to support operational requirements established for the SSME, the solid rocket boosters (SRBs) and external tanks (ETs), and the development of an ASRM. The SSME program includes: production of main engines necessary for the orbiter fleet and a spares inventory; ground testing in support of engine development; anomaly resolution and product improvement; and advanced development efforts to improve operating margins. SRB production and capability development activities include: the reclamation of production verification and 5I-L configuration solid propellant motors; investigation of returned flight hardware; procurement of tooling and equipment to support flight rate; and selected studies to continue investigative, analytical, and problem solving activities. With respect to the ASRM, in FY 1989 a contractor was selected to develop an ASRM for delivery in 1991. The program will include the design, development, test, and evaluation of the ASRM.

Launch and Mission Support provides for the required investment in Launch Operations and Flight Operations capability to meet Space Transportation System program objectives, which include supporting a safe flight rate. At the Kennedy Space Center, reactivation of launch pad A will complete a second time of facilities allowing simultaneous processing and checkout of orbiters and associated flight hardware from landing through launch. Additional facility and support equipment are being procured to sustain the flight rate capability. At the Johnson Space Center, mission support provides collateral hardware, principally the extra-vehicular maneuvering units (EMUs), while mission operations capability provides for improvements in the flight support systems. The flight support systems funded by this budget include training and carrier aircraft, additional landing aids and runway and barriers at the primary and contingency landing sites, and replacement/upgrade of equipment in the mission support complex including the Shuttle Mission Simulator and the Mission Control Center.

Space Shuttle Production and Operational Capability—Committee Comments

The return to flight of a safe, reliable space shuttle has been a long and arduous process and has been the result of the hard work and dedication of the NASA/contractor team. However, the real challenge for the space shuttle program still lies ahead, i.e. maintaining its safety and reliability and continuing to upgrade and increase the margin of safety and reliability of the space shuttle's components.

To assist in these activities, the Committee has fully funded the Space Shuttle Production and Operational Capability program in FY 1990. However, the Committee notes its concern that budget pressures have significantly depleted any reserves from this program area. The small reserve that does exist in FY 1990 is the result of the cancellation of a space shuttle flight. While the Committee agrees with NASA's decision in this matter and with the prioritization of safety/reliability over flight rate, it is concerned that an adequate resource base be available for sustained, testing, and upgrade activities.

To try to assist NASA in this regard and to ensure adequate funds for safety and reliability activities, the Committee has included language in the reported bill to permit NASA to use such sums as may be necessary from the amounts authorized for Space Shuttle Production and Operational Capability to ensure the safety and reliability of the space shuttle.

The Committee also has included language that permits NASA to use Space Shuttle Production and Operational Capability funds to ensure the availability of an EDO capability. The Committee is aware of ongoing efforts to obtain private sector financing for development of selected elements of this program. However, if these efforts are not successful, the Committee wants to be sure that this capability is developed. Based on an assessment of an EDO performed by NASA, it has been estimated that given access to a 28-day on-orbit capability, 85 percent of all materials sciences objectives could be satisfied. The Committee, therefore, endorses the current NASA EDO program and the proposed plan to achieve a 16-day mission by the end of 1992 and to evolve that capability beyond 16 days for later Spacelab missions.

Concerning the EDO, the Committee expects to be kept well advised of the findings and results of the EDO Medical Program and the requirements for an automated lander for EDO space shuttle missions.

The Committee also has earmarked \$121,300,000 for development of an ASRM and believes this motor will enhance the safety and reliability of the space shuttle system. S. 663, which has already been reported by the Committee, provides the necessary authority to allow NASA to utilize private sector financing for the ASRM production facility and capital equipment.

2. Space Transportation Operations—\$2,732,200,000

The Committee authorizes \$2,732,200,000 for Space Transportation Operations in FY 1990. This is the same as the President's budget request and reflects the Committee's strong desire to main-

tain the safety and reliability of the Nation's space transportation system.

Summary of FY 1990 funding levels

Flight operations.....	\$772,600,000
Flight hardware.....	1,236,500,000
Launch and landing operations.....	553,600,000
Shuttle operations.....	2,562,700,000
Expendable launch vehicles and services.....	169,500,000
Total.....	\$ 2,732,200,000

¹ This amount could be further reduced if NASA decides to apply any part of the \$10,000,000 general reduction to the Space Flight, Control and Data Communications account to this line item.

The major program elements of Shuttle Operations are Flight Operations, Flight Hardware, and Launch and Landing Operations. These elements provide for the standard service operation of the shuttle, including preflight preparation activities, procurement and refurbishment of flight hardware, and maintenance and operation of equipment and facilities necessary to support all phases of the shuttle flight process.

The Flight Operations activity is divided into three major elements: mission support, integration, and support. Mission support includes training, flight operations activities, and a wide variety of planning activities ranging from operational concepts and techniques to detailed systems operational procedures and checklists. Integration includes launch support services and sustaining engineering for orbiter systems, cargo analytical integration, and systems integration. The support element includes systems support activity at the Johnson Space Center such as aircraft operations, engineering support, and support to the National Space Transportation System program office. Shuttle system support at Headquarters and the Marshall Space Flight Center and Stennis Space Center is also included.

The Flight Hardware program element provides for: the procurement of ETS and SRB elements including motors, booster hardware, and solid propellants; replenishment of spare parts inventory and repair of the reusable SSME, orbiter, and crew equipment; ET disconnects, logistics support for the orbiter ET and SRB, and SSME flight hardware elements; and maintenance and operations of flight crew equipment. Included in the funding request for tanks and boosters are the long lead time raw materials, subassemblies, subsystems, and additional ground testing of the redesigned solid rocket motor (SRM) necessary to sustain and verify the production of elements in a manner consistent with the flight rate requirements.

Launch and Landing Operations provides for the prelaunch preparation, liquid propellants, launch, and landing operations of the shuttle and its cargo.

In addition to being the primary launch vehicle for NASA missions, the shuttle provides launch support to approved payloads on a reimbursable basis. Because of the *Challenger* accident, however, there are currently \$12.4 million in reimbursements in FY 1989 but no planned reimbursable funds for Shuttle Operations in FY 1990.

In this regard the ELV Mixed Fleet plan was initiated after the *Challenger* accident as a result of an assessment of NASA's space transportation requirements. This assessment showed that several U.S. civil government spacecraft should be launched on ELVs in order to provide increased access to space, to assure continuity of space operations, and to enhance mission flexibility. The missions currently planned for launch on ELVs are spacecraft requiring West Coast launches and selected East Coast launches which do not require the shuttle's unique capabilities and can transition to ELVs without significant impact to the spacecraft.

Space Transportation Operations—Committee Comments

The Committee believes that the operation of a safe, reliable transportation system has to be NASA's top priority. The Committee, therefore, has fully funded NASA's budget request.

As noted in the preceding section, the Committee endorses the prioritization of safety/reliability over flight rate and trusts that NASA will maintain these standards as it prepares to increase the space shuttle flight rate from four in FY 1989 to nine in FY 1990.

The Committee is pleased to see that the NASA Office of Space Flight has initiated a review of its ELV procurement process with industry and that NASA is committed to formulating a model contract and model request for proposals for commercial launch services. The Committee expects to be kept informed of NASA's progress and of any legislative requirements associated with this process.

The Committee also notes the Resources for the Future report "Launch Vouchers for Space Science Research." Elements of this concept could be applicable to the CCDS program payloads, as well as for space science research and JEA payloads. The Committee instructs NASA to assess this concept and to report its findings to the Committee by November 15, 1989.

Finally, the Committee is concerned about the status of the NASA/DOD Quid Pro Quo for launch services in light of the November 21, 1988, letter from the Air Force Director of Space and SDI programs, that indicated the Air Force was not able to provide a Titan IV. Since the Titan IV is the designated launch vehicle for the space station polar platforms, and CRAFT and Cassini missions, and is a candidate for other NASA missions, the Committee feels strongly that there must be a concrete agreement between NASA and DOD concerning cost and availability of Titan IVs. The Committee directs NASA to submit a report to the Committee on this matter and the status of the Quid Pro Quo Agreement by November 15, 1989.

3. Space Tracking and Data Acquisition—\$1,077,100,000

The Committee authorizes \$1,077,100,000 for Space Tracking and Data Acquisition in FY 1990. This is \$25,000,000 less than the President's budget request.

Summary of FY 1990 funding levels

Space network.....	\$582,300,000
Ground network.....	269,600,000

Communications and data systems	250,200,000
Total	1,077,100,000

This total reflects a general reduction of \$25,000,000 in FY 1990 to be applied at NASA's discretion. This total could be further reduced if NASA decides to apply any part of the \$10,000,000 general reduction to the Space Flight, Control and Data Communications account to this line item.

The purpose of the Space Tracking and Data Acquisition program is to provide vital tracking, telemetry, command, data acquisition, communications, and data processing 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 DOD, other government agencies, commercial firms, and other countries and international organizations. Support is provided for Earth orbital, planetary, and solar system exploration spacecraft missions, launch vehicles, research aircraft, sounding rockets, and balloons.

Tracking and acquisition of data for the space projects is presently accomplished through the use of a worldwide network of NASA ground stations and by two tracking and data relay satellites in geosynchronous orbit working with a highly specialized ground station. Ground facilities are interconnected by terrestrial and satellite communications circuits linking the spacecraft and their control centers for execution of the missions.

NASA has three basic support capabilities to meet the needs of all classes of NASA flight missions. These are the Spaceflight Tracking and Data Network (STDN), which currently supports Earth orbital missions; the Deep Space Network (DSN), which primarily supports planetary and interplanetary flight missions; and the Space Network, including the Tracking and Data Relay Satellite System (TDRSS), which will provide most low Earth orbital mission support when it becomes fully operational.

Highly specialized computation facilities provide real-time information for mission control and accommodate processing into meaningful form the large amounts of scientific, applications, and engineering data which are collected from flight projects. In addition, instrumentation facilities provide support for sounding rocket and balloon launchings and flight testing of aeronautical research aircraft.

The Space Flight, Control and Data Communications request includes the Space Network, STDN, DSN, and Communications and Data Systems elements of the program and provides funding for: (a) TDRSS operations, spacecraft production, and launch support; (b) operations and maintenance of the tracking, data acquisition, mission control, data processing, and communications facilities; (c) the engineering services and procurement of equipment to sustain and modify the various systems to support continuing, new, and changing flight project support requirements; and (d) the spectrum management, frequency allocation, and flight data standards support functions for NASA.

Space Tracking and Data Acquisition—Committee Comments

In this account, the Committee was required to make a general reduction from the President's request to provide funds for other

priority activities. The Committee believes this reduction can be made with minimum impact to the tracking and data acquisition program.

The Committee notes the successful launch and deployment of two Tracking and Data Relay Satellites by the space shuttle since last September. The successful deployment of this system provides a critical element of the Nation's space transportation and space research capability.

Also the Committee would like to indicate that it generally endorses the NASA proposal to modify the existing TDRSS contract with Contel, provided that the final contract improves management interfaces and reduces the overall program costs.

C. CONSTRUCTION OF FACILITIES—\$341,800,000

The Committee authorizes \$341,800,000 for Construction of Facilities in FY 1990. This is the same as the President's budget request.

Summary of FY 1990 funding levels

1. Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center	\$10,500,000
2. Construction of addition to Mission Control Center, Johnson Space Center	17,800,000
3. Construction of addition to Simulator/Training Facility, Johnson Space Center	3,800,000
4. Modifications for Expanded Solar Simulation, Johnson Space Center	2,000,000
5. Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center	4,000,000
6. Replacement of Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center	4,600,000
7. Replacement of Launch Complex 39, Pad A Chillers and Controls, Kennedy Space Center	1,200,000
8. Replacement of Roofs, Launch Complex 39, Kennedy Space Center	11,000,000
9. Replacement of Vehicle Assembly Building Air Handling Units, Kennedy Space Center	1,800,000
10. Upgrading of Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility 3, Kennedy Space Center	26,000,000
11. Modifications of High Pressure Industrial Water System, Stennis Space Center	2,000,000
12. Replacement of High Pressure Gas Storage Vessels, Stennis Space Center	3,000,000
13. Construction of natural resource protection at various locations.	3,800,000
14. Refurbishment of bridges, Merritt Island, Kennedy Space Center	4,500,000
15. Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center	3,500,000
16. Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center	2,800,000
17. Construction of Data Operations Facility, Goddard Space Flight Center	12,000,000
18. Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight System	7,500,000
19. Modernization of South Utility Systems, Jet Propulsion Laboratory	5,400,000
20. Construction of 40 x 80 Drive Motor Roof, Ames Research Center	1,000,000
21. Modifications to Thermo-Physics Facilities, Ames Research Center	4,600,000
22. Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center	1,000,000

23. Modifications to National Transonic Facility for Productivity, Langley Research Center.....	7,600,000
24. Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center.....	1,900,000
25. Rehabilitation of Central Air Systems, Lewis Research Center....	2,400,000
26. Rehabilitation of Central Refrigeration Equipment, Lewis Research Center.....	7,200,000
27. Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center.....	6,800,000
28. Rehabilitation of Hypersonic Tunnel, Plum Brook.....	4,100,000
29. Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center.....	27,600,000
30. Construction of Automation Sciences Research Facility, Ames Research Center.....	10,600,000
31. Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center.....	6,900,000
32. Modifications for Seismic Safety, Goldstone, California, Jet Propulsion Laboratory.....	2,600,000
33. Repair of facilities at various locations, not in excess of \$750,000 per project.....	28,000,000
34. Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project.....	36,000,000
35. Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project....	10,000,000
36. Environmental compliance and restoration.....	30,000,000
37. Facility planning and design not otherwise provided for.....	26,300,000
Total.....	341,800,000

The Construction of Facilities authorization provides contractual services for the repair, rehabilitation, and modification of existing facilities; the construction of new facilities and the acquisition of related facility equipment; environmental compliance activities; the design of facilities projects; and advanced planning related to future facilities needs. The funds requested for FY 1990 provide for continuing prior year endeavors to meet facilities requirements for the SSF and Space Flight Programs; construction of new facilities needed to support science, space technology, and aeronautical research; continuation of the multi-year effort to restore and modernize NASA's aeronautical research and development facilities; repair, rehabilitation, and modification of other facilities to maintain, upgrade, and improve the usefulness of the NASA physical plant; minor construction of new facilities; facility planning and design activities; and environmental compliance and restoration.

The projects and amounts in the budget estimates reflect SSF and Space Flight requirements that are time-sensitive to meet specific program objectives. Other program requirements for FY 1990 include refurbishing bridges at Merritt Island, rehabilitation of the Spacecraft Assembly and Encapsulation Facility II at the Kennedy Space Center, rehabilitation of the central heating/cooling plant at the Johnson Space Center, construction of a Data Operations Facility and a Quality Assurance and Detector Development Laboratory at the Goddard Space Flight Center, modernization of the south utility systems at the Jet Propulsion Laboratory, projects to repair, restore, and modernize NASA's aeronautical research and development facilities at Ames, Lewis, and Langley Research Centers, and at the Plum Brook Station, construction of an Automation Sciences Research Facility at the Ames Research Center, construction of a Supersonic/Hypersonic Low Disturbance Tunnel at the Langley Re-

search Center, and modifications for seismic safety, at Goldstone, California.

The FY 1990 program continues to meet the objectives of preserving and enhancing the capabilities and usefulness of existing facilities and ensuring safe, economical, and efficient use of the NASA physical plant. This request continues the necessary rehabilitation and modification program begun in prior years and continues a repair program. The repair program restores facilities to a condition substantially equivalent to their originally designed capability. The minor construction program continues to provide a means to accomplish smaller facility projects which accommodate changes in technical and institutional requirements. The environmental compliance and restoration program ensures that statutory environmental requirements are met and any necessary remedial action promptly taken.

In addition to the above, four projects are proposed for private sector financing. These projects are the ASRM production and test facility, Yellow Creek, Mississippi, the Space Station Processing Facility at the Kennedy Space Center, the Neutral Buoyancy Laboratory at the Johnson Space Center, and the Observational Instruments Laboratory at the Jet Propulsion Laboratory. The projects selected for privatization are functionally suitable for processing, developing, or manufacturing commercial space products as well as directly supporting NASA programs. Economic analyses show that privatization is cost-beneficial to the Government, provided the proposer retains 20 percent or more ownership of the facilities. It also precludes large outlays by the Government in FY 1990 and FY 1991.

Construction of Facilities—Committee Comments

This authorization reflects the Committee's belief that facilities are an integral component of the civil space program. For too long, there has been an emphasis on research and development funding at the expense of facilities and personnel funds.

As noted in the subsequent discussion of privately financed facilities in section 105 of the bill, the Committee has reservations about private sector financing of facilities. If such initiatives actually were to result in cost savings or expansion of the market for space services as a general matter, the Committee would look more favorably at this financing concept. However, the Committee has yet to see hard evidence of such an impact.

D. RESEARCH AND PROGRAM MANAGEMENT—\$2,032,200,000

The Committee authorizes \$2,032,200,000 for Research and Program Management in FY 1990. This is the same as the President's budget request and reflects the Committee's strong support of NASA's personnel.

Summary of FY 1990 funding levels

Personnel and related costs.....	\$1,222,040,000
Travel.....	50,957,000
Operation of installation.....	759,203,000
Facilities services.....	(305,468,000)
Technical services.....	(195,671,000)

Management and operations.....	(258,964,000)
Total.....	2,032,200,000

The Research and Program Management authorization funds the performance and management of research, technology and test activities at NASA installations, and the planning, management, and support of contractor research and development tasks necessary to meet the Nation's ongoing objectives in aeronautical and space research. The objectives of the activities funded by the Research and Program Management appropriation are (1) to provide a civil service staff with the technical and management skills to conduct the full range of programs for which NASA is responsible; (2) to provide base maintenance of facilities in support of research and development programs; and (3) to provide effective and efficient technical and administrative support for the research and development programs.

During the summer of FY 1988, NASA conducted an in-depth review of its manpower requirements. The results of the study indicated that based on Space Station program needs as well as Research and Technology base requirements, NASA would need a significant increase to its current work force. In discussions with OMB relative to the results of the manpower review, OMB agreed that NASA's full-time equivalent (FTE) ceilings be increased in FY 1989 to 23,734 and to 24,007 in FY 1990. Current budget levels will not allow NASA to meet OMB approved higher ceilings, and thus this budget is predicated on NASA's ability to fund FTE levels of 23,150 in FY 1989 and 23,846 in FY 1990, including the Inspector General's Office. NASA remains committed to achieving OMB approved ceilings for both FY 1989 and FY 1990. Every possible effort will be made to secure funding so that planned programmatic activities can be realized.

The FY 1990 Research and Program Management appropriation request provides funding for 23,700 permanent and temporary civil service FTE personnel, exclusive of the Inspector General's Office, at eight major installations and Headquarters. This civil service work force is NASA's most important resource and is vital to future space and aeronautics research activities. Approximately six percent of the requested funding provides for the salaries and related costs of the civil service work force. Two and one-half percent is for travel, critical to the successful management of the agency's in-house and contracted programs. The remaining amount of the Research and Program Management authorization provides support for the research, test, and operational facility support, and for related goods and services necessary to operate efficiently and effectively the NASA installations and to accomplish NASA's approved missions.

Research and Program Management—Committee Comments

A consistent theme at this year's NASA hearings was the concern over NASA's ability to attract and retain qualified personnel. The combined effect of current Federal pay levels and the enactment of the new ethics standards has worsened this situation and has had a serious impact on NASA personnel. Senior NASA man-

agers are retiring to avoid complications with the new ethics requirements, and junior NASA managers are going to industry where comparable jobs pay 50-100 percent more per year.

The Committee is seriously concerned about this problem and wants NASA to know that it will work actively with the agency and the Administration to resolve this situation. NASA's personnel are the agency's most precious resource, and the Committee believes more must be done to acknowledge and reward its dedicated civil service work force.

E. INSPECTOR GENERAL—\$8,795,000

The Committee authorizes \$8,795,000 for the Office of Inspector General (OIG) in FY 1990. This is the same as the President's budget request and reflects the Committee's strong support of the NASA Inspector General's Office.

The NASA OIG, established by the Inspector General Act of 1978 (Public Law 95-452), performs a balanced program of audits and investigations to assist NASA management in promoting economy, efficiency, and effectiveness in the administration of its programs and operations, and to prevent and detect fraud and mismanagement. With over 88 percent of the agency's total obligations allocated to procurement, a significant amount of OIG activity is directed toward contract fraud and procurement irregularities. OIG auditors and investigators conduct independent audits and investigations of NASA's programs and operations. The OIG works jointly with other Offices of Inspector General, the Federal Bureau of Investigation (FBI), the Defense Contract Audit Agency (DCAA), and other audit and investigative entities when concurrent jurisdiction exists.

The Inspector General (IG) and senior OIG managers have been active in a number of ways to promote the IG concept. The IG participates as a member of the Department of Commerce Computer System Security and Privacy Advisory Board (CSSPAB), speaks to NASA's senior executives and mid-level managers at the Senior Executive Program and Management Education Program sessions and internal management groups, and makes keynote addresses and presentations to professional organizations. Other senior OIG managers also have participated in various projects for the President's Council on Integrity and Efficiency (PCIE), in professional association committees, in intergovernmental forums, and in meetings and conferences, and have given presentations to professional organizations.

The OIG has continued to maintain a strong Congressional liaison in responding to specific requests and providing information on matters of interest to Committees. Matters having agency or office-related legislative impact have been reviewed and commented upon. During this reporting period, no serious or flagrant problems, abuses, or deficiencies relating to NASA's programs and operations were identified that required reporting under the provisions of Public Law 95-452, section 5(d).

In this reporting period, the Inspector General Act Amendments of 1988, Public Law 100-504, was enacted, which provides for revised reporting requirements of audit results and a separate appro-

priations account for the OIG. This authorization bill assumes implementation of the new audit reporting requirements to the extent practicable. However, DCAA statistics will continue to be reported under DCAA reporting requirements.

Inspector General—Committee Comments

During the course of the last five years, the Committee has established a close working relationship with the OIG and has used this Office to investigate some very sensitive matters. In each instance, the OIG has handled these matters with dispatch and resolve and in a very professional manner. The Committee looks forward to maintaining this relationship.

Sector 105

This section amends the National Aeronautics and Space Act of 1958 to give NASA the authority to enter into contracts, leases or agreements providing for private financing of three NASA facilities—the Space Station Processing Facility at the Kennedy Space Center, the Neutral Buoyancy Facility at the Johnson Space Center, and the Observational Instrument Laboratory at the Jet Propulsion Laboratory.

As was the case with the proposed private financing of the ASRM Production Facility, NASA requires legislative authority to be able to provide the necessary contingent liability/termination liability to ensure investor confidence in the private financing of such facilities. This language provides that authority and permits NASA to use its unobligated funds as collateral in case the Government terminates a contract for its convenience.

Based on its review of these and other private financing proposals contained in the President's FY 1990 NASA Authorization bill, the Committee became concerned that there were no clear standards by which to assess such private offerings. The Committee, therefore, asked the Congressional Budget Office (CBO) to assess the seven commercialization proposals that were contained in the NASA budget request. That CBO Staff Memorandum, "Preliminary Analysis of NASA Commercialization Initiatives," stated that:

* * * if the lease or service contract arrangement is to be less expensive to the government than direct procurement, the government will have to share the use and cost of the facilities or hardware with other customers. An example would be a space station facility that the government uses fully during the deployment—thus, a smaller, lower-capacity alternative would not do—but thereafter shares with another user. For the government to realize cost saving from private financing, the lower "principal" payments permitted by sharing with a non-U.S. Government user must be sufficient to offset the higher interest cost of borrowing at the private, as opposed to the government, rate.

Based on its analysis of the Administration's private financing proposals, the Committee has decided that it will assess each proposal on a case-by-case basis. The Committee, therefore, has not

given NASA generic authority for such proposals as requested in the Administration's proposed FY 1990 NASA Authorization bill. In light of some reservations about the value and benefits of private sector financing, the Committee has established three standards that must be met by the three facilities that are addressed in this section before the use of such financing is authorized.

First, the Administrator of NASA must determine that the privately financed facility is in the best interest of the Government.

Second, the Administrator of NASA must determine that the privately financed facility will result in net cost savings to the Government.

Third, no project considered for private financing shall be initiated unless the Administration (NASA) has submitted to the Committee a notice of intent to initiate the project, along with a description of the project, and thirty days have passed after each submission.

As noted above, the Government's financial obligations under such contracts, leases, or agreements would be limited to amounts provided in advance in appropriations Acts.

Section 106

This section instructs NASA to distribute its research and development funds on a geographical basis where possible. The Committee has annually legislated this requirement, believing it is in the national interest.

Section 107

This section reiterates the past Committee position that the space station may be used only for peaceful purposes. This language is consistent with existing U.S. treaty obligations (the Outer Space Treaty) and current law—Public Law 100-685.

Section 108

This section allows the Administrator of NASA to utilize up to five percent of the funds provided for the Small Business Innovation Research Program for program management and promotional activities. None of these funds may be used for travel or civil servant salaries. This would make NASA's implementation of the program consistent with other Federal agencies and ideally would result in more commercial spinoffs and applications.

Presently, NASA is not allowed to use any of the Small Business Innovative Research Program funds for administrative, program management, or promotional activities. During its review of the Program, the Committee was advised that this constraint, which was upheld by the Comptroller General in decision B-217925 of July 29, 1985 (64 Comp. Gen. 711), severely constrains the program and the dissemination of its technical findings. The Committee was advised by the program office that a small set-aside for program management and promotional activities such as proposal review costs, support contract costs, automated data processing costs, and outreach activities costs could assist the program and heighten the commercial potential of the innovative research being performed by small businesses.

Section 109

This section indicates that it is the sense of the Congress that the current prohibition on the export of U.S.-built satellites to the Soviet Union for launch on rockets of the Soviet Union shall continue to be the policy of the United States and that the policy shall be expanded to prohibit the export of U.S.-built satellites to other nations for launch on rockets of the Soviet Union.

TITLE II

Section 201—Office of Commercial Space Transportation

Section 201 of the bill amends section 24 of the Commercial Space Launch Act (49 U.S.C. 2623) to provide \$4,392,000 for FY 1990 for the Office of Commercial Space Transportation (OCST) of DOT. This conforms to the President's request, will enable OCST to fulfill responsibilities pursuant to the Commercial Space Launch Act, and will ensure that OCST meets projected demand in FY 1990 from entities seeking a DOT license to launch commercial ELVs.

OCST was established pursuant to Public Law 98-575, with the specific purpose of establishing and enforcing the licensing and regulatory regime necessary for commercial space transportation operations. These activities include safety research and planning and licensing procedures.

To date, OCST has issued three commercial launch licenses and currently has under review and in process six commercial launch applications. The Office anticipates that 20 more requests for licensing actions will be received before the end of the calendar year.

To review properly and thoroughly these applications, the Committee supports the FY 1990 budget request and the efforts of the Office to augment its staff with people with engineering and technical backgrounds.

Adequate resources to oversee and regulate properly the commercial ELV industry is essential to ensure that the United States can fulfill its obligations under international treaties, as well as to protect fully the health and safety of the public.

The Committee notes the role of the OCST in the effort to formulate model government contracts and requests for proposals for launch services on domestic ELVs. The Committee supports these efforts.

The Committee also notes the report submitted by the Secretary of DOT concerning "A Study of the Scheduling of Commercial Launch Operations at National Ranges." This report raises a variety of issues and concerns that the Committee intends to address as it assesses the viability and marketability of domestic ELVs.

TITLE III

Section 301—National Space Council authorization

Section 301 of the bill authorizes \$1,200,000 for the activities of the National Space Council in FY 1990. The Council was established pursuant to section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42

U.S.C. 2471). The Committee has reviewed this authorization with the Council and OMB and believes the prescribed level of funding is adequate for FY 1990.

The Committee notes that the proposed level of funding in FY 1990 would provide for a 50 percent reimbursement for any Executive Branch employee detailed to the National Space Council. Concerning detailees, the Committee also notes that in establishing the Council, it did not envisage a prominent role for detailees. The Committee saw the Council as "lean and mean" with a professional staff of not more than seven people as required by section 501(C) of Public Law 100-685—the FY 1989 NASA Authorization Act. Detailees were seen as "temporary" staff who would bring a specific expertise to the Council for a limited period of time—not permanent employees who would head up directorates. The Committee wants to remind the Council of this intent and will continue to work with Council on improving its effectiveness.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Title III of that Act

SEC. 301 through SEC. 311 * * *

PRIVATELY FINANCED FACILITY PROJECTS

SEC. 312. Notwithstanding the provisions of any other law, the Administration is authorized to enter into contracts, leases, or agreements providing for private financing of the Space Station Processing Facility at the Kennedy Space Center, the Neutral Buoyancy Laboratory at the Johnson Space Center, and the Observational Instrument Laboratory at the Jet Propulsion Laboratory for the use of the Administration, its contractors, or its subcontractors, except that—

(1) such authorization may not be utilized unless the Administrator determines that such privately financed construction or modification is in the best interest of the Government and results in net cost savings to the Government;

(2) no project considered for private financing shall be initiated unless the Administration has submitted to the Committee on Commerce, Science, and Transportation of the Senate, the Committee on Science, Space, and Technology of the House of Representatives, and the Committees on Appropriations of the Senate and House of Representatives a notice of intent to initiate the project, along with a description of the project, and thirty days have passed after such submission; and

(3) if, pursuant to this section, the Administrator authorizes privately financed construction or modification, the Administration is authorized, notwithstanding any provision of law to

the contrary, to assume in the resulting contract, lease, or agreement contingent liability in excess of available appropriations relating to the Government's potential termination for its convenience of such contract, lease, or agreement, if such contract, lease, or agreement limits the amount of the payments that the Federal Government is allowed to make under such contract, lease, or agreement to amounts to be provided in advance in appropriations Acts.

COMMERCIAL SPACE LAUNCH ACT

Section 24 of that Act

[AUTHORIZED APPROPRIATIONS

[SEC. 24. There are authorized to be appropriated to the Secretary \$4,000,000 for fiscal year 1985. There is authorized to be appropriated to the Secretary to carry out this Act \$586,000 for fiscal year 1986. There is authorized to be appropriated to the Secretary to carry out this Act \$4,548,000 for fiscal year 1988. There is authorized to be appropriated to the Secretary to carry out this Act \$3,827,000 for fiscal year 1989.]

AUTHORIZED APPROPRIATIONS

SEC. 24. There is authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990. Sums appropriated for research and development shall remain available until expended.

○

The PRESIDING OFFICER. The question is on the engrossment and third reading of the bill.

The bill was ordered to be engrossed for a third reading, was read the third time, and passed, as follows:

E. 918

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Aeronautics and Space Administration Authorization Act, Fiscal Year 1990".

TITLE I—FISCAL YEAR 1990 NASA AUTHORIZATION

NASA AUTHORIZATION

Sec. 101. (a) There is authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989, for "Research and development", for the following programs:

(1) Space Station Freedom, \$2,350,200,000, of which \$80,000,000 is authorized only for development of the flight telerobotic servicer.

(2) Space transportation capability development, \$635,500,000, of which \$6,000,000 is authorized only for the Advanced Communications Technology Satellite upper stage development, plus such additional funds as may be transferred to the Administration from any other agency pursuant to a fiscal year 1990 appropriations Act.

(3) Physics and astronomy, \$903,500,000, of which \$25,000,000 is authorized only for the Gravity Probe B space shuttle flight experiment.

(4) Life sciences, \$122,700,000.

(5) Planetary exploration, \$398,900,000, of which \$30,000,000 is authorized only for the CRAF and CaSSINI missions if a cost containment plan is formulated for those missions and submitted to the Committee on Commerce, Science, and Transportation of the Senate, to the Committee on Science, Space, and Technology of the House of Representatives, and to the Committees on Appropriations of the Senate and House of Representatives.

(6) Space applications, \$631,500,000, of which \$62,000,000 is authorized only for the Advanced Communications Technology Satellite and \$10,000,000 is authorized only for the Total Ozone Mapping Spectrometer.

(7) Earth Observing System of Mission to Planet Earth, \$24,200,000 in order to complete Phase B activities and to initiate Phase C/D of this program in fiscal year 1990.

(8) Technology utilization, \$22,700,000.

(9) Commercial use of space, \$38,300,000.

(10) Aeronautical research and technology, \$462,800,000, of which \$25,000,000 is authorized only for the initiation of the environmental technologies research required for a high speed commercial transport and \$10,000,000 is authorized only for the initiation of a high performance computer initiative.

(11) Transatmospheric research and technology, \$127,000,000 if a new National Aerospace Plane management plan is submitted to the Committee on Commerce, Science, and Transportation and Committee on Armed Services of the Senate and to the Committee on Science, Space, and Technology and Committee on Armed Services of the House of Representatives within 60 days after the date of enactment of this Act.

(12) Space research and technology, \$325,100,000.

(13) Safety, reliability, maintainability, and quality assurance, \$23,300,000.

(14) Tracking and data advanced systems, \$19,900,000.

(15) University Space Science and Technology Academic Program, \$38,000,000, of which \$5,000,000 is authorized only for the National Space Grant College and Fellowship Program.

Notwithstanding paragraphs (1) through (15), the total amount authorized by this subsection shall not exceed \$5,786,800,000.

(b) There is authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989, for "Space flight, control and data communications", for the following programs:

(1) Space shuttle production and operational capability, \$1,340,300,000, of which \$121,300,000 is authorized only for development of an advanced solid rocket motor, of which \$25,000,000 is authorized only for tooling and equipment associated with the Advanced Solid Rocket Motor Facility authorized in subsection (c)(3) of this section, and of which such sums as may be necessary are authorized to ensure a safe, reliable space shuttle and an extended duration orbiter capability.

(2) Space transportation operations, \$2,732,200,000.

(3) Space and ground network, communications and data systems, \$1,077,100,000.

Notwithstanding paragraphs (1) through (3), the total amount authorized by this subsection shall not exceed \$5,104,600,000.

(c) There is authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989, for "Construction of facilities", including land acquisition, as follows:

(1) Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center, \$10,500,000.

(2) Construction of addition to Mission Control Center, Johnson Space Center, \$17,800,000.

(3) Construction of addition to Simulator/Training Facility, Johnson Space Center, \$3,800,000.

(4) Modifications for Expanded Solar Simulation, Johnson Space Center, \$2,000,000.

(5) Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center, \$4,000,000.

(6) Replacement of Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center, \$4,600,000.

(7) Replacement of Launch Complex 39, Pad A Chillers and Controls, Kennedy Space Center, \$1,200,000.

(8) Replacement of Roofs, Launch Complex 39, Kennedy Space Center, \$11,000,000.

(9) Replacement of Vehicle Assembly Building Air Handling Units, Kennedy Space Center, \$1,800,000.

(10) Upgrading of Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility 3, Kennedy Space Center, \$25,000,000.

(11) Modifications of High Pressure Industrial Water System, Stennis Space Center, \$2,000,000.

(12) Replacement of High Pressure Gas Storage Vessels, Stennis Space Center, \$3,000,000.

(13) Construction of natural resource protection at various locations, \$3,800,000.

(14) Refurbishment of bridges, Merritt Island, Kennedy Space Center, \$4,500,000.

(15) Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center, \$3,500,000.

(16) Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center, \$2,800,000.

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(17) Construction of Data Operations Facility, Goddard Space Flight Center, \$12,000,000.

(18) Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center, \$7,500,000.

(19) Modernization of South Utility Systems, Jet Propulsion Laboratory, \$5,400,000.

(20) Construction of 40 x 80 Drive Motor Roof, Ames Research Center, \$1,000,900.

(21) Modifications to Thermo-Physics Facilities, Ames Research Center, \$4,600,000.

(22) Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center, \$1,000,000.

(23) Modifications to National Transonic Facility for Productivity, Langley Research Center, \$7,600,000.

(24) Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center, \$1,900,000.

(25) Rehabilitation of Central Air Systems, Lewis Research Center, \$2,400,000.

(26) Rehabilitation of Central Refrigeration Equipment, Lewis Research Center, \$7,200,000.

(27) Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center, \$6,800,000.

(28) Rehabilitation of Hypersonic Tunnel, Plum Brook, \$4,100,000.

(29) Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center, \$27,600,000.

(30) Construction of Automation Sciences Research Facility, Ames Research Center, \$10,600,000.

(31) Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center, \$6,900,000.

(32) Modifications for Seismic Safety, Goldstone, California, Jet Propulsion Laboratory, \$2,600,000.

(33) Repair of facilities at various locations, not in excess of \$750,000 per project, \$28,000,000.

(34) Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project, \$36,000,000.

(35) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project, \$10,000,000.

(36) Environmental compliance and restoration, \$30,000,000.

(37) Facility planning and design not otherwise provided for, \$26,300,000.

(38) Construction of the Advanced Solid Rocket Motor Facility, Yellow Creek, Mississippi, \$90,000,000.

(39) Construction of a Space Station Orbital Debris Radar Facility, \$15,000,000.

(40) Construction of a Wake Shield Facility, \$2,500,000.

(d) There are authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989, for "Research and program management", \$2,049,200,000.

(e) There is authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1989, for "Inspector General", \$3,795,000.

(f) Notwithstanding the provision of subsection (i), appropriations authorized in this Act for "Research and development" and "Space flight, control and data communications" may be used (1) for any items of a capital nature (other than acquisition of land) which may be required at locations other than installations of the National Aeronautics and Space Administration for the performance of research and development contracts, and (2) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conduct of scientific research, for purchase or construction of additional

research facilities; and title to such facilities shall be vested in the United States unless the Administrator of the National Aeronautics and Space Administration (hereinafter referred to as the "Administrator") determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant. None of the funds appropriated for "Research and development" and "Space flight, control and data communications" pursuant to this Act may be used in accordance with this subsection for the construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$500,000, unless the Administrator or the Administrator's designee has notified the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives of the nature, collection, and estimated cost of such facility.

(g) When so specified and to the extent provided in appropriations Acts, (1) any amount appropriated for "Research and development", for "Space flight, control and data communications", or for "Construction facilities" may remain available without fiscal year limitation, and (2) contracts may be entered into under the "Research and program management" appropriation for maintenance and operation of facilities and for other services for periods not in excess of 12 months beginning at any time during the fiscal year.

(h) Appropriations made pursuant to subsection (d) may be used, but not to exceed \$35,000, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and the Administrator's determination shall be final and conclusive upon the accounting officers of the Government.

(i)(1) Funds appropriated pursuant to subsections (a), (b), and (d) may be used for the construction of new facilities and additions to, repair of, rehabilitation of, or modification of existing facilities, except that the cost of each such project, including collateral equipment, shall not exceed \$100,000.

(2) Funds appropriated pursuant to subsections (a) and (b) may be used for unforeseen programmatic facility project needs, except that the cost of each such project, including collateral equipment, shall not exceed \$500,000.

(3) Funds appropriated pursuant to subsection (d) may be used for repair, rehabilitation, or modification of facilities controlled by the General Services Administration, except that the cost of each project, including collateral equipment, shall not exceed \$500,000.

ADMINISTRATOR'S REPROGRAMMING AUTHORITY

Sec. 102. Authorization is granted whereby any of the amounts prescribed in section 101(c)(91) through (37)—

(1) in the discretion of the Administrator or the Administrator's designee, may be varied upward by 10 percent, or

(2) following a report by the Administrator or the Administrator's designee to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on the circumstances of such action, may be varied upward by 25 percent, to meet unusual cost variations.

The total cost of all work authorized under paragraphs (1) and (2) shall not

exceed the total of the amounts specified in section 101(c).

SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES

Sec. 103. Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred; and that such changes require the use of additional funds for the purposes of construction, expansion, or modification of facilities at any locations; and that deferral of such action until the enactment of the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities; the Administrator may transfer not to exceed one-half of one percent of the funds appropriated pursuant to section 101 (a) and (b) to the "Construction of facilities" appropriation for such purposes. The Administrator may also use up to \$10,000,000 of the amounts authorized under section 101(c) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30 days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a written report describing the nature of the construction, its cost, and the reasons therefor.

LIMITATIONS ON AUTHORITY

Sec. 104. Notwithstanding any other provision of this Act—

(1) no amount appropriated pursuant to this Act may be used for any program deleted by the Congress from requests as originally made to either the Committee on Commerce, Science, and Transportation of the Senate or the Committee on Science, Space, and Technology of the House of Representatives;

(2) no amount appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by section 101 (a), (b), and (d); and

(3) no amount appropriated pursuant to this act may be used for any program which has not been presented to either such committee,

unless a period of 30 days has passed after the receipt by each such committee, of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

GEOGRAPHICAL DISTRIBUTION

Sec. 105. It is the sense of the Congress that it is in the national interest that consideration be given to geographical distribution of Federal research funds whenever feasible, and that the National Aeronautics and Space Administration should explore ways and means of distributing its research and development funds whenever feasible.

PEACEFUL USES OF SPACE STATION

Sec. 106. No civil space station authorized under section 101(a)(1) of this Act may be used to carry or place in orbit any nuclear weapon or any other weapon of mass destruction, to install any such weapon on any celestial body, or to station any such weapon in space in any other manner. This

civil space station may be used only for peaceful purposes.

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Sec. 107. The Administrator of the National Aeronautics and Space Administration may utilize up to five percent of the funds provided for the Small Business Innovation Research Program for program management and promotional activities. None of the NASA Small Business Innovation Research Program funds may be used for travel or civil service salaries.

EXPORTS OF UNITED STATES-BUILT SATELLITES

Sec. 108. It is the sense of the Congress that the current prohibition on the export of United States-built satellites to the Soviet Union for launch on rockets of the Soviet Union shall continue to be the policy of the United States and that the policy shall be expanded to prohibit the export of United States-built satellites to other nations for launch on rockets of the Soviet Union.

FUNDING FOR SPACE SHUTTLE STRUCTURAL SPARES

Sec. 109. The administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-591; 100 Stat. 3341-242), for space shuttle structural spares.

FUNDING FOR EXTENDED DURATION ORBITER DEVELOPMENT

Sec. 110. The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-591; 100 Stat. 3341-242), for continued development of an extended duration orbiter.

FUNDING FOR SPACE TRANSPORTATION SYSTEM

Sec. 111. The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-591; 100 Stat. 3341-242), for space transportation system requirements.

TITLE II—COMMERCIAL SPACE LAUNCH ACT

AUTHORIZATION FOR SECRETARY OF TRANSPORTATION

Sec. 201. Section 24 of the Commercial Space Launch Act (49 App. U.S.C. 2623) is amended to read as follows:

"AUTHORIZES APPROPRIATIONS

"Sec. 24. There is authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990. Sums appropriated for research and development shall remain available until expended."

TITLE III—NATIONAL SPACE COUNCIL COUNCIL AUTHORIZATION

Sec. 301. There is authorized to be appropriated to carry out the activities of the National Space Council established by section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471), \$1,300,000 for fiscal year 1990: Provided, That the National Space Council shall reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it.

Sec. 302. Not more than six individuals may be employed by the National Space

Council without regard to any provision of law regulating the employment or compensation of persons in the government service, at rates not to exceed the rate of pay for level VI of the Senior Executive Schedule, as provided pursuant to section 5382 of title 5, United States Code.

Sec. 303. Section 5314 of title 5, United States Code is amended by adding at the end thereof:

"EXECUTIVE SECRETARY, NATIONAL SPACE COUNCIL"

Sec. 304. The National Space Council may, for the purposes of carrying out its functions employ experts and consultants in accordance with section 3109 of title 5, United States Code, and may compensate individuals so employed for each day (including travel time) at rates not in excess of the maximum rate of pay for grade GS-18 as provided in section 5332 of title 5, United States Code.

Sec. 305. (1) The National Space Council is requested to initiate a review of United States launch policy including the Nation's expendable launch vehicle and satellite industries, their current and projected markets, the existing and projected level of foreign competition in these industries, the extent and level of support from foreign governments in these markets and industries, the consequences of the entry of non-market providers of launch services and satellites into the world market, restrictions on the use of foreign launch services and the export of United States satellites, and the importance of the United States launch vehicle and satellite industry to the national and economic security.

(2) The findings of this review and any policy recommendations are to be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation in the Senate by August 1, 1990.

TITLE IV—NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

Sec. 401. Section 203(1) of Public Law 100-147, the National Aeronautics and Space Administration Authorization Act of 1988, (42 USC 2486a(1)) is amended by inserting "and undergraduate" immediately after "graduate".

Sec. 402. Section 209(a) of Public Law 100-147, the National Aeronautics and Space Administration Authorization Act of 1988, (42 USC 2486g(a)) is amended by inserting "and undergraduate" immediately after "graduate".

Mr. MITCHELL. Mr. President, I move to reconsider the vote by which the bill as amended was passed.

Mr. DOLE. I move to lay that motion on the table.

The motion to lay on the table was agreed to.

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Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Aeronautics and Space Administration Multiyear Authorization Act of 1989".

SEC. 2. FINDINGS.

The Congress finds that—

- (1) the United States aeronautics and space program is supported by an overwhelming majority of the American people;
- (2) the United States aeronautics and space program genuinely reflects our Nation's pioneer heritage and demonstrates our quest for leadership, economic growth, and human understanding;
- (3) the United States space program is based on a solid record of achievement and continues to promote the objective of international cooperation in the exploration of the universe;
- (4) the United States aeronautics and space program generates critical technology breakthroughs that benefit our economy and significantly improve our standard of living;
- (5) the United States aeronautics and space program excites the imagination of every generation and can stimulate the youth of our Nation toward the pursuit of excellence in the fields of science and mathematics;
- (6) the United States aeronautics and space program contributes to the Nation's technological competitive advantage;
- (7) the United States aeronautics and space program requires a sustained commitment of financial and human resources;
- (8) the United States space transportation system will depend upon a robust fleet of Space Shuttle Orbiters and expendable launch vehicle services;
- (9) the United States space program will be advanced with the deployment of a permanently manned space station with research, observation, servicing, manufacturing, and staging capabilities;
- (10) the United States aeronautics program has been a key factor in maintaining preeminence in aviation over many decades;
- (11) the United States needs to maintain a strong program with respect to transatmospheric research and technology; and
- (12) the National Aeronautics and Space Administration is primarily responsible for formulating and implementing the civil aeronautics and space program in the United States.

SEC. 3. POLICY.

It is declared to be national policy that the United States should—

- (1) rededicate itself to the goal of leadership in critical areas of space science, space exploration, and space commercialization;
- (2) increase its commitment of budgetary resources for the space program to reverse the dramatic decline in real spending for such program since the achievements of the Apollo program;
- (3) forge a robust national space program that maintains a healthy balance between manned and unmanned space activities and recognizes the mutually reinforcing benefits of both;
- (4) maintain an active fleet of space shuttle orbiters, including an adequate provision of structural spare parts, and evolve the Or-

biter design to improve safety and performance, and reduce operational costs;

(5) sustain a mixed fleet by utilizing commercial expendable launch vehicle services;

(6) continue with the development and deployment of a permanently manned space station;

(7) establish a dual capability for logistics and resupply of the space station utilizing the space shuttle and expendable launch vehicles, including commercial services if available;

(8) continue to seek opportunities for international cooperation in space;

(9) maintain an aggressive program of aeronautical research and technology development designed to enhance the United States preeminence in civil and military aviation and improve safety and efficiency of the United States air transportation system; and

(10) conduct a program of technology maturation and flight demonstration to prove the feasibility of an air-breathing, hypersonic aero-space plane capable of single-stage-to-orbit operation and hypersonic cruise in the atmosphere.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are hereby authorized to be appropriated to the National Aeronautics and Space Administration for fiscal year 1990, except as otherwise provided:

(1) For "research and development", for the following programs:

(A) United States International Space Station Freedom—

(i) Notwithstanding section 201(a)(1)(A) of the National Aeronautics and Space Administration Act, fiscal year 1989, not more than \$1,800,000,000 shall be made available for Phase I for fiscal year 1990.

(ii) of the \$2,912,500,000 authorized for fiscal year 1991 by section 201(a)(1)(A) of the National Aeronautics and Space Administration Act, fiscal year 1989, \$2,700,000,000 shall be made available for Phase I for fiscal year 1991 and \$212,500,000 shall be made available for Phase II enhancements for fiscal year 1991.

(iii) \$3,085,000,000 for Phase I for fiscal year 1992 and \$409,400,000 for Phase II enhancements for fiscal year 1992.

A Phase II enhancements plan shall be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate within 120 days of enactment.

(B) Space transportation capability development, \$551,500,000, along with \$716,000,000 for fiscal year 1991.

(C) Physics and astronomy, \$914,500,000, along with \$1,013,000,000 for fiscal year 1991.

(D) Life sciences, \$124,200,000, along with \$154,000,000 for fiscal year 1991.

(E) Planetary exploration, \$361,900,000, along with \$322,000,000 for fiscal year 1991.

(F) Space applications, \$631,500,000, of which \$62,000,000 shall be available only for the Advanced Communications Technology Satellite, and of which \$10,000,000 shall be available only for a program of Earth Probes beginning with the Total Ozone Mapping Spectrometer, along with \$552,000,000 for fiscal year 1991 including not more than \$2,000,000 for each such fiscal year for experimenter ground stations for the Advanced Communications Technology Satellite, but only if the experimenter receiving funds obtains at least an equal amount of funds from sources other than the National Aeronautics and Space Administration as is received under this subparagraph.

(G) Global Change, \$24,200,000 for the Earth Observing System of Mission to

Planet Earth in order to complete phase B activities and to initiate phase C/D of the program in fiscal year 1991.

(H) Technology utilization, \$22,700,000, along with \$23,400,000 for fiscal year 1991.

(I) Commercial use of space, \$40,300,000, along with \$59,700,000 for fiscal year 1991.

(J) Aeronautical research and technology, and transatmospheric research and technology, \$589,800,000, along with \$621,000,000 for fiscal year 1991. None of the funds authorized under this subparagraph for fiscal year 1990 shall be expended unless at least \$127,000,000 are made available for such fiscal year for the National Aero-Space Plane program.

(K) Space research and technology, \$358,100,000, of which \$72,300,000 shall be available only for the Pathfinder program, along with \$487,000,000 for fiscal year 1991, of which \$150,000,000 shall be available only for the Pathfinder program.

(L) Space exploration, \$20,000,000, along with \$35,000,000 for fiscal year 1991.

(M) Safety, reliability, maintainability, and quality assurance, \$23,300,000, along with \$24,000,000 for fiscal year 1991.

(N) Tracking and data advanced systems, \$19,900,000, along with \$21,000,000 for fiscal year 1991.

(O) University Space Science and Technology Academic Program, \$38,000,000 for fiscal year 1990, of which \$5,000,000 shall be available only for the National Space Grant College and Fellowship Program, \$40,000,000 for fiscal year 1991.

(P) Comet Rendezvous Asteroid Flyby/Cassini mission, not to exceed \$1,800,000,000, for development, launch, and 30 days of operations thereof, to remain available until expended, of which—

(i) \$490,000,000 shall be available for obligation after October 1, 1989;

(ii) an additional \$370,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a preliminary design review to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate;

(iii) an additional \$640,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a critical design review to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate; and

(iv) an additional \$100,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a spacecraft integration and systems test to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

A cost containment plan shall be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate by January 31, 1990, and updated on July 31 and January 31 of each succeeding year until such funds are expended.

(2) For "Space flight, control and data communications", for the following programs:

(A) Shuttle production and operational capability, \$1,340,300,000, of which \$90,000,000 are authorized only for safety enhancements to the shuttle orbiter, including—

(i) for the space shuttle main engine—

- (1) improved design and installation of High Pressure Oxygen Turbopump bearings;

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(II) installation of the 2-duct hot gas manifold;

(III) development of enlarged throat diameter;

(IV) development of single-crystal turbine blades; and

(V) general redesign to reduce welds and make welds totally inspectable;

(ii) for the solid rocket booster/solid rocket motor—

(I) implementation of the recommendations contained in the report of the National Research Council entitled "Collected Reports of the Panel on Technical Evaluation of NASA's Redesign of the Space Shuttle Solid Rocket Booster", issued in 1988;

(II) development of a locking feature for the nozzle leak check port plugs;

(III) development of one-piece case stiffener rings;

(IV) development of nonasbestos motor insulation;

(V) enhancement of lightning protection for case and nozzle; and

(VI) modification of aft skirt structure;

(iii) for the external tank—

(I) upgrading of liquid hydrogen and oxygen temperature, pressure, and liquid level sensors;

(II) upgrading of thermal insulation on areas where dislodged insulation can affect the orbiter; and

(III) investigation of corrosion prevention methods to preclude structural problems; and

(iv) for the orbiter—

(I) modification of structure to eliminate negative margins;

(II) upgrading of the auxiliary power units;

(III) development of a redundant nose wheel steering system (including possible extension of the nose wheel strut);

(IV) elimination of Kapton electrical wire insulation; and

(V) upgrading of valves and regulators to preclude leakage of fuels and oxidizers.

By September 30, 1990, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a full report on the completion of the safety enhancements specified in this subparagraph. Additionally, there is authorized to be appropriated \$1,303,000,000 for fiscal year 1991.

(B) Shuttle operations, \$2,344,900,000, along with \$2,495,000,000 for fiscal year 1991.

(C) Expendable launch vehicles and services, \$171,500,000, along with \$240,000,000 for fiscal year 1991. Of such funds, \$2,000,000 in fiscal year 1990, and \$26,000,000 in fiscal year 1991 may be used only to purchase expendable launch vehicle services, supporting studies, and spacecraft modification for dual compatibility for the TDRS-G satellite.

(D) Space and ground network, communications and data systems, \$1,077,100,000, along with \$1,159,000,000 for fiscal year 1991.

(3) For "Construction of facilities", including land acquisition, as follows:

(A) Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center, \$10,500,000.

(B) Construction of addition to Mission Control Center, Johnson Space Center, \$17,800,000.

(C) Construction of addition to Simulator Training Facility, Johnson Space Center, \$3,800,000.

(D) Modifications for Expanded Solar Simulation, Johnson Space Center, \$2,000,000.

(E) Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center, \$4,000,000.

(F) Replace Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center, \$4,600,000.

(G) Replace Pad A Chillers and Controls, Launch Complex 39, Kennedy Space Center, \$1,200,000.

(H) Replace Roofs, Launch Complex 39, Kennedy Space Center, \$11,000,000.

(I) Replace Vehicle Assembly Building Air Handling Units, Kennedy Space Center, \$1,800,000.

(J) Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility #3, Kennedy Space Center, \$26,000,000.

(K) Modification of High Pressure Industrial Water System, Stennis Space Center, \$2,000,000.

(L) Replacement of High Pressure Gas Storage Vessels, Stennis Space Center, \$2,000,000.

(M) Construction of natural resource protection at various locations, \$3,800,000.

(N) Refurbish bridges, Merritt Island, Kennedy Space Center, \$4,500,000.

(O) Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center, \$3,500,000.

(P) Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center, \$2,800,000.

(Q) Construction of Data Operations Facility, Goddard Space Flight Center, \$12,000,000.

(R) Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center, \$7,500,000.

(S) Modernization of South Utility Systems, Jet Propulsion Laboratory, \$5,400,000.

(T) Construction of 40 x 80 Drive Motor Roof, Ames Research Center, \$1,000,000.

(U) Modifications to Thermo-Physics Facilities, Ames Research Center, \$4,600,000.

(V) Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center, \$1,000,000.

(W) Modifications to National Transonic Facility for Productivity, Langley Research Center, \$7,600,000.

(X) Modifications to 20-Foot Vertical Spin Tunnel, Langley Research Center, \$1,900,000.

(Y) Rehabilitation of Central Air Systems, Lewis Research Center, \$2,400,000.

(Z) Rehabilitation of Central Refrigeration Equipment, Lewis Research Center, \$7,200,000.

(AA) Rehabilitation of 8 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center, \$6,800,000.

(BB) Rehabilitation of Hypersonic Tunnel, Plum Brook, \$4,100,000.

(CC) Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center, \$27,600,000.

(DD) Construction of Automation Sciences Research Facility, Ames Research Center, \$10,600,000.

(EE) Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center, \$6,900,000.

(FF) Modifications for Seismic Safety, Goldstone, CA, Jet Propulsion Laboratory, \$2,600,000.

(GG) Repair of facilities at various locations, not in excess of \$750,000 per project, \$28,000,000.

(HH) Rehabilitation and modification of facilities at various locations, not in excess of \$750,000 per project, \$36,000,000.

(II) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project, \$10,000,000.

(JJ) Environmental compliance and restoration, \$30,000,000.

(KK) Facility planning and design not otherwise provided for, \$26,300,000.

(LL) Construction of the Advanced Solid Rocket Motor Facility, Yellow Creek, Mississippi, \$90,000,000.

(MM) Construction of a Space Station Orbital Debris Radar Facility, \$15,000,000.

(NN) Construction of a Wake Shield Facility, \$2,500,000.

(OO) Construction of Observational Instrument Laboratory, Jet Propulsion Laboratory, \$14,000,000.

Notwithstanding subparagraphs (A) through (OO), the total amount appropriated under such subparagraphs shall not exceed \$449,300,000.

(4) For "Research and program management", \$2,032,200,000.

(5) For "Inspector General", \$8,795,000, along with \$9,000,000 for fiscal year 1991.

(6) Notwithstanding paragraph (9), appropriations authorized pursuant to this Act for "Research and development" and "Space flight, control and data communications" may be used (A) for any items of a capital nature (other than acquisition of land) which may be required at locations other than installations of the National Aeronautics and Space Administration for the performance of research and development contracts, and (B) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conduct of scientific research, for purchase or construction of additional research facilities; and title to such facilities shall be vested in the United States unless the Administrator of the National Aeronautics and Space Administration (hereafter in this Act referred to as the "Administrator") determines that the national program of aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant. None of the funds appropriated for "Research and development" and "Space flight, control and data communications" pursuant to this Act may be used in accordance with this paragraph for the construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$500,000, unless the Administrator or the Administrator's designee has notified the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, of the nature, location, and estimated cost of such facility.

(7) Except as otherwise provided, and to the extent provided in an appropriation Act, (A) any amount appropriated pursuant to this Act for "Research and development", for "Space flight, control and data communications", or for "Construction of facilities" may remain available without fiscal year limitation, and (B) contracts may be entered into under "Research and program management" for maintenance and operation of facilities, and for other services to be provided, during the next fiscal year.

(8) Appropriations made pursuant to paragraph (4) may be used, but not to exceed \$35,000 per fiscal year, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and his determination shall be final and conclusive upon the accounting officers of the Government.

(9)(A) Funds appropriated pursuant to paragraphs (1), (2), and (4) may be used for

the construction of new facilities and additions to, repair, rehabilitation, or modification of existing facilities, if the cost of each such project, including collateral equipment, does not exceed \$100,000.

(B) Funds appropriated pursuant to paragraphs (1) and (2) may be used for unforeseen programmatic facility project needs, if the cost of each such project, including collateral equipment, does not exceed \$500,000.

(C) Funds appropriated pursuant to paragraph (4) may be used for repair, rehabilitation, or modification of facilities controlled by the General Services Administration, if the cost of each project, including collateral equipment, does not exceed \$500,000.

(10) None of the funds authorized under this section for fiscal year 1991 shall be expended unless at least \$2,700,000,000 are made available for such fiscal year for the United States International Space Station Freedom unless such amount is not available solely due to the application of the Balanced Budget and Deficit Control Act of 1985.

SEC. 5. ADMINISTRATOR'S REPROGRAMMING AUTHORITY.

Any of the amounts authorized in section 4(3)(A)—

(1) in the discretion of the Administrator or the Administrator's designee, may be varied upward 10 percent; or

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, on the circumstances of such action, may be varied upward 25 percent, to meet unusual cost variations.

The total amount authorized under section 4(3) for fiscal year 1990 shall not be increased as a result of reprogramming carried out pursuant to this section.

SEC. 6. SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES.

Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred, and that such changes require the use of additional funds for the purposes of construction, expansion, or modification of facilities at any location and that deferral of such action until the enactment of the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities, the Administrator may transfer not to exceed 1/2 of 1 percent of the funds appropriated pursuant to section 4(1) and (2), to the "Construction of Facilities" appropriation for such purposes. The Administrator may also use up to \$10,000,000 of the amounts authorized under section 4(3) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30 days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a written report denouncing the nature of the construction, its cost, and the reasons therefor.

SEC. 7. LIMITATIONS ON AUTHORITY.

Notwithstanding any other provision of this Act, no amount appropriated pursuant to this Act may be used for any program not authorized, or in excess of amounts authorized, by the Congress, unless a period of 30

days has passed after the receipt by the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

SEC. 8. PROCUREMENT OF SPACE SHUTTLE STRUCTURAL SPARE PARTS.

The Administrator is authorized and encouraged to use up to \$25,000,000 of the funds appropriated for orbiter production under section 101(g) of the joint resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes" (100 Stat. 3341-242) to procure shuttle structural spare parts.

SEC. 9. GEOGRAPHICAL DISTRIBUTION.

The Administrator shall distribute research and development funds geographically in order to provide the broadest practicable participation in the programs of the National Aeronautics and Space Administration.

SEC. 10. BUY AMERICAN.

(a) GENERAL RULE.—The Administrator shall award to a domestic firm a contract that, under the use of competitive procedures, would be awarded to a foreign firm, if—

(1) the final product of the domestic firm will be completely assembled in the United States;

(2) when completely assembled, not less than 50 percent of the final product of the domestic firm will be domestically produced; and

(3) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(b) EXCEPTIONS.—This section shall not apply to the extent to which—

(1) such applicability would not be in the public interest;

(2) compelling national security considerations require otherwise; or

(3) the United States Trade Representative determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(c) DEFINITIONS.—For purposes of this section—

(1) the term "domestic firm" means a business entity that is incorporated in the United States and that conducts business operations in the United States;

(2) the term "foreign firm" means a business entity not described in paragraph (1).

(d) LIMITATION.—This section shall apply only to contracts for which—

(1) amounts are made available pursuant to this Act; and

(2) solicitations for bids are issued after the date of the enactment of this Act.

(e) REPORT TO CONGRESS.—The Administrator shall report to the Congress on contracts covered under this section and entered into with foreign entities in fiscal year 1990 and 1991 and shall report to the Congress on the number of contracts that meet the requirements of subsection (a) but which are determined by the United States Trade Representative to be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party. The Administrator shall also report to the Congress on the number of contracts covered under this Act and awarded based upon the parameters of this section.

SEC. 11. AMENDMENTS TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958.

Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) is amended—

(1) in subsection (a), by—

(A) striking "and" at the end of paragraph (2);

(B) striking the period at the end of paragraph (3) and inserting in lieu thereof a semicolon; and

(C) adding at the end the following new paragraphs:

"(4) seek and encourage, to the maximum extent possible, the fullest commercial use of space; and

"(5) encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government."

(2) In order to establish procedures for the procurement of private sector space launch services and hardware for the National Aeronautics and Space Administration or other Government agencies, the Administrator shall provide by March 15, 1990, to the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House a report on specific Federal Acquisition Regulations, policies, and all other directives which inhibit the acquisition of such space launch services and hardware on a commercially reasonable basis.

SEC. 12. COMMERCIAL SPACE LAUNCH ACT AUTHORIZATION.

Section 24 of the Commercial Space Launch Act (49 U.S.C. App. 2623) is amended by adding at the end thereof the following: "There are authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990."

SEC. 13. NATIONAL SPACE COUNCIL AUTHORIZATION.

(a) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out the activities of the National Space Council established by section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471), \$1,200,000 for fiscal year 1990. The National Space Council shall reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it.

(b) STAFFING.—Not more than 6 individuals may be employed by the National Space Council without regard to any provision of law regulating the employment or compensation of persons in the Government service, at rates not to exceed the rate of pay for level VI of the Senior Executive Schedule as provided pursuant to section 5382 of title 5, United States Code.

(c) CONFORMING AMENDMENT.—Section 5314 of title 5, United States Code, is amended by adding at the end thereof the following: "Executive Secretary, National Space Council."

(d) EXPERTS AND CONSULTANTS.—The National Space Council may, for purposes of carrying out its functions, employ experts and consultants in accordance with section 3109 of title 5, United States Code, and may compensate individuals so employed for each day they are involved in a business of the National Space Council (including travel time) at rates not in excess of the daily equivalent of the maximum rate of pay for grade GS-18 as provided pursuant to section 5332 of title 5, United States Code.

(e) REVIEW OF LAUNCH INDUSTRY.—(1) The National Space Council is requested to initiate a review of United States launch policy, including the Nation's expendable launch

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vehicle and satellite industries, their current and projected markets, the existing and projected level of foreign competition in these industries, the extent and level of support from foreign governments in these markets and industries, the consequences of the entry of nonmarket providers of launch services and satellites into the world market, restrictions on the use of foreign launch services and the export of United States satellites, and the importance of the United States launch vehicle and satellite industry to the national and economic security.

(2) The findings of this review and any policy recommendations are to be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate by August 1, 1990.

SEC. 14. INTERNATIONAL SPACE YEAR.

(a) SENSE OF THE CONGRESS.—It is the sense of the Congress that the President should—

(1) lead the formulation of an International Space Year agenda developed in consultation with foreign leaders;

(2) declare a World Space Congress, to be convened in 1992, to establish a program for cooperative space activities among cooperating nations in space science, space exploration, and the application of space technologies;

(3) invite the American public to develop International Space Year activities that foster the cooperative spirit of the International Space Year; and

(4) direct the National Aeronautics and Space Administration to continue to develop International Space Year activities with a primary emphasis on Mission to Planet Earth, but also with a strong emphasis on the other space sciences, human exploration, education, and developing nations applications.

(b) REPORT TO CONGRESS.—The President shall report to Congress at the earliest practicable date, but no later than January 1, 1990, on the steps taken pursuant to this section.

SEC. 15. ADVANCED SOLID ROCKET MOTOR.

The Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the following:

(1) A report on the projected cost to complete the design, development, and qualification of the Advanced Solid Rocket Motor. The first report shall be submitted at the end of 6 months after the signing of the Advanced Solid Rocket Motor contract, and thereafter with the National Aeronautics and Space Administration's annual budget request.

(2) An annual report on the projected unit cost of the flight motors.

(3) An annual report on the increase in space shuttle payload capability provided by the Advanced Solid Rocket Motor. The report shall include the original baseline payload capability, adjustments to that baseline capability, and the projected payload capability.

(4) An assessment by the National Research Council of the need for the Advanced Solid Rocket Motor by September 1, 1990.

(5) An assessment by the National Research Council of options to the Advanced Solid Rocket Motor to provide desired performance and safety enhancements by September 1, 1990.

SEC. 16. SPACE SHUTTLE USE POLICY.

(a)(1) It shall be the policy of the United States to use the Space Shuttle for purposes that (i) require the presence of man, (ii) require the unique capabilities of the Space

Shuttle or (iii) when other compelling circumstances exist.

(2) The term "compelling circumstances" includes, but is not limited to, occasions when the Administrator determines, in consultation with the Secretary of Defense and/or the Secretary of State, that important national security or foreign policy interests would be served by a Shuttle launch.

(3) The policy stated in subsection (a)(1) shall not preclude the use of available cargo space, on a Space Shuttle mission otherwise consistent with the policy described under subsection (a)(1), for the purpose of carrying secondary payloads (as defined by the Administrator) that do not require the presence of man if such payloads are consistent with the requirements of research, development, demonstration, scientific, commercial, and educational programs authorized by the Administrator.

(b) The Administrator shall, within six months after the date of enactment of this Act, submit a report to the Congress setting forth a plan for the implementation of the policy described in subsection (a)(1).

Such plan shall include—

(1) details of the implementation plan;

(2) a list of purposes that meet such policy;

(3) a proposed schedule for the implementation of such policy;

(4) an estimate of the costs to the United States of implementing such policy; and

(5) a process for informing the Congress in a timely and regular manner of how the plan is being implemented.

(c) At least annually, the Administrator shall submit to the Congress a report certifying that the payloads scheduled to be launched on the space shuttle for the next four years are consistent with the policy set forth in subsection (a)(1). For each payload scheduled to be launched from the space shuttle, which do not require the presence of man, the Administrator shall, in the certified report to Congress, state the specific circumstances which justified the use of the space shuttle. If, during the period between scheduled reports to the Congress, any additions are made to the list of certified payloads intended to be launched from the Shuttle, the Administrator shall inform the Congress of the additions and the reasons therefor within 45 days of the change.

(d) The report described in subsection (c) shall also include those NASA payloads designed solely to fly on the space shuttle which have begun the phase C/D of its development cycle.

SEC. 17. FAIR PRICING AGREEMENT.

(a) FINDINGS.—The Congress finds that—

(1) the export of United States manufactured satellites is a valuable contributor to the United States balance of trade and should be encouraged;

(2) unfair trade practices which undermine the viability of the United States launch vehicle industry will also ultimately lead to the loss of the United States competitive posture for United States manufactured satellites; and

(3) the viability of the United States commercial launch industry is undermined by competition from the Soviet Union, whose subsidized launch vehicles are priced significantly below world market prices.

(b) POLICY.—It is the policy of the United States that the United States Trade Representative should enter into negotiations for the purpose of achieving fair pricing agreements for international trade in commercial launch services. Such agreement shall support free and fair competition for those services.

(c) PRESIDENTIAL CERTIFICATION.—The policy stated in subsection (b) shall not

apply if the President certifies to Congress that the price of launch services offered by any nation utilizing Soviet Union launch vehicles is not more than 25 percent below the price of a comparable launch vehicle built in a market-based economy, as determined using generally accepted cost accounting standards used in market-based economies.

(d) FURTHER POLICY.—In absence of agreement stated in subsection (b), or Presidential Certification stated in subsection (c), it is the policy of the United States that the export of United States manufactured satellites for launch on Soviet Union manufactured vehicles should be prohibited.

SEC. 18. EXPORT OF SATELLITES FOR LAUNCH BY THE PEOPLE'S REPUBLIC OF CHINA.

(a) EXPORT OF SATELLITES.—Any license for the export of a satellite of United States origin that is intended for launch from a launch vehicle owned by the People's Republic of China (specifically including the Hughes Aircraft Model HS-601 Spacecraft (commercial communications satellites) whose export is described in the certification transmitted to the Congress pursuant to section 36(c) of the Arms Export Control Act on September 12, 1988) shall continue to be suspended, unless the President makes a report under subsection (b) of this section. Any license for such an export that was issued before the enactment of this Act shall also continue to be suspended unless the President makes a report under subsection (b) of this section.

(b) PRESIDENT'S REPORT.—A report referred to in subsection (a) is a report of the President to the Congress—

(1) that the Government of the People's Republic of China has made progress on a program of political reform throughout the country, including Tibet, which includes—

(A) lifting of martial law;

(B) halting of executions and other reprisals against individuals for the nonviolent expression of their political beliefs;

(C) release of political prisoners;

(D) increased respect for internationally recognized human rights, including freedom of expression, the press, assembly, and association; and

(E) permitting a freer flow of information, including an end to the jamming of Voice of America and greater access for foreign journalists; or

(2) that it is in the national security interest of the United States to terminate a suspension under subsection (a).

SEC. 19. LIFE SCIENCES STRATEGIC PLAN.

(a) FINDINGS.—The Congress finds that—

(1) the current knowledge base in life sciences is not compatible with the National Aeronautics Space Administration's current objectives in space, and the National Aeronautics Space Administration lacks an adequate strategic plan to acquire this knowledge base;

(2) it is critical to the success of manned missions in space, be they commercial operations of microgravity laboratories or manned missions to Mars, that a realistic appraisal of the influences of the space environment on biological systems is completed and appropriate protective countermeasures developed;

(3) the space station is rapidly approaching design maturity without a corresponding development of the physiological and other human factors knowledge base necessary for long-term manned operations in space; and

(4) space station laboratory hardware specifications are being fixed before fully establishing the objectives and requirements for life sciences research.

(b) STRATEGIC PLAN.—The Administrator shall—

(1) review currently proposed manned space flight missions in order to—

(A) identify the physiological and other human factors knowledge base necessary to determine the human capacity to adapt to and perform effectively in the space environment according to mission requirements, including identifying which life sciences parameters must be measured and which technologies, processes, and procedures must be developed; and

(B) develop a schedule indicating when specific components of information, technologies, processes, or procedures identified under subparagraph (A) will need to be acquired or developed in order to verify that human adaptability requirements of manned space flight missions can be achieved;

(2) develop a strategic plan for life sciences research and technology development sufficient to accomplish the life sciences knowledge base acquisition schedule developed under paragraph (1)(B), including—

(A) a crew certification plan setting acceptable crew deconditioning standards for Extended Duration Orbiter operations and verifying countermeasures sufficient to meet those standards before actual Extended Duration Orbiter operations; and

(B) a life sciences implementation plan for the design and development of the space station, to be provided as part of the Preliminary Design Review for the space station, and to include crew adaptability standards; and

(3) verify the physiological and technical feasibility of the life sciences implementation plan developed under paragraph (2)(B), as part of the Critical Design Review for the space station.

SEC. 20. COMMISSION FOR INTERNATIONAL COOPERATION IN PLANETARY EXPLORATION.

(a) **SHORT TITLE.**—This section may be cited as the "Commission for International Cooperation in Planetary Exploration Act".

(b) **FINDINGS.**—The Congress finds that—

(1) the President on January 5, 1985 established the long-range goal of expanding human presence and activity beyond Earth orbit into the solar system in the twenty-first century;

(2) the United States and the Soviet Union, in cooperation with other countries, are currently planning further unmanned missions to the Moon and to Mars with the possible goal of landing a human on Mars;

(3) a series of international missions to expand human presence beyond Earth orbit would further a spirit of, and follow through on the commitment made in the 1987 agreement between the Soviet Union and the United States for space cooperation, as well as the successful cooperative agreements the United States has pursued with over one hundred countries since its inception, including the agreement with Japan, Canada, and the European countries for Space Station Freedom;

(4) international manned missions beyond Earth orbit could save the individual nations involved tens of billions of dollars over national missions; and

(5) a multilateral effort for manned missions to establish a lunar colony, a Mars mission, and any other missions that have the goal of establishing human presence beyond Earth's orbit and possibly landing a human on Mars would lead to greater understanding of our universe and greater sensitivity to our own planet.

(c) **ESTABLISHMENT.**—There is established a commission to be known as the "Commission for International Cooperation in Planetary Exploration" (hereafter in this section referred to as the "Commission").

(d) **PURPOSE OF COMMISSION.**—The purpose of the Commission is—

(1) to develop an inventory of intentions of all national space agencies with regard to lunar and planetary exploration, both manned and unmanned;

(2) to seek ways to enhance the planning and exchange of information and data among the United States, the Soviet Union, European countries, Canada, Japan, and other interested countries with respect to unmanned projects beyond Earth orbit, in anticipation of later international manned missions to the Moon and to other bodies, including the possible goal of an international manned mission to Mars;

(3) to prepare a detailed proposal that most efficiently uses the resources of the national space agencies in cooperative endeavors to establish human presence beyond Earth orbit;

(4) to develop priority goals that accomplish unmet needs that could not be achieved by any individual country;

(5) to explore the possibilities of international unmanned probes to the Moon and Mars, and the possibilities for international manned missions beyond Earth's orbit; and

(6) to devise strategies for such cooperation that would prevent the unwanted transfer of technology.

(e) **MEMBERSHIP.**—

(1) **NUMBER AND APPOINTMENT.**—The Commission shall be composed of 16 members, appointed from among experts in space policy or space science, as follows:

(A) Eight members shall be appointed by the President, one of whom shall be the Chairman of the National Space Council, who shall serve as Chairman of the Commission.

(B) Four members shall be appointed by the Speaker of the House of Representatives.

(C) Four members shall be appointed by the President Pro Tempore of the Senate.

A vacancy in the Commission shall be filled in the manner in which the original appointment was made.

(2) **BASIC PAY.**—Members of the Commission shall serve without pay.

(f) **DIRECTOR AND STAFF OF COMMISSION.**—

(1) **DIRECTOR.**—The Commission shall, without regard to section 5311(b) of title 5, United States Code, have a Director who shall be appointed by the Commission and who shall be paid at the rate of basic pay payable for GS-15 of the General Schedule.

(2) **STAFF.**—Subject to paragraph (3) and such rules as may be prescribed by the Commission, without regard to section 5311(b) of title 5, United States Code, the Commission may appoint and fix the pay of such additional personnel as the Commission considers appropriate.

(3) **APPLICABILITY OF CERTAIN CIVIL SERVICE LAWS.**—The staff of the Commission shall be appointed subject to the provisions of title 5, United States Code, governing appointments in the competitive service, and shall be paid in accordance with the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates.

(4) **EXPERTS AND CONSULTANTS.**—Subject to such rules as may be prescribed by the Commission, the Commission may procure temporary and intermittent services under section 3109(b) of title 5 of the United States Code.

(5) **STAFF OF FEDERAL AGENCIES.**—Upon request of the Commission, the head of any Federal agency is authorized to detail, on a reimbursable basis, any of the personnel of such agency to the Commission to assist the Commission in carrying out its duties under this section.

(g) **POWERS OF COMMISSION.**—

(1) **HEARINGS AND SESSIONS.**—The Commission may, for the purpose of carrying out this section, hold such hearings, sit and act at such times and places, take such testimony, and receive such evidence, as the Commission considers appropriate.

(2) **POWERS OF MEMBERS AND AGENTS.**—Any member or agent of the Commission may, if so authorized by the Commission, take any action which the Commission is authorized to take by this subsection.

(3) **OBTAINING OFFICIAL DATA.**—The Commission may secure directly from any department or agency of the United States information necessary to enable it to carry out this section. Upon request of the Chairman of the Commission, the head of such department or agency shall furnish such information to the Commission.

(4) **GIFTS.**—The Commission may accept, use, and dispose of gifts or donations of services or property.

(5) **MAILS.**—The Commission may use the United States mails in the same manner and under the same conditions as other departments and agencies of the United States.

(6) **ADMINISTRATIVE SUPPORT SERVICES.**—The Administrator of General Services shall provide to the Commission on a reimbursable basis such administrative support services as the Commission may request.

(h) **REPORT.**—The Commission shall, within one year after the date of the enactment of this Act, prepare and submit to the President and the Congress a report—

(1) outlining a preliminary strategy for cooperation among the United States, the Soviet Union, European countries, Canada, Japan, and other interested countries with respect to unmanned projects beyond Earth orbit, in anticipation of later international manned missions to the Moon and to other bodies, including the possible goal of an international manned mission to Mars;

(2) including an initial proposal outlining a possible international manned mission, in coordination with the preliminary strategy referred to in paragraph (1); and

(3) containing an inventory of planned and anticipated missions, manned and unmanned, that are being considered by national space agencies.

(i) **TERMINATION.**—The Commission shall cease to exist thirty days after submitting its report pursuant to subsection (h), unless the President or the Congress have requested further revisions to the report.

SEC. 21. OFFICE OF SPACE COMMERCE.

(a) **ESTABLISHMENT.**—There is established within the Department of Commerce an Office of Space Commerce.

(b) **FUNCTIONS.**—The Office of Space Commerce shall be the principal unit for the coordination of space related issues, programs, and initiatives within the Department of Commerce. The Office shall—

(1) promote private sector investment in space activities by collecting, analyzing, and disseminating information on space markets, and conducting workshops and seminars to increase awareness of commercial space opportunities;

(2) assist commercial space companies in their efforts to do business with the United States Government, and act as an industry advocate within the Executive Branch to ensure that the Government meets its space related requirements, to the fullest extent feasible, with commercially available space goods and services;

(3) ensure that the United States Government does not compete with the private sector in the provision of space hardware and services otherwise available from the private sector.

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(4) promote the export of space related goods and services;

(5) represent the Department of Commerce in the development of United States policies and in negotiations with foreign countries to ensure free and fair trade internationally in the area of space commerce; and

(6) seek the removal of legal, policy, and institutional impediments to space commerce.

SEC. 22. NATIONAL AERO-SPACE PLANE PROGRAM.

(a) **FINDINGS.**—The Congress finds that—

(1) if the United States is to maintain pre-eminence in military and commercial aeronautics into the next century, research into technology development and validation of the National Aero-Space Plane (NASP) is vital;

(2) the new and advanced materials being developed for the NASP have numerous applications in the military and the civilian aviation industry, as well as in other industries utilizing high temperature technologies;

(3) the benefits to the military and civilian aviation programs from the new and innovative technologies developed in connection with the NASP program in propulsion systems, aerodynamics, and control systems could be enormous, especially for high speed aeronautical and space flight; and

(4) military and commercial spin-off applications of NASP technologies include future superior military aircraft, space transportation systems, and commercial hypersonic aircraft.

(b) **ESTABLISHMENT OF PROGRAM.**—The Secretary of Defense (hereafter in this section referred to as the "Secretary") and the Administrator shall jointly establish a National Aero-Space Plane program whose objective shall be exclusively the development and demonstration, by 1995, of a primarily air-breathing single-stage-to-orbit and long range hypersonic cruise research flight vehicle. The program shall be a research program, and to the extent practicable technological information developed shall be transferred to the military and to the domestic civil aviation and other private industries.

(c) **RESPONSIBILITIES.**—The Secretary shall have responsibility for procurement, experimental flight vehicles, and overall program administration of the program established under subsection (b). The Administrator shall have responsibility for providing technology development and flight test support and shall have an integral role in the overall program. Representatives of both the Secretary and the Administrator shall participate in all aspects of the program.

(d) **MANAGEMENT PLAN.**—

(1) The Secretary and the Administrator shall jointly develop a management plan for the program established under subsection (b), which shall include goals, major tasks, anticipated schedules, organizational structure, funding profiles, details of the respective responsibilities of the Secretary and the Administrator, and resource procurement strategies.

(2) The management plan developed pursuant to paragraph (1) shall be submitted to the Congress within 120 days after the date of enactment of this Act.

(e) **FUNDING.**—The Secretary shall be responsible for not less than two-thirds of the funding for the program established under this section, and the Administrator shall be responsible for not more than one-third of the funding for such program.

SEC. 23. RANDOM DRUG TESTING.

The Administrator shall require random drug testing of officers and employees of the National Aeronautics and Space Administration.

SEC. 24. SMALL BUSINESS INNOVATION RESEARCH PROGRAM.

The Administrator may utilize up to 5 percent of the funds provided for the Small Business Innovation Research Program for program management and promotional activities. None of the the National Aeronautics and Space Administration Small Business Innovation Research Program funds may be used for travel or civil service salaries.

SEC. 25. FUNDING FOR EXTENDED DURATION ORBITER DEVELOPMENT.

The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-591; 100 Stat. 3341), for continued development of an extended duration orbiter.

SEC. 26. FUNDING FOR SPACE TRANSPORTATION SYSTEM.

The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-591; 100 Stat. 3341), for space transportation system requirements.

SEC. 27. NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM.

(a) Section 203(l) of the National Aeronautics and Space Administration Authorization Act of 1988 (42 U.S.C. 2286a(l)) is amended by inserting "and undergraduate" after "graduate".

(b) Section 209(a) of the National Aeronautics and Space Administration Authorization Act of 1988 (42 U.S.C. 2486a(a)) is amended by inserting "and undergraduate" after "graduate".

SEC. 28. PEACEFUL USES OF SPACE STATION.

No civil Space Station authorized under this Act may be used to carry or place in orbit any nuclear weapon or any other weapon of mass destruction, to install any such weapon on any celestial body, or to station any such weapon in space in any other manner. This civil Space Station may be used only for peaceful purposes.

The bill was ordered to be engrossed and read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

AMENDMENT NO. 1208

Mr. MITCHELL. Mr. President, I send to the desk a substitute amendment on behalf of Senators HOLLINGS and GORE and ask for its immediate consideration.

The PRESIDING OFFICER. The clerk will report the amendment.

The assistant legislative clerk read as follows:

The Senator from Maine (Mr. MITCHELL), for Mr. HOLLINGS (for himself and Mr. GORE), proposes an amendment numbered 1208.

Mr. MITCHELL. Mr. President, I ask unanimous consent that further reading of the amendment be dispensed with.

The PRESIDING OFFICER. Without objection, it is so ordered.

(The text of the amendment is printed in today's RECORD under "Amendments Submitted.")

The PRESIDING OFFICER. If there be no further amendment to be proposed, the question is on agreeing to the committee amendment in the nature of a substitute.

The amendment was agreed to.

The PRESIDING OFFICER. The question is on the engrossment of the committee amendment and third reading of the bill.

The amendment was ordered to be engrossed, and the bill to be read a third time.

The bill was read a third time.

The PRESIDING OFFICER. The bill having been read the third time, the question is, Shall the bill pass?

So the bill (H.R. 3729), as amended, was passed.

Mr. MITCHELL. Mr. President, I move to reconsider the vote.

Mr. DOLE. I move to lay that motion on the table.

The motion to lay on the table was agreed to.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION

HOLLINGS (AND GORE)
AMENDMENT NO. 1208

Mr. MITCHELL (for Mr. HOLLINGS, for himself, and Mr. GORE) proposed

an amendment to the bill (H.R. 3729) to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, and research and program management, and for other purposes, as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Aeronautics and Space Administration Multi-Year Authorization Act of 1969".

SEC. 1. FINDINGS.

The Congress finds that—

(1) the United States aeronautics and space program is supported by an overwhelming majority of the American people;

(2) the United States aeronautics and space program genuinely reflects our Nation's pioneer heritage and demonstrates our quest for leadership, economic growth, and human understanding;

(3) the United States space program is based on a solid record of achievement and continues to promote the objective of international cooperation in the exploration of the universe;

(4) the United States aeronautics and space program generates critical technology breakthroughs that benefit our economy and significantly improve our standard of living;

(5) the United States aeronautics and space program excites the imagination of every generation and can stimulate the youth of our Nation toward the pursuit of excellence in the fields of science and mathematics;

(6) the United States aeronautics and space program contributes to the Nation's technological competitive advantage;

(7) the United States aeronautics and space program requires a sustained commitment of financial and human resources;

(8) the United States space transportation system will depend upon a robust fleet of Space Shuttle Orbiters and expendable launch vehicle services;

(9) the United States space program will be advanced with the deployment of a permanently manned space station with research, observation, servicing, manufacturing, and training capabilities;

(10) the United States aeronautics program has been a key factor in maintaining preeminence in aviation over many decades;

(11) the United States needs to maintain a strong program with respect to transatmospheric research and technology; and

(12) the National Aeronautics and Space Administration is primarily responsible for formulating and implementing the civil aeronautics and space program in the United States.

SEC. 2. POLICY.

It is declared to be national policy that the United States should—

(1) rededicate itself to the goal of leadership in critical areas of space science, space exploration, and space commercialization;

(2) increase its commitment of budgetary resources for the space program to reverse the dramatic decline in real spending for such program since the achievements of the Apollo program;

(3) forge a robust national space program that maintains a healthy balance between manned and unmanned space activities and recognizes the mutually reinforcing benefits of both;

(4) maintain an active fleet of space shuttle orbiters, including an adequate provision

of structural spare parts, and evolve the Orbiter design to improve safety and performance, and reduce operational costs.

(5) sustain a mixed fleet by utilizing commercial expendable launch vehicle services;

(6) continue with the development and deployment of a permanently manned space station;

(7) establish a dual capability for logistics and resupply of the space station utilizing the space shuttle and expendable launch vehicles, including commercial services if available;

(8) continue to seek opportunities for international cooperation in space;

(9) maintain an aggressive program of aeronautical research and technology development designed to enhance the United States preeminence in civil and military aviation and improve safety and efficiency of the United States air transportation system; and

(10) conduct a program of technology maturation and flight demonstration to prove the feasibility of an air-breathing, hypersonic zero-space plane capable of single-stage-to-orbit operation and hypersonic cruise in the atmosphere.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are hereby authorized to be appropriated to the National Aeronautics and Space Administration for fiscal year 1990, except as otherwise provided:

(1) For "research and development", for the following programs:

(A) United States International Space Station Freedom, \$1,300,000,000 for fiscal year 1990, \$2,700,000,000 for fiscal year 1991, and \$3,385,000,000 for fiscal year 1992.

(B) Space transportation capability development, \$651,500,000.

(C) Physics and astronomy, \$914,500,000.

(D) Life sciences, \$124,200,000.

(E) Planetary exploration, \$366,900,000.

(F) Space applications, \$631,500,000, of which \$62,000,000 shall be available only for the Advanced Communications Technology Satellite, and of which \$10,000,000 shall be available only for a program of Earth Probes beginning with the Total Ozone Mapping Spectrometer. Of the funds provided for space applications, not more than \$2,000,000 shall be available for experiment or ground stations for the Advanced Communications Technology Satellite, but only if the experimenter receiving funds obtains at least an equal amount of funds from sources other than the National Aeronautics and Space Administration as is received under this subparagraph.

(G) Global change, \$24,200,000 for the Earth Observing System of Mission to Planet Earth in order to complete phase B activities and to initiate phase C/D of the program in fiscal year 1991.

(H) Technology utilization, \$22,700,000.

(I) Commercial use of space, \$38,200,000.

(J) Aeronautical research and technology, and transatmospheric research and technology, \$589,800,000.

(K) Space research and technology, \$338,100,000.

(L) Space exploration, \$29,000,000.

(M) Safety, reliability, maintainability, and quality assurance, \$23,300,000.

(N) Tracking and data advanced systems, \$19,900,000.

(O) University Space Science and Technology Academic Program, \$38,000,000 for fiscal year 1990, of which \$5,000,000 shall be available only for the National Space Grant College and Fellowship Program.

(P) Comet Rendezvous Asteroid Flyby/Cassini mission, not to exceed \$1,600,000,000, for development, launch, and 30 days of operations thereof, to remain available until expended, of which—

(i) \$499,000,000 shall be available for obligation after October 1, 1989;

(ii) an additional \$370,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a preliminary design review to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate;

(iii) an additional \$640,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a critical design review to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate; and

(iv) an additional \$100,000,000 shall be available for obligation 30 days after the submission of a report summarizing the results of a spacecraft integration and systems tests to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

A cost containment plan shall be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate by January 31, 1990, and updated on July 31, and January 31 of each succeeding year until such funds are expended.

(2) For "Space flight, control and data communications", for the following programs:

(A) Shuttle production and operational capability, \$1,340,200,000, of which \$35,000,000 are authorized only for tooling and equipment for the advanced solid rocket motor facility and of which \$75,000,000 are authorized only for safety enhancements which may include:

(i) for the space shuttle main engine—

(I) improve design and installation of High Pressure Oxygen Turbopump bearings;

(II) installation of the 2-duct hot gas manifold;

(III) development of enlarged throat diameter;

(IV) development of single-crystal turbine blades; and

(V) general redesign to reduce welds and make welds totally inspectable;

(ii) for the solid rocket booster/solid rocket motor—

(I) implementation of the recommendations contained in the report of the National Research Council entitled "Collected Reports of the Panel on Technical Evaluation of NASA's Redesign of the Space Shuttle Solid Rocket Booster", issued in 1988;

(II) development of a locking feature for the nozzle leak check port plug;

(III) development of one-piece case stiffener rings;

(IV) development of nonasbestos motor insulation;

(V) enhancement of lightning protection for case and nozzle; and

(VI) modification of aft skirt structure;

(iii) for external tank—

(I) upgrading of liquid hydrogen and oxygen temperature, pressure, and liquid level sensors;

(II) upgrading of thermal insulation on areas where dislodged insulation can affect the orbiter; and

(III) investigation of corrosion prevention methods to preclude structural problems; and

(iv) for the orbiter—

(I) modification of structure to eliminate negative margins;

(II) upgrading of the auxiliary power unit;

(III) development of a redundant nose wheel steering system (including possible extension of the nose wheel strut);

(IV) elimination of Kapton electrical wire insulation; and

(V) upgrading of valves and regulators to preclude leakage of fuels and oxidizers.

By September 30, 1990, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a full report on the completion of the safety enhancements specified in this subparagraph.

(B) Shuttle operations, \$2,544,900,000.

(C) Expendable launch vehicles and services, \$169,500,000. By March 30, 1990, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that outlines the anticipated schedule for block changes in the Tracking Data Relay Satellite System and the launch of these spacecraft on expendable launch vehicles.

(D) Space and ground network, communications and data systems, \$1,077,100,000.

(3) For "Construction of facilities", including land acquisition, as follows:

(A) Construction of addition for Space Systems Automated Integration and Assembly Facility, Johnson Space Center, \$10,500,000.

(B) Construction of addition to Mission Control Center, Johnson Space Center, \$17,300,000.

(C) Construction of addition to Simulator/Training Facility, Johnson Space Center, \$3,300,000.

(D) Modifications for Expanded Solar Simulation, Johnson Space Center, \$2,000,000.

(E) Modifications of Process Technology Facility for Space Station, Marshall Space Flight Center, \$4,000,000.

(F) Replace Cooling Towers, Launch Complex 39 Utility Annex, Kennedy Space Center, \$4,300,000.

(G) Replace Pad 1 Cranes and Controls, Launch Complex 39, Kennedy Space Center, \$1,200,000.

(H) Replace Roofs, Launch Complex 39, Kennedy Space Center, \$11,000,000.

(I) Replace Vehicle Assembly Building Air Handling Units, Kennedy Space Center, \$1,300,000.

(J) Upgrade Orbiter Modification and Refurbishment Facility to Orbiter Processing Facility No. 3, Kennedy Space Center, \$28,000,000.

(K) Modification of High Pressure Industrial Water System, Stennis Space Center, \$2,000,000.

(L) Replacement of High Pressure Gas Storage Vessels, Stennis Space Center, \$3,000,000.

(M) Construction of natural resource protection at various locations, \$3,300,000.

(N) Refurbish bridges, Merritt Island, Kennedy Space Center, \$4,500,000.

(O) Rehabilitation of Spacecraft Assembly and Encapsulation Facility II, Kennedy Space Center, \$3,500,000.

(P) Rehabilitation of Central Heating/Cooling Plant, Johnson Space Center, \$2,500,000.

(Q) Construction of Data Operations Facility, Goddard Space Flight Center, \$12,000,000.

(R) Construction of Quality Assurance and Detector Development Laboratory, Goddard Space Flight Center, \$7,500,000.

(S) Modernization of South Utility Systems Jet Propulsion Laboratory, \$3,400,000.

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(T) Construction of 40 x 80 Drive Motor Roof, Ames Research Center, \$1,000,000.

(U) Modifications to Thermo-Physics Facilities, Ames Research Center, \$4,000,000.

(V) Modifications to 14 x 22 Subsonic Wind Tunnel, Langley Research Center, \$1,000,000.

(W) Modifications to National Transonic Facility Productivity, Langley Research Center, \$7,000,000.

(X) Modifications to 36-Foot Vertical Spin Tunnel, Langley Research Center, \$1,000,000.

(Y) Rehabilitation of Central Air Systems, Lewis Research Center, \$2,400,000.

(Z) Rehabilitation of Central Refrigeration Equipment, Lewis Research Center, \$7,000,000.

(AA) Rehabilitation of 3 x 6 Supersonic and 9 x 15 Low-Speed Wind Tunnels, Lewis Research Center, \$6,000,000.

(AB) Rehabilitation of Hypersonic Tunnel, Plum Brook, \$4,100,000.

(AC) Repair and Modernization of the 12-Foot Pressure Wind Tunnel, Ames Research Center, \$7,000,000.

(AD) Construction of Automation Sciences Research Facility, Ames Research Center, \$10,000,000.

(AE) Construction of Supersonic/Hypersonic Low Disturbance Tunnel, Langley Research Center, \$6,000,000.

(AF) Modifications for Seismic Safety, Golden, Co., Jet Propulsion Laboratory, \$2,000,000.

(AG) Repair of facilities at various locations, not in excess of \$750,000 per project, 123,000,000.

(AH) Renovation and modification of facilities at various locations, not in excess of \$750,000 per project, 136,000,000.

(AI) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$500,000 per project, 118,000,000.

(AJ) Environmental compliance and restoration, 330,000,000.

(AK) Facility planning and design not otherwise provided for, 126,300,000.

(AL) Construction of the Advanced Solid Rocket Motor Facility, Yellow Creek, Mississippi, 200,000,000.

(AM) Construction of a Space Station Orbits Debris Radar Facility, 115,000,000.

(AN) Construction of a Wave Shield Facility, 22,500,000.

(AO) Construction of Observational Instrument Laboratory, Jet Propulsion Laboratory, 114,000,000.

Notwithstanding subparagraphs (A) through (AO), the total amount appropriated under such subparagraphs shall not exceed \$449,300,000.

(4) For "Research and program management", \$2,049,700,000.

(5) For "Inspector General", \$8,793,000.

(6) Notwithstanding paragraph (9), appropriations authorized pursuant to this Act for "Research and development" and "Space flight, control and data communications" may be used (A) for any items of a special nature (other than acquisition of land) which may be required at locations other than installations of the National Aeronautics and Space Administration for the performance of research and development contracts, and (B) for grants to nonprofit institutions of higher education, or to nonprofit organizations whose primary purpose is the conduct of scientific research, for purchase or construction of additional research facilities and title to such facilities shall be vested in the United States unless the Administrator of the National Aeronautics and Space Administration (hereafter in this Act referred to as the "Administrator") determines that the national program of

aeronautical and space activities will best be served by vesting title in any such grantee institution or organization. Each such grant shall be made under such conditions as the Administrator shall determine to be required to ensure that the United States will receive therefrom benefit adequate to justify the making of that grant. None of the funds appropriated for "Research and development" and "Space flight, control and data communications" pursuant to this Act may be used in accordance with this paragraph for the construction of any major facility, the estimated cost of which, including collateral equipment, exceeds \$500,000, unless the Administrator or the Administrator's designee has notified the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, of the nature, location, and estimated cost of such facility.

(7) Except as otherwise provided, and to the extent provided in an appropriation Act, (A) any amount appropriated for "Research and Development", for "Space flight, control and data communications", or for "Construction of facilities" may remain available without fiscal year limitation, and (B) contracts may be entered into under "Research and program management" for maintenance and operation of facilities, and for other services to be provided, during the next fiscal year.

(8) Appropriations made pursuant to paragraph (4) may be used, but not to exceed \$25,000 per fiscal year, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator, and his determination shall be final and conclusive upon the accounting officers of the Government.

(9A) Funds appropriated pursuant to paragraphs (1), (2), and (4) may be used for the construction of new facilities and additions to repair, renovation, or modification of existing facilities, if the cost of each such project, including collateral equipment, does not exceed \$100,000.

(9B) Funds appropriated pursuant to paragraphs (1) and (2) may be used for interrelated programmatic facility project needs, if the cost of each such project, including collateral equipment, does not exceed \$500,000.

(9C) Funds appropriated pursuant to paragraph (4) may be used for repair, renovation, or modification of facilities controlled by the General Services Administration, if the cost of each project, including collateral equipment, does not exceed \$500,000.

SEC. 4. ADMINISTRATOR'S REPROGRAMMING AUTHORITY.

Any of the amounts authorized in section 4(3)—

(1) in the discretion of the Administrator or the Administrator's designee, may be varied upward 10 percent, or

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, on the circumstances of such action, may be varied upward 25 percent, to meet unusual cost variations.

The total amount authorized under section 4(3) for fiscal year 1990 shall not be increased as a result of reprogramming carried out pursuant to this section.

SEC. 5. SPECIAL REPROGRAMMING AUTHORITY FOR CONSTRUCTION OF FACILITIES.

Where the Administrator determines that new developments or scientific or engineering changes in the national program of aeronautical and space activities have occurred, and that such changes require the

use of additional funds for the purposes of construction, expansion, or modification of facilities at any location; and that deferral of such action until the enactment of the next authorization Act would be inconsistent with the interest of the Nation in aeronautical and space activities; the Administrator may transfer not to exceed 1/2 of 1 percent of the funds appropriated pursuant to section 4(1) and (2) to the "Construction of facilities" appropriation for such purposes. The Administrator may also use up to \$18,000,000 of the amounts authorized under section 4(3) for such purposes. The funds so made available pursuant to this section may be expended to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment. No such funds may be obligated until a period of 30 days has passed after the Administrator or the Administrator's designee has transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a written report describing the nature of the construction, its cost, and the reasons therefor.

SEC. 7. LIMITATIONS ON AUTHORITY.

Notwithstanding any other provision of this Act, no amount appropriated pursuant to this Act may be used for any program not authorized, or in excess of amounts authorized, by the Congress, unless a period of 30 days has passed after the receipt by the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate of notice given by the Administrator or the Administrator's designee containing a full and complete statement of the action proposed to be taken and the facts and circumstances relied upon in support of such proposed action.

SEC. 8. PROCUREMENT OF SPACE SHUTTLE STRUCTURAL SPARE PARTS.

The Administrator is authorized and encouraged to use up to \$25,000,000 of the funds appropriated for greater production under section 101(g) of the joint resolution entitled "Joint Resolution Making Continuing Appropriations for the fiscal year 1987, and for other purposes" (100 Stat. 7341-242) to procure shuttle structural spare parts.

SEC. 9. GEOGRAPHICAL DISTRIBUTION.

The Administrator shall distribute research and development funds geographically in order to provide the broadest practicable participation in the programs of the National Aeronautics and Space Administration.

SEC. 10. BUY AMERICAN.

(a) GENERAL RULE.—The Administrator shall award to a domestic firm a contract that, under the use of competitive procedures, would be awarded to a foreign firm.

(1) the final product of the domestic firm will be completely assembled in the United States;

(2) when completely assembled, not less than 50 percent of the final product of the domestic firm will be domestically produced; and

(3) the difference between the bids submitted by the foreign and domestic firms is not more than 4 percent.

(b) EXCEPTIONS.—This section shall not apply to the extent to which—

(1) such applicability would not be in the public interest;

(2) compelling national security considerations require otherwise; or

(3) the United States Trade Representative determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(c) **DEFINITIONS.**—For purposes of this section—

(1) the term "domestic firm" means a business entity that is incorporated in the United States and that conducts business operations in the United States;

(2) the term "foreign firm" means a business entity not described in paragraph (1).

(d) **LIMITATION.**—This section shall apply only to contracts for which—

(1) amounts are made available pursuant to this Act; and

(2) solicitations for bids are issued after the date of the enactment of this Act.

SEC. 11. AMENDMENTS TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1968

Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) is amended in subsection (a), by—

(1) striking "and" at the end of paragraph (2);

(2) striking the period at the end of paragraph (3) and inserting in lieu thereof a semicolon; and

(3) adding at the end the following new paragraphs:

"(4) seek and encourage, to the maximum extent possible, the fullest commercial use of space; and

"(5) encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government."

SEC. 12. COMMERCIAL SERVICES REPORT

In order to establish procedures for the procurement of private sector space launch services and hardware for the National Aeronautics and Space Administration or other Government agencies, the Administrator shall provide by March 15, 1990, to the Committee on Commerce, Science and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House a report on specific Federal Acquisition Regulations, policies, and other directives which inhibit the acquisition of such space launch services and hardware on a commercially reasonable basis.

SEC. 13. COMMERCIAL SPACE LAUNCH ACT AUTHORIZATION

Section 24 of the Commercial Space Launch Act (49 U.S.C. App. 2622) is amended by adding at the end thereof the following: "There are authorized to be appropriated to the Secretary to carry out this Act \$4,392,000 for fiscal year 1990."

SEC. 14. NATIONAL SPACE COUNCIL AUTHORIZATION

(a) **AUTHORIZATION OF APPROPRIATIONS.**—There are authorized to be appropriated to carry out the activities of the National Space Council established by section 501 of the National Aeronautics and Space Administration Authorization Act, Fiscal Year 1989 (42 U.S.C. 2471), \$1,200,000 for fiscal year 1990. The National Space Council shall reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it.

(b) **STAFFING.**—Not more than 5 individuals may be employed by the National Space Council without regard to any provision of law regulating the employment or compensation of persons in the Government service, at rates not to exceed the rate of pay for level VI of the Senior Executive Schedule as provided pursuant to section 5382 of title 5, United States Code.

(c) **CONFORMING AMENDMENT.**—Section 5314 of title 5, United States Code, is

amended by adding at the end thereof the following:

"Executive Secretary, National Space Council."

(d) **EXPERTS AND CONSULTANTS.**—The National Space Council may, for purposes of carrying out its functions, employ experts and consultants in accordance with section 3109 of title 5, United States Code, and may compensate individuals so employed for each day they are involved in a business of the National Space Council (including travel time) at rates not in excess of the daily equivalent of the maximum rate of pay for grade GS-18 as provided pursuant to section 5332 of title 5, United States Code.

(e) **REVIEW OF LAUNCH INDUSTRY.**—(1) The National Space Council is requested to initiate a review of United States launch policy, including the Nation's expendable launch vehicle and satellite industries, their current and projected markets, the existing and projected level of foreign competition in these industries, the extent and level of support from foreign governments in these markets and industries, the consequences of the entry of nonmarket providers of launch services and satellites into the world market, restrictions on the use of foreign launch services and the export of United States satellites, and the importance of the United States launch vehicle and satellite industry to the national and economic security.

(2) The findings of this review and any policy recommendations are to be submitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate by August 1, 1990.

SEC. 15. INTERNATIONAL SPACE YEAR

(a) **SENSE OF THE CONGRESS.**—It is the sense of the Congress that the President should—

(1) lead the formulation of an International Space Year agenda developed in consultation with foreign leaders;

(2) declare a World Space Congress to be convened in 1992 to establish a program for cooperative space activities among cooperating nations in space science, space exploration, and the application of space technologies;

(3) invite the American public to develop International Space Year activities that foster the cooperative spirit of the International Space Year; and

(4) direct the National Aeronautics and Space Administration to continue to develop International Space Year activities with a primary emphasis on Mission to Planet Earth, but also with a strong emphasis on the other space sciences, human exploration, education, and developing nations applications.

(b) **REPORT TO CONGRESS.**—The President shall report to Congress at the earliest practicable date, but not later than January 1, 1990, on the steps taken pursuant to this section.

SEC. 16. ADVANCED SOLID ROCKET MOTOR REPORT

The Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the projected cost to complete the design, development, and qualification of the Advanced Solid Rocket Motor and progress toward meeting the objective of providing additional payload capability for the space shuttle. The first report shall be submitted at the end of 6 months after the signing of the Advanced Solid Rocket Motor contract, and thereafter with the National Aeronautics and Space Administration's annual budget request.

SECTION 17. SPACE SHUTTLE USE POLICY

(a)(1) It shall be the policy of the United States to use the Space Shuttle for purposes that (A) require the presence of man, (B) require the unique capabilities of the Space Shuttle or (C) when other compelling circumstances exist.

(2) The term "compelling circumstances" includes, but is not limited to, occasions when the Administrator determines, in consultation with the Secretary of Defense and/or the Secretary of State, that important national security or foreign policy interests would be served by a Shuttle launch.

(3) The policy stated in subsection (a)(1) shall not preclude the use of available cargo space on a Space Shuttle mission otherwise consistent with the policy described under subsection (a)(1), for the purpose of carrying secondary payloads (as defined by the Administrator) that do not require the presence of man if such payloads are consistent with the requirements of research, development, demonstration, scientific, commercial, and educational programs authorized by the Administrator.

(b) The Administrator shall within six months after the date of enactment of this Act, submit a report to the Congress setting forth a plan for the implementation of the policy described in subsection (a)(1).

Such plan shall include—

(1) details of the implementation plan;

(2) a list of purposes that meet such policy;

(3) a proposed schedule for the implementation of such policy;

(4) an estimate of the costs to the United States of implementing such policy; and

(5) a process for informing the Congress in a timely and regular manner of how the plan is being implemented.

(c) At least annually, the Administrator shall submit to the Congress a report certifying that the payloads scheduled to be launched on the Space Shuttle for the next four years are consistent with the policy set forth in subsection (a)(1). For each payload scheduled to be launched from the Space Shuttle, which do not require the presence of man, the Administrator shall in the report to Congress, state the specific circumstances which justified the use of the Space Shuttle. If, during the period between scheduled reports to the Congress, any additions are made to the list of certified payloads intended to be launched from the Shuttle, the Administrator shall inform the Congress of the additions and the reasons therefor within 45 days of the change.

(d) The report described in subsection (c) shall also include those NASA payloads designed solely to fly on the Space Shuttle which have begun the phase C/D of its development cycle.

SEC. 18. LIFE SCIENCES STRATEGIC PLAN

(a) **FINDINGS.**—The Congress finds that—

(1) the current knowledge base in life sciences is not compatible with the National Aeronautics Space Administration's current objectives in space, and the National Aeronautics Space Administration lacks an adequate strategic plan to acquire this knowledge base;

(2) it is critical to the success of manned missions in space, be they commercial operations of microgravity laboratories or manned missions to Mars, that a realistic appraisal of the influences of the space environment on biological systems is completed and appropriate protective countermeasures developed;

(3) the space station is rapidly approaching design maturity without a corresponding development of the physiological and other human factors knowledge base necessary for long-term manned operations in space; and

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(4) space station laboratory hardware specifications are being fixed before fully establishing the objectives and requirements for life sciences research.

(b) STRATEGIC PLAN.—The Administrator shall—

(1) review currently proposed manned space flight missions in order to—

(A) identify the physiological and other human factors knowledge base necessary to determine the human capacity to adapt to and perform effectively in the space environment according to mission requirements, including identifying which life sciences parameters must be measured and which technologies, processes, and procedures must be developed; and

(B) develop a schedule indicating when specific components of information, technologies, processes, or procedures identified under subparagraph (A) will need to be acquired or developed in order to verify that human adaptability requirements of manned space flight missions can be achieved;

(2) develop a strategic plan for life sciences research and technology development sufficient to accomplish the life sciences knowledge base acquisition schedule developed under paragraph (1)(B), including—

(A) a crew certification plan setting acceptable crew deconditioning standards for Extended Duration Orbiter operations and verifying countermeasures sufficient to meet those standards before actual Extended Duration Orbiter operations; and

(B) a life sciences implementation plan for the design and development of the space station to be provided as part of the Preliminary Design Review for the space station, and to include crew medical standards; and

(3) verify the physiological and technical feasibility of the life sciences implementation plan developed under paragraph (2)(B), as part of the Critical Design Review for the space station.

SEC. 3. OFFICE OF SPACE COMMERCE.

There is established within the Department of Commerce an Office of Space Commerce.

SEC. 4. NATIONAL AERO-SPACE PLANE PROGRAM.

(a) FINDING.—The Congress finds that—

(1) if the United States is to maintain pre-eminence in military and commercial aeronautics into the next century, research and technology development and validation of the National Aero-Space Plane (NASP) is vital;

(2) the new and advanced materials being developed for the NASP have numerous applications in the military and the civilian aviation industry, as well as in other industries utilizing high temperature technologies;

(3) the benefits to the military and civilian aviation programs from the new and innovative technologies developed in connection with the NASP program in propulsion systems, aerodynamics, and control systems could be enormous, especially for high speed aeronautical and space flight; and

(4) military and commercial spin-off applications of NASP technologies include future superior military aircraft, space transportation systems, and commercial hypersonic aircraft.

(b) CARRY-OUT OF THE JOINT PROGRAM.—The Secretary of Defense (hereafter in this section referred to as the "Secretary") and the Administrator shall continue to jointly conduct a National Aero-Space Plane program whose objective shall be the development and demonstration in a research flight vehicle of air breathing technologies for single-stage-to-orbit and long range hypersonic flight. The program shall be a research program, and to the extent practicable techno-

logical information developed shall be transferred to the military and to the domestic civil aviation and other private industries.

(c) RESPONSIBILITIES.—The Secretary shall have responsibility for procurement, experimental flight vehicles, and overall program administration of the program established under subsection (b). The Administrator shall have responsibility for providing technology development and flight test support and shall have an integral role in the overall program. Representatives of both the Secretary and the Administrator shall participate in all aspects of the program.

(d) MANAGEMENT PLAN.—

(1) The Secretary and the Administrator shall jointly develop a management plan for the program established under subsection (b), which shall include goals, major tasks, anticipated schedules, organizational structure, funding profiles, details of the respective responsibilities of the Secretary and the Administrator, and resource procurement strategies.

(2) The management plan developed pursuant to paragraph (1) shall be submitted to the Congress within 120 days after the date of enactment of this Act.

SEC. 5. SMALL BUSINESS INNOVATION RESEARCH PROGRAM.

Administrator may utilize up to 5 percent of the funds provided for the Small Business Innovation Research Program for program management and promotional activities. None of the National Aeronautics and Space Administration Small Business Innovation Research Program funds may be used for travel or civil service salaries.

SEC. 6. FUNDING FOR EXTENDED DURATION ORBITER DEVELOPMENT.

The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-561; 100 Stat. 3341), for continued development of an extended duration orbiter.

SEC. 7. FUNDING FOR SPACE TRANSPORTATION SYSTEM.

The Administrator is authorized to use up to \$25,000,000 of the funds appropriated in section 101(g) of the Joint Resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1987, and for other purposes", approved October 30, 1986 (Public Law 99-561; 100 Stat. 3341), for space transportation system requirements.

SEC. 8. NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM.

(a) Section 303(1) of the National Aeronautics and Space Administration Authorization Act of 1968 (42 U.S.C. 2393a(1)) is amended by inserting "and undergraduate" after "graduate".

(b) Section 308(a) of the National Aeronautics and Space Administration Authorization Act of 1968 (42 U.S.C. 2484(a)) is amended by inserting "and undergraduate" after "graduate".

SEC. 9. PEACEFUL USES OF SPACE STATION.

No civil Space Station authorized under this Act may be used to carry or place in orbit any nuclear weapon or any other weapon of mass destruction, to install any such weapon on any celestial body, or to station any such weapon in space in any other manner. This civil Space Station may be used only for peaceful purposes.

101ST CONGRESS
1st Session

HOUSE OF REPRESENTATIVES

REPORT
101-150DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING
AND URBAN DEVELOPMENT, AND INDEPENDENT
AGENCIES APPROPRIATIONS BILL, 1990JULY 17, 1989.—Committed to the Committee of the Whole House on the State of
the Union and ordered to be printedMr. TRAXLER, from the Committee on Appropriations,
submitted the following

REPORT

[To accompany H.R. 2916]

The Committee on Appropriations submits the following report in explanation of the accompanying bill making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes.

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SUMMARY OF THE BILL

The Committee recommends \$65,141,250,000 in new budget (obligational) authority for the Departments of Veterans Affairs and Housing and Urban Development, and 18 independent agencies and offices. This is \$4,520,369,000 above the 1989 appropriations level.

The following table summarizes the amounts recommended in the bill in comparison with appropriations for fiscal year 1989 and budget estimates for fiscal year 1990.

SUMMARY OF ESTIMATES AND NEW BUDGET (OBLIGATIONAL) AUTHORITY IN BILL

Department or agency	Appropriations, 1989	Budget estimates, 1990	Recommended in bill	Bill compared with—	
				Appropriations, 1989	Budget estimates, 1990
(1)	(2)	(3)	(4)	(5)	(6)
American Battle Monuments Commission.....	\$15,085,000	\$14,507,000	\$15,000,000	-\$85,000	+\$493,000
Cemeterial Expenses, Army.....	13,195,000	12,569,000	12,569,000	-626,000	
Consumer Information Center.....	1,354,000	1,360,000	1,360,000	+6,000	
Consumer Product Safety Commission.....	34,500,000	33,479,000	35,500,000	+1,000,000	+2,021,000
Council on Environmental Quality.....	850,000	861,000	861,000	+11,000	
Court of Veterans Appeals.....	3,100,000	1,462,000	3,000,000	-100,000	+1,538,000
Department of Housing and Urban Development.....	12,771,472,000	12,978,673,365	15,167,427,000	+2,390,955,000	+2,233,753,635
Department of Veterans Affairs.....	29,344,886,000	29,616,115,000	29,524,305,000	+179,419,000	+908,190,000
Environmental Protection Agency.....	5,155,125,000	4,883,000,000	5,427,117,000	+266,992,000	+529,117,000
Federal Emergency Management Agency.....	633,712,000	816,273,000	648,928,000	+15,216,000	167,345,000
Federal Home Loan Bank Board *.....	(31,942,000)	(33,464,000)		(-31,942,000)	(-33,464,000)
National Aeronautics and Space Administration.....	10,676,000,000	13,273,395,000	12,262,995,000	+1,586,995,000	-1,011,000,000
National Credit Union Administration *.....	(600,000,000)	(600,000,000)	(600,000,000)		
National Institute of Building Sciences *.....		500,000	500,000	+500,000	+500,000
National Science Foundation *.....	1,922,500,000	2,149,022,000	1,999,000,000	+76,500,000	-150,022,000
National Space Council.....		563,000	1,200,000	+1,200,000	+637,000
Neighborhood Reinvestment Corporation.....	19,494,000	14,581,000	21,250,000	+1,766,000	+6,679,000
Office of Consumer Affairs.....	1,708,000	1,988,000	1,888,000	+180,000	-100,000
Office of Science and Technology Policy.....	1,587,000	2,027,000	2,027,000	+440,000	
Selective Service System.....	26,313,000	26,313,000	26,313,000		
Total	60,620,881,000	62,776,788,365	65,141,250,000	+4,520,369,000	+2,364,461,635

* Limitation on administrative expenses, corporate funds

* Limitation on direct loans

* In 1989 and prior years, \$500,000 was provided from trust fund interest

* Does not reflect \$17,500,000 advance 1990 appropriation in P.L. 101-45

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND DEVELOPMENT

1989 appropriations.....	\$4,166,700,000
Estimate, 1990.....	5,751,600,000
Recommendation.....	5,203,100,000
Decrease below estimate.....	-548,500,000

The Committee recommends a total of \$5,203,100,000 for this account in fiscal year 1990. This is \$548,500,000 below the budget request and includes the following increases, decreases, and changes to the program areas described below.

—\$395,000,000 from the \$2,050,200,000 requested to provide a total of \$1,655,200,000 for space station. The Committee's space station recommendation is summarized as follows:

	Request	Change
Space Station:		
Development.....	\$1,970,200,000	-\$395,000,000
Flight Telerobotic Servicer.....	15,000,000	+ 65,000,000
Operations.....	25,000,000	- 25,000,000
Transition Definition.....	25,000,000	- 25,000,000
Orbital Debris Radar.....	15,000,000	- 15,000,000
Total.....	2,050,200,000	- 395,000,000

Within the station program the Committee has reduced the development line item by \$395,000,000—from \$1,970,200,000 to \$1,575,200,000. In view of the shortfall in the section 302(b) outlay allocation to the VA, HUD, and Independent Agencies Subcommittee, the Committee had no alternative to this recommendation. It recognizes that this decrease may cause a slip in the first element launch of space station beyond the current date of March 1995 and/or some "descopeing" of the Block I elements.

The Committee believes that the impact of the 1990 reduction can be ameliorated, in part, by NASA actively seeking to reduce

the "overhead" associated with the space station program. In that connection, bill language has been included requiring that not more than 50 percent of the \$395,000,000 reduction in the development line item be taken from the work package "primes" with an estimated 1990 content value of \$1,288,000,000. The Committee has been advised that supporting development costs, which constitute 14 percent of total 1990 dollars, could be excessive—particularly in comparison with other NASA programs. Other savings may be possible in the operation/utilization funding area and management and integration activities. A table, furnished by NASA, and outlining the various space station categories described above, appears on page 53 of Volume VI of the 1990 VA-HUD-Independent Agencies hearings.

The Committee expects to have an independent analysis of space station overhead costs made as soon as possible. It hopes that this analysis will focus on determining what elements of the supporting development, operation/utilization capability, and management and integration costs are absolutely essential and directly required by the station program. In the meantime, the Committee urges NASA to "scrub" the outyear overhead costs so that the maximum dollars are applied to the work package primes for the actual development of flight hardware.

Also, because the Committee believes that the earth observation system (EOS), which is scheduled to start in fiscal year 1991 and which forms the basis for the polar platform and is an essential tool in monitoring the world's environment, it has included bill language requiring that any reduction in the work package 3 "prime", which includes the polar platform, shall not exceed 10 percent of the \$107,000,000 requested in 1990.

The Committee further notes that the development, construction and operation of the space station is one of the most ambitious projects undertaken by our nation. Unfortunately, NASA reports that, in 1987, less than one percent of space station contracts were awarded to women-owned businesses. Approximately three percent of space station contracts were awarded to minority-owned businesses during 1989.

Traditionally, minority-owned firms have not been involved with projects of this magnitude. Consequently, our nation faces a situation constituting de facto exclusion of qualified contractors from such projects. By including bill language that at least 10 percent of station funds be allocated for women and minority-owned businesses, NASA helps to enhance and guarantee minority involvement in the scientific and technological industries which are bound to shape our nation's future.

The Committee has added \$65,000,000 to the \$15,000,000 requested for the flight telerobotic servicer (FTS). This will provide for a total FTS program of not less than \$80,000,000 from within the total \$1,655,200,000 made available for space station. This level of funding should ensure that the flight demonstrations scheduled for 1991 and 1993 remain on schedule. The Committee continues to believe that this program offers an excellent opportunity to enhance the nation's competitive capability in the robotics area.

Finally, the Committee has transferred the \$15,000,000 requested for the orbital debris radar from this account to the construction of facilities account.

– \$15,000,000 from the \$88,600,000 requested for upper stages.

– \$10,000,000 from the \$189,800,000 requested for the engineering and technical base.

– \$20,000,000 from the \$48,700,000 requested for advanced programs. Of this amount \$5,000,000 represents a general reduction. The remaining \$15,000,000 represents \$7,000,000 requested for a space station crew rescue vehicle in 1990 and \$8,000,000 provided in 1989 and carried forward into 1990 for the same purpose. In that connection, the committee is recommending that not less than \$3,000,000 of 1989 funds be available for phase A prime studies only. The Committee believes that phase B funding can be deferred in view of the probable delay of permanent manned capability.

– \$10,000,000 from the \$107,000,000 requested for the orbital maneuvering vehicle.

+ \$22,000,000 for the gravity probe (B) mission. This restores this important basic science program to the approximate level assumed in NASA's request to the Office of Management and Budget.

– \$15,000,000 from the \$124,200,000 requested for life sciences. The reduction may be taken at the agency's discretion.

+ \$10,000,000 for continued development of instruments for the total ozone mapping spectrometer satellite (TOMS).

– \$5,000,000 from the \$34,100,000 requested for information systems.

– \$10,000,000 from the \$61,000,000 requested for commercial programs. The Committee directs that none of the reduction should be taken from the \$22,700,000 requested for "technology utilization." Also, NASA is directed to allocate \$625,000 for Rural Enterprises, Incorporate, which has been designated by NASA as the only rural applications center and the central U.S. industrial applications center.

– \$17,500,000 from the \$144,500,000 requested for the Civil Space Technology Initiative. The reduction may be taken at the agency's discretion.

– \$25,000,000 from the \$47,300,000 requested for the Pathfinder program. The reduction may be taken at the agency's discretion.

– \$49,000,000 from the \$127,000,000 requested for the National Aerospace Plane. The Committee deeply regrets having to recommend this cut in such an important national technology effort. However, this reduction reflects the ongoing budget realities which accords space station first priority. The Committee does, however, find it difficult to understand how in the face of an exceedingly tight section 302(b) outlay allocation to the VA, HUD, and Independent Agencies Subcommittee the Administration expects NASA funding to be maintained at the full budget request while allowing the DOD contribution to fall to less than 45 percent of the original 1990 requirement (\$300,000,000).

+ \$1,000,000 to the \$2,300,000 requested for interdisciplinary research and analysis for climate studies.

– \$10,000,000 from the research and development account to be taken at the agency's discretion, except that none of the reduction

may be applied to those programs enhanced in the Committee's recommendations.

The Committee has included no funding for the Advanced Communications Technology Satellite. This reduction is made without prejudice and is solely driven by the extremely constrained section 302(b) allocation. The Committee hopes, however, that funding can be restored during the remaining appropriations cycle.

The Committee directs NASA to earmark from available funds, \$1,400,000 to Wheeling Jesuit College to establish and equip a computer software program for the purpose of developing software for the Challenger Space Center at Wheeling Jesuit College and its sister affiliate sites throughout the nation. The Committee understands that the Challenger Center for Science Space Education has accepted Wheeling Jesuit College's application to become the first college-based Challenger Center affiliate site in the nation. Challenger Center officials suggest that a need for software for nationwide operations is essential and the Center believes that the proposal offered by Wheeling Jesuit College to undertake a software development program can be integrated into the nationwide Challenger Centers for Space Science Education.

The Committee has also included \$30,000,000 for the initiation of the Comet Rendezvous Asteroid Flyby (CRAF)—Cassini program. The Committee recommends this amount for the CRAF-Cassini program with the understanding that the total budget authority for development of the two spacecraft, through launch plus thirty days of the Cassini mission, will not exceed \$1,600,000,000. Recognizing normal budget constraints, the Committee expects to recommend the annual level required for this program. It will, however, "cap" each annual appropriation at such amount, provided that the accumulated sum of these amounts does not exceed the \$1,600,000,000 limit. In the event that it is determined during the course of this program that the total budget will exceed \$1,600,000,000, NASA will be required to descope the program to fit within the total funding limit. If the descoping includes the cancellation of one of the missions, the mission to be cancelled is CRAF. The \$1,600,000,000 estimate is based on the standard NASA inflation model. If such model proves to underrun actual inflation, the Committee will consider revising the annual and total caps.

The Committee expects NASA to submit with the FY 1990 operating plan the projected annual funding requirements for each year of development of the CRAF-Cassini program. These annual funding requirements should be updated on January 31 and July 31 of each subsequent fiscal year based on the most recent data available, including the program operating plan (POP) results.

The Committee wishes to commend NASA for working with a consortium of universities in the private sector to promote commercial uses of jetisoned shuttle external tanks. NASA has signed a memorandum of agreement with the University Corporation for Atmospheric Research (UCAR), granting it use of five external tanks on a suborbital basis. UCAR is commended for planning to develop the external tanks through private financing at no cost to the government, and it is hoped that this unique type of collaborated effort between government, universities and the private sector will improve U.S. productivity and international competitiveness in

the years ahead. The Committee will continue to monitor the concept of using jettisoned external tanks for various commercial purposes and will look forward to an early demonstration of this innovative collaborative approach to gaining additional value from one element of the space shuttle system.

In approving the \$5,000,000 request for the National Space Grant College and Fellowship program, the Committee directs NASA, in addition to criteria in the enabling legislation, to consider for funding those universities that promote research in the areas of application of advanced electronics in dynamic control of lightweight structures, non-destructive testing during space-based manufacturing of crystals and new lightweight composite materials for advanced space systems.

The Committee is also concerned with improving the geographic diversity of competitive research grants awarded by the Federal government and notes that a small pilot program to address this disparity exists within the National Science Foundation. This program is known as the Experimental Program to Stimulate Competitive Research (EPSCOR). It has achieved significant results in aiding less competitive states in developing their research infrastructure and improving their ability to compete for research grants and leveraging those federal dollars with nonfederal dollars for research and science education.

Therefore, the Committee directs NASA to submit a report to the Appropriations Committee by January 1, 1990, which (1) gives a geographic breakdown of NASA research funding for the period 1984-1989; (2) examines the potential for increasing the geographic diversity of NASA research funding through a coordinated effort with state EPSCOR committees; and (3) provides an analysis of the potential for expanding the research and science education base in states with an EPSCOR committee.

The Committee has included bill language delaying the obligation of \$384,000,000 of space transportation capability development funds until April 15, 1990. The Committee believes that this delay will not cause any significant program disruption.

Finally, the Committee is "capping" the 1990 amounts for a number of programs. In accordance with the agreement as outlined in the letter from NASA to the Committee dated August 9, 1984, these "caps", if included in the conference report, may not be exceeded without the approval of the Committees on Appropriations.

- (1) Gamma Ray Observer—\$26,700,000
- (2) Galileo—\$17,400,000
- (3) AXAF—\$44,000,000
- (4) Hubble Space Telescope—\$67,000,000
- (5) CRAF-Cassini—\$30,000,000
- (6) Mars Observer—\$100,500,000
- (7) Upper Atmospheric Research Satellite—\$73,900,000

SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS

1989 appropriation.....	\$4,364,200,000
Estimate, 1990.....	5,139,600,000
Recommendation.....	4,709,600,000
Decrease below estimate.....	-430,000,000

The space flight, control and data communications account includes the program elements that provide for the national fleet of space shuttle orbiters, including main engines, launch site mission operations, control requirements, spares, production tooling, and related supporting activities. This account also provides the standard operational support services for the space shuttle and expendable launch vehicles, and includes tracking, telemetry, command, and data acquisition support required to meet all NASA flight projects.

The Committee recommends a total of \$4,709,600,000 for this account in 1990. This is a decrease of \$430,000,000 below the budget request and is \$345,400,000 above the 1989 level. The recommendation includes the following increases, decreases, and changes to the program areas described below:

- \$380,000,000 from the \$4,037,500,000 requested for the space transportation system (shuttle). The reduction may be taken at NASA's discretion from the shuttle production or shuttle operations line items subject to the normal reprogramming procedures.
- + \$25,000,000 for the space shuttle "structural spares" program and + \$25,000,000 for continued development of an extended duration orbiter (EDO). The total of \$50,000,000 shall be derived from funds previously appropriated for the construction of orbiter 105. The Committee has included bill language which will make available the above amount.

Taken together with the funds available from fiscal year 1989, the \$25,000,000 provided herein for the structural spares program will provide for a total program effort of \$60,000,000.

In connection with the extended duration orbiter, the Committee recognizes that NASA is currently in negotiations concerning a proposal to "commercialize", in part, the development of the EDO. If these negotiations conclude with an agreement that renders unnecessary the use of these funds, the Committee directs that the \$25,000,000, or any part thereof, may be used for the "structural spares" program or other shuttle operational requirements subject to the normal reprogramming procedures.

- \$50,000,000 from the \$1,102,100,000 requested for tracking and data acquisition. The reduction may be applied at the agency's discretion subject to the Committee's normal reprogramming procedures.

Again, in fiscal year 1990 the Committee is recommending that NASA may withhold until the fourth quarter of fiscal year 1990 the \$227,000,000 payment to the Federal Financing Bank requested for the tracking and data relay satellite system. This payment is made annually in connection with the "off budget" financing of the TDRSS program. The funds are to be held until the last quarter to provide NASA flexibility in connection with any unforeseen shuttle operations costs during fiscal year 1990.

The Committee has also included language delaying the obligation of \$1,400,000,000 of shuttle production and operations funds until April 15, 1990. The Committee does not expect this delay to be disruptive to the programmatic requirement for such funds.

CONSTRUCTION OF FACILITIES
(INCLUDING TRANSFER OF FUNDS)

1989 appropriation.....	\$290,100,000
Estimate, 1990.....	341,800,000
Recommendation.....	384,300,000
Increase above estimate.....	+ 42,500,000

The Committee recommends \$384,300,000 for construction of facilities in 1990. This amount is \$42,500,000 above the President's budget request. The recommendation includes the following increases, decreases, and changes to the program areas described below:

The Committee is recommending a total of \$15,000,000 in the construction of facilities account that was denied for an orbital debris radar facility requested under the research and development account. The Committee believes this activity is more appropriately funded under the construction of facilities account.

The Committee has also included language providing the Administrator of NASA with the option of transferring up to \$35,000,000 of the funds provided in the construction of facilities account to the space flight, control and data communications and/or research and program management account. These funds may be made available at the agency's discretion subject to normal reprogramming procedures.

Also, the Committee has no objection to NASA allocating up to \$15,000,000 of available construction of facilities funds to initiate construction of the neutral buoyancy laboratory and/or the space station processing facility if current efforts to "commercialize" the construction of these projects prove unworkable. However, the use of such funds is subject to normal reprogramming procedures.

Finally, the Committee has included bill language waiving the prohibition on the use of private funding for the construction of the Observational Instruments Laboratory (OIL) at the Jet Propulsion Laboratory.

RESEARCH AND PROGRAM MANAGEMENT

1989 appropriation.....	\$1,855,000,000
Estimate, 1990.....	2,032,200,000
Recommended in bill.....	1,957,200,000
Decrease below estimate.....	- 75,000,000

The research and program management appropriation funds the performance and management of research, technology and test activities at NASA installations, and the planning, management and support of contractor research and development tasks necessary to meet the Nation's ongoing objectives in aeronautical and space research. The objectives of the activities funded by this appropriation are to (1) provide the civil service staff with the technical and management skills to conduct the full range of programs for which NASA is responsible, (2) provide base maintenance of facilities and manage its use in support of research and development programs, and (3) provide effective and efficient technical and administrative support for the research and development programs.

The bill includes \$1,957,200,000 for research and program management in fiscal year 1990, a decrease of \$75,000,000 below the

budget request. The recommendation includes the following changes from the budget estimate:

— \$27,500,000 and 529 FTE from the \$50,527,000 and 696 FTE increase requested for personnel and related costs. The 529 FTE is the increase requested for the space station program. The Committee is concerned that that station program could be excessively impacted with both external and internal overhead costs. This reduction will provide for an adequate review of this question.

— \$47,500,000 from the \$90,073,000 increase requested for travel and operation of installations. This reduction is to be taken at the agency's discretion.

The Committee is aware that the Goddard Space Flight Center has entered into a memorandum of agreement with operations and maintenance division employee group representatives to try to assure that those employees are not subject to involuntary separation or other negative consequences resulting from procedures adopted to accomplish a "skill mix change."

The Committee urges that the Goddard Space Flight Center assure that these employees receive appropriate training if offered a job in another skill or craft and that no employees be downgraded. Additionally, the Committee directs that these employees will not be denied due process under law or the collective bargaining agreement.

The Committee will closely monitor the agency's implementation of these and other employee protections included in the memorandum of agreement, and expects a report on the impact of the memorandum of agreement 180 days following implementation.

OFFICE OF INSPECTOR GENERAL

1989 appropriation.....	(1)
Estimate, 1990.....	\$8,795,000	
Recommended in bill.....	8,795,000	

¹ Previously funded in the research and program management appropriation.

The Office of Inspector General (OIG) was established by the Inspector General Act of 1978 and it is responsible for audit and investigation of all Agency programs and operations. In accordance with the Inspector General Act Amendments, Public Law 100-504, a separate appropriation is being requested for the OIG. Previously, such activities were funded in the research and program management appropriation.

The Committee recommends the budget estimate of \$8,795,000 for the new Office of Inspector General in fiscal year 1990. The recommended amount will support the current staffing level of 146.

TITLE V

GENERAL PROVISIONS

The Committee recommends that those general provisions applicable to the Departments and agencies in the current fiscal year be continued in fiscal year 1990, with the addition of section 516, which is intended to assure that positions at the deputy assistant secretary, deputy assistant administrator, deputy assistant director, and deputy general counsel level be filled by career staff. The Committee believes that having career staff in these positions will strengthen agency programs, contribute to good management, and provide organizational continuity. This language has been included as a general provision in order to assure its consistent application to all the Departments and agencies funded in this bill.

TRANSFER OF FUNDS

Pursuant to Clause 1(b), Rule X of the Rules of the House of Representatives, the following statements are made describing the transfers of funds provided in the accompanying bill.

The Committee recommends providing authority during 1990 to allow the Department of Veterans Affairs to transfer unobligated balances in the direct loan revolving fund to the loan guaranty revolving fund. This will permit available funds in the direct loan revolving fund to be used for losses sustained in the loan guaranty program.

The Committee has recommended a provision under the construction, minor projects account in the Department of Veterans Affairs permitting the transfer of up to \$15,000,000 to general operating expenses.

The Committee recommends providing authority under administrative provisions for the Department of Veterans Affairs for any funds appropriated for 1990 for compensation and pensions, readjustment benefits, veterans insurance and indemnities, and the loan guaranty revolving fund to be transferred between those four accounts. This will provide the Department of Veterans Affairs flexibility in administering its entitlement programs.

The Committee has recommended a provision under the annual contributions for assisted housing account in the Department of Housing and Urban Development permitting the transfer of up to \$14,000,000 to salaries and expenses.

The Committee recommends that \$50,000,000 be transferred from urban development action grants to community development grants in the Department of Housing and Urban Development.

The Committee recommends that not to exceed \$355,846,000 be transferred from the various funds of the Federal Housing Administration to salaries and expenses of the Department of Housing and Urban Development. This will allow funds for activities of the Federal Housing Administration to be carried in a consolidated account covering all operating expenses of the Department.

The Committee has included language transferring \$6,431,000 from the various funds of the Federal Housing Administration to the office of inspector general. This allows all funds for the inspector general's office to be carried in a single account.

The Committee has included language under the office of the inspector general in the Environmental Protection Agency which derives certain funds from the hazardous substance superfund trust fund, rather than the general fund. While this is not considered a transfer, the Committee felt it deserved mention.

The Committee has included a provision under research and development in the Environmental Protection Agency permitting the transfer of up to \$5,000,000 to salaries and expenses.

The Committee has included a provision under abatement, control, and compliance in the Environmental Protection Agency permitting the transfer of up to \$10,000,000 to salaries and expenses.

The Committee recommends that \$10,734,000 be transferred from the National Flood Insurance Fund to salaries and expenses of the Federal Emergency Management Agency (FEMA) to fund all administrative costs from one account. In addition, \$40,303,000 is recommended for transfer from the National Flood Insurance Fund to FEMA's emergency management planning and assistance account to continue the present method of funding flood plain management activities.

The Committee has included a provision under construction of facilities in the National Aeronautics and Space Administration permitting the transfer of up to \$35,000,000 to space flight, control and data communications or research and program management.

RESCISSION OF FUNDS

Pursuant to clause 1(b), rule X of the Rules of the House of Representatives the following statements are made describing rescission of funds provided in the accompanying bill.

The Committee recommends the proposed rescission under the Department of Housing and Urban Development, annual contributions for assisted housing of recaptured budget authority estimated to be \$221,500,000.

The Committee recommends the proposed rescission of not more than \$48,000,000 of budget authority (and \$2,000,000 in annual contract authority) under the rental housing assistance program in the Department of Housing and Urban Development. The Department proposes to covert projects under the rental assistance payments program to the section 8 program in 1989. The number of units eligible for payment is estimated to decline by 1,000 in 1990 due to mortgage insurance terminations. Therefore, authority previously

provided under the rental housing assistance program will be recaptured and is no longer required.

The Committee has recommended a provision under construction grants in the Environmental Protection Agency rescinding \$47,700,000 of funds appropriated in prior years under section 206(a).

INFLATIONARY IMPACT STATEMENT

Clause 2(1)(4) of Rule XI of the House of Representatives requires that each Committee report on a bill or resolution shall contain a statement whether enactment of such bill or resolution may have an inflationary impact on prices and costs in the operation of the national economy.

Critics of Government spending suggest that practically any spending by Government is inflationary. If that were true, then the funds proposed in this bill would be inflationary. However, all Federal spending is not inherently inflationary. It should be analyzed in the context of the economic situation in which it occurs, the financial condition of Government at the time, and the sectors of the economy which the spending may affect.

The amount proposed for appropriation totals \$65,141,250,000. This is \$2,364,461,635 above the President's request. Included in the total recommended are funds for veterans benefits, assisted housing, community development grants and environmental programs. Other funds will support advanced technology and science that directly and indirectly increase productivity and national competitiveness.

It is the considered opinion of the Committee that enactment of this bill will not have an inflationary impact on prices and costs in the operation of the national economy. Further information on the purpose of the spending proposed in this bill can be obtained in other parts of this report. Also, a large amount of detailed statistical and financial information can be obtained in the hearings conducted in developing this bill.

CHANGES IN THE APPLICATION OF EXISTING LAW

The Committee submits the following statements in compliance with Clause 3, Rule XXI of the House of Representatives, describing the effects of provisions proposed in the accompanying bill which may be considered, under certain circumstances, to change the application of existing law, either directly or indirectly.

The Committee, in a number of instances, has found it necessary to recommend funding for ongoing activities and programs where authorizations have not been enacted to date. This includes some or all of the programs under the Department of Housing and Urban Development, the Consumer Product Safety Commission, the Environmental Protection Agency, the Federal Emergency Management Agency, the National Aeronautics and Space Administration, the National Institute of Building Sciences, and the Neighborhood Reinvestment Corporation.

In some cases, the Committee has recommended appropriations which are less than the maximum amounts authorized for the various programs funded in the bill. Whether these actions constitute a

change in the application of existing law is subject to interpretation, but the Committee felt that this should be mentioned.

The bill provides that several appropriations shall remain available for more than one year for which the basic authorizing legislation does not presently authorize such extended availability. These items have been carried in previous appropriations Acts. The Committee deems such language desirable in order to provide for the effective use of the funds.

The Committee has included limitations for official reception and representation expenses for selected agencies in the bill.

The bill contains administrative provisions under the Department of Veterans Affairs, which could possibly be construed as changing the application of existing law. This includes a new provision requiring that the salary payments for the last pay period in fiscal year 1989 for the Department of Veterans Affairs, the Environmental Protection Agency, and the National Aeronautics and Space Administration be paid by no later than September 29, 1989.

Sections 501 through 515 of title V of the bill, all of which are carried in the 1989 appropriations Act, are general provisions which place limitations on the use of funds in the bill and which might, under certain circumstances, be construed as changing the application of existing law. A new general provision, section 516, limits the use of funds for salary payments for deputy assistant secretaries, deputy assistant administrators, deputy assistant directors, and deputy general counsels.

The bill includes, in certain instances, limitations on the obligation of funds for particular functions or programs. These limitations include restrictions on the obligation of funds for administrative expenses, the use of consultants, and programmatic areas within the overall jurisdiction of a particular agency.

The language on page 3, in connection with the Department of Veterans Affairs, readjustment benefits, provides for the use of certain unobligated funds for normal expenses associated with the appropriation.

The language on page 4, in connection with the Department of Veterans Affairs, loan guaranty revolving fund, provides for the transfer of unobligated balances and does not require interest payments on transferred funds.

The appropriation language on page 4, in connection with the Department of Veterans Affairs, direct loan revolving fund, limits loans and could, under certain circumstances, be construed as changing the application of existing law.

The provision on pages 5 and 6, in connection with the Department of Veterans Affairs, medical care, delays the availability of certain equipment and land and structures funds.

The language on page 7, in connection with the Department of Veterans Affairs, general operating expenses, provides for reimbursement to the Department of Defense for the cost of overseas employee mail. This language has been carried previously and permits free mailing privileges for VA personnel stationed in the Philippines.

The language on page 7, in connection with the Department of Veterans Affairs, general operating expenses, requires the VA to

maintain minimum funding and average employment levels for the Veterans Benefits Administration.

The provision on page 40, in connection with the National Space Council, requires reimbursement of at least one-half of the cost of detailed employees.

The provision on page 40, in connection with the Office of Science and Technology Policy, requires reimbursement of at least one-half of the cost of detailed employees.

The language on pages 42 and 43, in connection with the National Flood Insurance Fund, transfers funds and limits increases in certain fund expenses without prior notice to the Committees on Appropriations.

The language on page 43, in connection with the emergency food and shelter program, limits administrative expenses.

The provisions on page 43, in connection with the Consumer Information Center, limits certain fund and administrative expenses, and could be construed as changing the application of existing law.

The language on pages 44 and 45, in connection with the National Aeronautics and Space Administration, research and development, delays the availability of certain space transportation funds until April 15, 1990, and limits funds for certain space station activities.

The provisions on pages 45 and 46, in connection with the National Aeronautics and Space Administration, space flight, control and data communications, delays the availability of certain space transportation funds until April 15, 1990, and makes funds previously appropriated for orbiter production available for all expenses of this account.

The provisions on pages 46, 47, and 48, in connection with the National Aeronautics and Space Administration, construction of facilities, extends the availability of certain project funds and limits the use of funds for lease or construction of facilities, except for a facility at the Jet Propulsion Laboratory.

The language on page 49, in connection with the National Aeronautics and Space Administration, administrative provisions, requires that at least ten percent of NASA funding be used to enhance and guarantee minority involvement in the scientific and technical industries. A second proviso limits reductions in funding for the polar platform portion of space station development.

The language on page 50, in connection with the National Credit Union Administration, central liquidity facility, limits new loans and administrative expenses.

The provisions on page 51, in connection with the National Science Foundation, research and related activities, limit administrative expenses, permits contracts for various services and expenditures for certain activities and programs; provide for the use of receipts for other research facilities, and could require proportional reductions in legislative earmarkings.

The provisions on pages 52 and 53, in connection with the National Science Foundation, United States Antarctic program activi-

ties, provide that certain receipts may be credited to this appropriation and clarifies a provision regarding procurement of the services of a vessel with ice-breaking capability.

The provision on page 53, in connection with the National Science Foundation, science education activities, could require a proportional reduction in legislative earmarkings.

The provisions on page 54, in connection with the Selective Service System, salaries and expenses, permits the President to exempt the agency from apportionment restrictions of the Budget and Accounting Act of 1921, and requires the reclassification of conscientious objectors.

The provision on page 55, in connection with corporations, requires release in an appropriations Act of loans and mortgage purchase authority not otherwise required by law.

PERMANENT OBLIGATIONAL AUTHORITY—FEDERAL FUNDS AND TRUST FUNDS

Substantial sums of new budget (obligational) authority are made available by permanent legislation for the continuation of certain government activities not subject to the annual appropriations process. Details of these activities for the agencies covered in this bill are reflected in appropriate tables appearing at the end of this report. The most significant are the life insurance programs of the Department of Veterans Affairs and the borrowing authority of the Federal Savings and Loan Insurance Corporation. The budget estimates that such permanent authorities will aggregate \$8,112,489,000 in fiscal year 1990.

COMPARISON WITH BUDGET RESOLUTION

Section 308(a)(1)(A) of the Congressional Budget and Impoundment Control Act of 1974 (Public Law 93-344), as amended, requires that the report accompanying a bill providing new budget authority contain a statement detailing how the authority compares with the reports submitted under section 302 of the Act for the most recently agreed to concurrent resolution on the budget for the fiscal year. This information follows:

(In million of dollars)

	Sec 302(b)		The bill	
	Discretionary	Mandatory	Discretionary	Mandatory
Budget authority.....	48,392	17,191	48,387	16,791
Outlays.....	53,469	16,269	53,467	15,858
Direct loans.....	860		860	
Primary guarantees.....	57,436		57,436	

The bill provides no new spending authority as described in section 401(c)(2) of the Congressional Budget and Impoundment Control Act of 1974 (Public Law 93-344), as amended, except for receipts and interest forgone pursuant to the administrative provisions in the Department of Housing and Urban Development.

BALANCED BUDGET AND EMERGENCY DEFICIT CONTROL ACT

During fiscal year 1990, for purposes of the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177), the following information provides the definition of the term "program, project, and activity" for departments and agencies carried in the accompanying bill. The term "program, project, and activity" shall include the most specific level of budget items identified in the 1990 Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, the accompanying House and Senate Committee reports, the conference report or the joint explanatory statement of the managers of the committee of conference.

In applying any sequestration reductions, departments and agencies shall apply the percentage of reduction required for fiscal year 1990 pursuant to the provisions of Public Law 99-177 to each program, project, activity and subactivity contained in the budget justification documents submitted to the Committees on Appropriations of the House and Senate in support of the fiscal year 1990 budget estimates, as amended, for such departments and agencies as subsequently altered, modified or changed by Congressional action identified by the aforementioned Acts, resolutions and reports. Further, it is intended that in implementing the Presidential order, (1) no program, project, or activity should be eliminated, (2) no re-ordering of funds or priorities occur, and (3) no unfunded program, project, or activity be initiated. However, for the purposes of program execution, it is not intended that normal reprogramming between programs, projects, and activities be precluded after reductions required under the Balanced Budget and Emergency Deficit Control Act are implemented.

FIVE-YEAR PROJECTIONS OF OUTLAYS

In accordance with section 308(a)(1)(C) of the Congressional Budget Act of 1974 (Public Law 99-344), as amended, the following information was provided to the Committee by the Congressional Budget Office:

Budget authority.....	\$64,968,315,000
Outlays:	
1990.....	37,412,736,000
1991.....	12,876,208,000
1992.....	4,041,325,000
1993.....	1,932,919,000
1994 and future years.....	9,129,186,000

FINANCIAL ASSISTANCE TO STATE AND LOCAL GOVERNMENTS

In accordance with section 308(a)(1)(D) of Public Law 99-344, the new budget authority and outlays provided by the accompanying bill for financial assistance to state and local government are as follows:

Budget authority.....	\$16,536,183,000
Outlays.....	1,453,443,000

**COMPARATIVE STATEMENT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY FOR 1989 AND THE
BUDGET ESTIMATES FOR 1990**

PERMANENT NEW BUDGET (OBLIGATIONAL) AUTHORITY

[These funds become available automatically under earlier, or "permanent" law without further, or annual action by the Congress. Thus, these amounts are not included in the accompanying bill.]

Agency and item (1)	New budget (obligational) authority, fiscal year 1989 (2)	Budget estimates of new (obligational) authority, fiscal year 1990 (3)	Fiscal year 1990 estimate compared with, fiscal year 1989 (4)
PERMANENT NEW BUDGET (OBLIGATIONAL) AUTHORITY			
FEDERAL FUNDS			
Department of Veterans Affairs:			
Loan guaranty revolving fund (indefinite).....	---	910,800,000	+910,800,000
Department of Housing and Urban Development:			
Housing payments (appropriation to liquidate contract authority).....	(12,350,347,000)	(13,609,957,000)	(+1,259,610,000)
Federal Housing Administration fund (authority to borrow, indefinite).....	1,319,900,000	1,070,900,000	-249,000,000
Interstate land sales (indefinite).....	600,000	600,000	---
Manufactured home inspection and monitoring (indefinite).....	7,320,000	7,320,000	---
Low-rent public housing-loans and other expenses (authority to borrow, indefinite).....	856,075,000	567,200,000	-288,875,000
Government National Mortgage Association: Management and liquidating functions fund (indefinite).....	23,947,000	---	-23,947,000
Total, Department of Housing and Urban Development.....	<u>2,207,842,000</u>	<u>1,646,020,000</u>	<u>-561,822,000</u>
Federal Emergency Management Agency:			
National insurance development fund (authority to borrow, indefinite).....	16,335,000	17,222,000	+887,000
Federal Home Loan Bank Board:			
Federal Savings and Loan Insurance Corporation Fund (authority to borrow, indefinite).....	9,747,714,000	3,799,910,000	-5,947,804,000
National Aeronautics and Space Administration:			
Space flight, control and data communications.....	253,108,000	47,935,000	-205,173,000
Total, Federal Funds.....	<u>12,224,999,000</u>	<u>6,421,887,000</u>	<u>-5,803,112,000</u>
TRUST FUNDS			
Department of Veterans Affairs:			
Post-Vietnam era veterans education account (indefinite).....	208,370,000	164,773,000	-43,597,000
General post fund, national homes (indefinite)...	21,000,000	21,500,000	+500,000
National service life insurance fund (indefinite)	1,421,036,000	1,419,330,000	-1,706,000
U.S. government life insurance fund (indefinite).	14,680,000	12,960,000	-1,720,000
Department of Housing and Urban Development:			
Gifts and bequests (indefinite).....	5,000	5,000	---
American Battle Monuments Commission:			
Contributions (indefinite).....	1,700,000	1,275,000	-425,000
Environmental Protection Agency:			
Miscellaneous contributed funds (indefinite)....	10,000	10,000	---
Federal Emergency Management Agency:			
Gifts and bequests (indefinite).....	78,000	58,000	-20,000
National Aeronautics and Space Administration:			
Space flight, control and data communications.....	253,108,000	47,935,000	-205,173,000
National Institute of Building Sciences trust fund (indefinite).....	500,000	---	-500,000
National Science Foundation: Donations (indefinite)..	21,000,000	21,756,000	+756,000
Science, space, and technology education trust fund..	500,000	1,000,000	+500,000
Total, Trust Funds.....	<u>1,941,987,000</u>	<u>1,690,602,000</u>	<u>-251,385,000</u>
Total Permanent Funds.....	<u>14,166,986,000</u>	<u>8,112,489,000</u>	<u>-6,054,497,000</u>

**COMPARATIVE STATEMENT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY FOR 1989 AND BUDGET ESTIMATES
AND AMOUNTS RECOMMENDED IN THE BILL FOR 1990—Continued**

Agency and item (1)	New budget (obligational) authority appropriated, 1989 (enacted to date) (2)	Budget estimates of new (obligational) authority, 1990 (3)	New budget (obligational) authority recommended in bill (4)	Bill compared with new budget (obligational) authority, 1989 (5)	Bill compared with budget estimates of new (obligational) authority, 1990 (6)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION					
Research and development.....	4,191,700,000	5,751,600,000	5,203,100,000	+1,011,400,000	-548,500,000
Rescission.....	-25,000,000	---	---	+25,000,000	---
Space flight, control and data communications.....	4,364,200,000	5,139,600,000	4,709,600,000	+345,400,000	-430,000,000
Construction of facilities.....	290,100,000	341,800,000	384,300,000	+94,200,000	-42,500,000
Science, space and technology education trust fund (by transfer).....	(15,000,000)	---	---	(-15,000,000)	---
Research and program management.....	1,855,000,000	2,032,200,000	1,957,200,000	+102,200,000	-75,000,000
(By transfer).....	(35,000,000)	---	---	(-35,000,000)	---
Office of the Inspector General.....	---	8,795,000	8,795,000	-8,795,000	---
Total, National Aeronautics and Space Administration (net).....	10,676,000,000	13,273,995,000	12,262,995,000	+1,586,995,000	-1,011,000,000

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101ST CONGRESS
1st Session

SENATE

REPORT
101-128

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DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING
AND URBAN DEVELOPMENT, AND INDEPENDENT
AGENCIES APPROPRIATION BILL, 1990

SEPTEMBER 13 (legislative day, SEPTEMBER 6), 1989.—Ordered to be printed

MR. MIKULSKI, from the Committee on Appropriations,
submitted the following

REPORT

[To accompany H.R. 2916]

The Committee on Appropriations to which was referred the bill (H.R. 2916) making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes, reports the same to the Senate with various amendments and presents herewith an explanation of the contents of the bill.

AMOUNT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY

Amount of bill as recommended in House	\$65,143,950,000
Amount of change by Committee	+ 2,031,096,978
Amount of bill as reported to Senate	67,175,046,978
Amount of appropriations to date, 1989	60,620,880,990
Amount of budget estimates, 1990	62,687,357,900
Over estimate for 1990	+ 4,587,689,078
Over appropriations for 1989	+ 6,554,165,988

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SUMMARY OF THE BILL

The Committee recommends new budget authority of \$67,175,046,978 for the Departments of Veterans Affairs and Housing and Urban Development, the National Aeronautics and Space Administration, the Environmental Protection Agency, the National Science Foundation, and other agencies, commissions, boards, corporations, and offices. This amount is \$4,587,689,078 above the budget request, \$2,031,096,978 above the House allowance, and \$6,554,165,988 more than the appropriation for fiscal year 1989.

The following table summarizes the amounts recommended in the bill in comparison with appropriations for fiscal year 1989 and budget estimates for fiscal year 1990:

HIGHLIGHTS

The Committee has recommended a number of significant adjustments to the administration's budget request and the House bill. The most significant are:

One, the Committee has recommended a space station budget of \$1,850,000,000. This is \$200,000,000 below the administration's request and \$194,800,000 above the House bill level. The Committee is constrained to a level below the President's request because of the subcommittee's severe shortfall in its 302(b) allocation.

Two, the Committee has provided \$11,514,546,000 for veterans medical care. This is \$773,115,000 over the administration's request but \$46,885,000 less than the House provided.

Three, the Committee has provided \$1,575,000,000 for the Hazardous Substance Superfund Program, a decrease of \$164,683,000 below the administration's budget request and an increase of \$150,000,000 over the House allowance.

Four, the Committee has provided \$2,050,000,000 for sewage treatment construction grants, an increase of \$850,000,000 over the administration's request and \$26,000,000 over the House-passed level.

Five, the Committee has provided a total of \$15,187,827,000 for the Department of Housing and Urban Development, \$2,260,354,100 above the administration's request and \$26,600,000 above the House-passed bill.

The Committee recommends separate accounts for three programs that the House bill funds in the "Annual contributions for assisted housing" account. These three are section 8 contract renewals, public housing modernization, and the moderate rehabilitation single room occupancy (SRO) program. In addition, the Committee has created a new program area entitled homeless assistance that includes the five homeless programs within the Department of Housing and Urban Development. This structure provides a comprehensive view of how the Committee proposes allocating the full level of funding authorized by the Stewart B. McKinney Homeless Assistance Act

REPROGRAMMING AND INITIATION OF NEW PROGRAMS

The Committee continues to have a particular interest in being informed of reprogrammings which, although they may not change either the total amount available in an account or any of the purposes for which the appropriation is legally available, represent a significant departure from budget plans presented to the Committee in an agency's budget justifications.

Consequently, the Committee directs that the Departments of Veterans Affairs and Housing and Urban Development and the agencies funded through this bill notify the chairman of the Com-

SUMMARY OF ESTIMATES AND NEW BUDGET (OBIGATIONAL) AUTHORITY IN BILL

Department or agency	Appropriation, 1985		Budget authority, 1990		Committee		Appropriation, 1989		Budget authority, 1990		House bill	
	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990	1985	1990
American Battle Monuments Commission	\$15,085,000	\$14,507,000	\$15,000,000	\$14,507,000	\$14,507,000	\$14,507,000	—	—	—	—	—	—
Central Command, Army	13,195,000	12,569,000	12,569,000	12,569,000	12,569,000	12,569,000	—	—	—	—	—	—
Consumer Information Center	1,354,000	1,360,000	1,360,000	1,360,000	1,360,000	1,360,000	—	—	—	—	—	—
Consumer Product Safety Commission	34,500,000	33,479,000	35,500,000	35,702,000	35,702,000	35,702,000	—	—	—	—	—	—
Council on Environmental Quality	850,000	861,000	861,000	861,000	1,500,000	1,500,000	—	—	—	—	—	—
Dept. of Veterans Affairs	3,100,000	1,462,000	3,000,000	3,000,000	3,000,000	3,000,000	—	—	—	—	—	—
Department of Housing and Urban Development	12,776,571,990	12,927,472,990	15,161,277,000	15,187,827,000	15,187,827,000	15,187,827,000	—	—	—	—	—	—
Department of Veterans Affairs	29,344,886,000	28,425,715,000	29,527,005,000	29,527,005,000	29,154,759,978	29,154,759,978	—	—	—	—	—	—
Environmental Protection Agency	5,155,123,000	4,883,800,000	5,422,117,000	5,422,117,000	5,822,373,000	5,822,373,000	—	—	—	—	—	—
Federal Deposit Insurance Corporation	633,712,000	816,273,000	648,528,000	648,528,000	655,198,000	655,198,000	—	—	—	—	—	—
Federal Emergency Management Agency	(31,942,000)	(33,464,000)	1,200,000	1,200,000	1,200,000	1,200,000	—	—	—	—	—	—
Federal Reserve Bank Board ¹	1,100,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	—	—	—	—	—	—
Intelligence Council on the Americas	10,676,000,000	12,273,995,000	12,262,955,000	12,262,955,000	12,339,195,000	12,339,195,000	—	—	—	—	—	—
National Archives and State Administration	(600,000,000)	(600,000,000)	(600,000,000)	(600,000,000)	(600,000,000)	(600,000,000)	—	—	—	—	—	—
National Credit Union Administration ²	1,922,500,000	2,149,022,000	500,000	500,000	2,063,600,000	2,063,600,000	—	—	—	—	—	—
National Institute of Building Sciences	563,000	563,000	1,999,000,000	1,999,000,000	900,000	900,000	—	—	—	—	—	—
National Science Foundation	19,494,000	14,581,000	1,200,000	1,200,000	2,260,000	2,260,000	—	—	—	—	—	—
National Science Council	1,706,000	1,988,000	1,888,000	1,888,000	1,888,000	1,888,000	—	—	—	—	—	—
National Endowment for the Arts	1,587,000	2,997,000	2,027,000	2,027,000	2,997,000	2,997,000	—	—	—	—	—	—
Office of Science and Technology Policy	26,313,000	26,313,000	26,313,000	26,313,000	26,313,000	26,313,000	—	—	—	—	—	—
Science Service System	26,313,000	26,313,000	26,313,000	26,313,000	26,313,000	26,313,000	—	—	—	—	—	—
Space Shuttle Activities, Air Force	60,670,860,999	62,357,357,996	65,143,950,000	67,175,046,978	67,175,046,978	67,175,046,978	—	—	—	—	—	—
Total												

¹ Current, regular appropriation for FISC (maximum limit)
² Function of administrative expense (concrete limit)
³ Function of project (none)
⁴ Current, regular appropriation for FISC (maximum limit)
⁵ Current, regular appropriation for FISC (maximum limit)

mittee prior to reprogramming of funds in excess of \$250,000 between programs, activities, or elements. The Committee desires to be notified of reprogramming actions which involve less than the above-mentioned amounts if such actions would have the effect of changing an agency's funding requirements in future years or if programs or projects specifically cited in the Committee's reports are affected. Finally, the Committee wishes to be notified regarding reorganizations of offices, programs, or activities prior to the planned implementation of such reorganizations.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

Appropriations, 1989.....	\$1,166,700,000
Budget estimate, 1990.....	5,754,600,000
House allowance.....	5,203,100,000
Committee recommendation.....	5,321,600,000

PROGRAM DESCRIPTION

The objectives of the National Aeronautics and Space Administration's [NASA] program of research and development are to extend our knowledge of the Earth, its space environment, and the universe; to expand the practical applications of space technology; to develop, operate, and improve unmanned space vehicles; to provide technology for improving the performance of aeronautical vehicles while minimizing their environmental effects and energy consumption; and to assure continued development of the aeronautics and space technology necessary to accomplish national goals.

The appropriations request would continue funding for a permanently manned space station, including development work on the hardware components and supporting development activities such as systems engineering and integration, and the technical and management information system. Definition and preliminary design of the Flight Telerobotic System Program would also be continued.

Another major area of activity is space transportation capability development including efforts related to the spacelab, the upper stages that place satellites in high altitude orbits not attainable by the shuttle, the engineering and technical base, payload operations and support equipment, advanced programs study and evaluation efforts, the development of the United States/Italy tethered satellite system, and development of the orbital maneuvering vehicle. Funding is included to continue definition and preliminary design activities on the assured crew return capability for the space sta-

tion. Technology development and advanced launch system study activities will continue along with the definition studies on critical propulsion systems.

The space science and applications program utilizes space systems supported by airborne and ground based observations to conduct scientific investigations of the Earth and its space environment, the Sun, the planets, interplanetary and interstellar space, and the other stars of our galaxy and universe. Results from these investigations contribute to our understanding of the universe, including the key questions of life, matter, and energy. In addition, this program conducts the research and selected technology developments to encourage the practical application of space technologies to needs on Earth. Funding is included to initiate development of the comet rendezvous asteroid flyby [CRAF]/Cassini mission. These missions will send one spacecraft to study at close range a comet and its total environs and a second spacecraft to study the planet Saturn, its atmosphere, rings, and its moon, Titan.

Commercial programs include the technology utilization and commercial use of space. The Technology Utilization Program is designed to facilitate the transfer of NASA developed technology to the nonaerospace sectors of the U.S. economy. 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 utilizing the unique characteristics of space.

The objective of the aeronautical research and technology program is to provide the broad technology base essential to the preservation of U.S. leadership in aviation. The objectives of the space research and technology program are to provide the technology base necessary to support current and future space activities and to formulate and advance technology options for the future. These activities emphasize the longer-range aspects of generic research and technology development which are crucial in maintaining future U.S. leadership. Funding is included to initiate the In-Space Flight Experiments Technology Program which provides for the design and development of space experiments to provide validated technologies for incorporation in future space projects.

The objective of the joint NASA/DOD transatmospheric research and technology program is to explore new approaches for cost-effective hypersonic flight in the atmosphere with the capability to accelerate to orbit.

The safety, reliability, and quality assurance program will continue to support activities in safety, reliability, quality assurance, maintainability systems engineering, and program practices including independent assessment activities which reduce program risk.

The university space science and technology academic program will support graduate student fellowships, faculty fellowships, the historically black colleges and university research program and the space grant college and fellowship program.

The overall objective of the tracking advanced systems program is to perform studies to ensure capability for tracking and data acquisitions, communications, and data processing support required by all NASA flight projects in accomplishing their mission objectives.

COMMITTEE RECOMMENDATION

The Committee recommends an appropriation of \$5,367,600,000 for research and development activities. This amount is \$1,175,900,000 above the fiscal year 1989 enacted level, \$161,500,000 above the House allowance, and \$384,000,000 below the budget request.

The Committee recommends \$1,850,000,000 for the space station program, \$200,000,000 below the budget request, but \$194,800,000 above the House level. The Committee's space station recommendation is summarized as follows:

	Request	Change
Space station:		
Development	\$1,970,200,000	\$200,000,000
Flight tele robotic services	15,000,000	1,65,000,000
Operations	25,000,000	25,000,000
Transition definition	25,000,000	25,000,000
Orbital debris radar	15,000,000	15,000,000
Total	2,050,200,000	200,000,000

Within the station program, the Committee has reduced the development line \$200,000,000 below the budget request, but \$194,800,000 above the House level. Like the House, the Committee is constrained to a level below the President's request for this aspect of the station program because of the subcommittee's severe shortfall in its 302(b) outlay allocation.

Nevertheless, the Committee has recommended a level higher than the House because of recent analysis, done by NASA at both Committees' request, on the effects of the House-passed space station budget, an amount \$100,000,000 below the President's request in 1990. That study, known as the Langley review, concluded that a cut of this size in 1990 would, among other things, require cutting the block I space station power by one-half, from 75 kW to 37.5 kW, and reducing the station's crew size from eight to four.

The Committee finds these alternatives unacceptable. First, a space station descope in this fashion would substantially reduce the capacity of the program to meet the challenges required to carry out the President's initiative for long-term space exploration. Second, it would dramatically reduce the early scientific capability of the space station, a key factor in the Committee's support for this program. Third, the Committee believes that reducing the scope of block I of the space station in this fashion could have a serious, adverse, and permanent effect on the ability of the United States to conduct joint scientific projects with our international partners in Europe, Canada, and Japan. Finally, NASA has written to the Committee indicating that the level provided in the Committee's recommendation, \$1,850,000,000, is the minimum amount needed to sustain the space station program in a fashion which will guarantee a block I space station that has 75 kW of power when the station has a permanently manned capability, now scheduled for mid-1998.

Since NASA's final review of the Langley study is not yet complete, the Committee expects to be fully consulted on any final space station design configurations prior to any final agency decision on this matter.

The Committee has deleted, without prejudice, bill language proposed by the House that requires that not more than 50 percent of any reduction in space station development costs be taken from the four work package prime contracts. The House included this language out of concern that NASA's program overhead costs for the space station were consuming far too high a level of the space station's total development budget. While the Committee shares the House's concern about excessive management costs in the space station budget, it believes the House language will unduly restrict the agency's flexibility to properly manage the station program.

The Committee does believe that certain portions of the nonprime contract portions of the space station development budget could be reduced in 1990 without significantly affecting the content or the schedule of the station program. For example, work package two's nonprime contract costs are expected to nearly triple from fiscal year 1989 to fiscal year 1990, from \$61,000,000 to over \$170,000,000. While some increase should be expected in this area as the program moves further into advanced development, growth of this level seems higher than necessary. The Committee expects the agency to reduce this increase when it submits its 1990 operating plan. In addition, the Committee is concerned about the current plans which indicate that nonprime development costs will remain fairly constant as a percentage of the overall station development budget in all future years. As a result, the Committee directs NASA to submit an annual report, concurrent with the submission of the President's budget, on space station nonprime development costs and steps it is actively pursuing to reduce these costs.

The Committee concurs with the House in adding \$65,000,000 to the \$15,000,000 request for the flight tele robotic servicer (FTS). This will provide for a total FTS program of \$80,000,000 from within funds made available for the space station. This level should ensure that flight demonstrations scheduled for 1991 and 1993 aboard the space shuttle remain on schedule. Recent information from NASA suggests that the FTS may prove even more necessary for expediting on-orbit assembly of the station and in turn lower risks to astronauts by reducing the time needed for them to remain outside of the shuttle to manually assemble the station.

The Committee concurs with the House in transferring the \$15,000,000 requested for the orbital debris radar from the "Research and development" account to the "Construction of facilities" account.

The Committee is strongly committed, as is the House, to increasing the role of minority- and women-owned businesses in the aerospace industry in general and the space station program in particular. While NASA's agencywide record in this area is among the best of all Federal agencies, its record on the space station program has been disappointing at best.

At the same time, the Committee is concerned about placing a 10 percent minority- and women-owned business requirement on the space station program without having had sufficient time to review

both the feasibility and programmatic effect of such a goal, particularly while the space station program itself is undergoing a significant content review. For this reason, the Committee has inserted bill language which raises NASA's overall minority- and women-owned business set-aside requirement from 5 to 6 percent immediately, and permits the agency to work up to an annual rate of 6 percent in the space station program by the time it reaches full operational status in the mid-1990's. This proposal should provide a substantially larger base from which minority- and women-owned businesses can draw on an annual basis than a 10-percent set-aside within the space station program. The language requires a report from the NASA Administrator on his efforts to fully implement and enforce this requirement 1 year after the date of enactment.

The Committee also concurs with bill language added by the House that would limit the reduction which NASA could make in work package three in fiscal year 1990 to no more than 10 percent of the \$107,000,000 requested in the budget. This will insure that the Earth observing system (EOS), scheduled as a new start in fiscal 1991, and the space station's polar platforms, which are essential to EOS, will not be adversely affected by a reduction in funds for the space station.

Finally, the Committee has added bill language delaying the availability of \$750,000,000 of the total amount provided for the space station until June 1, 1990. This delay will provide the National Space Council with sufficient time to develop a specific plan for determining how the space station program will be used as a catalyst for implementing the President's long-term space exploration initiative.

For space transportation capability development, the Committee recommends the following:

- \$10,000,000 from the \$88,600,000 requested for upper stages. This is a reduction of \$5,000,000 less than that proposed by the House. From within this amount, the Committee directs NASA to absorb \$6,500,000 for upper stage activities needed for the advanced communications technology (ACTS) satellite.
- \$15,000,000 from the \$189,800,000 requested for the engineering and technical base, a reduction of \$5,000,000 more than that proposed by the House. None of this reduction should be taken from safety, reliability, management, and quality assurance (SRM&QA) activities.
- \$16,300,000 for payload operation and support. These reductions are to be taken from space station support (-\$12,800,000) and commercially developed space facility activities (-\$3,500,000). The Committee expects any space station support activities to be absorbed in the development costs provided for the space station program.
- \$12,000,000 from the \$48,700,000 requested for advanced programs. The Committee concurs with the House in recommending that \$5,000,000 of this total be taken as a general reduction. In addition, while the Committee concurs in deleting the \$7,000,000 requested for studies of a space station crew rescue vehicle in 1990, it does not agree in recommending deletion of the \$8,000,000 carried over for this purpose from 1989.

- \$5,000,000 from the \$5,000,000 requested for advanced launch systems. The Committee expects any funding for this program to be transferred from the Department of Defense as has been the case in prior years.

- \$12,500,000 from the \$107,000,000 requested for the orbital maneuvering vehicle, a reduction of \$2,500,000 more than that proposed by the House.

+ \$15,000,000 for the continuation of phase A/B studies on the Shuttle C.

The Committee concurs with the House in recommending bill language delaying the obligation of \$384,000,000 of space transportation capability development funds until April 15, 1990. The Committee does not expect this to cause any significant program disruption.

For space science and applications, the Committee recommends the following:

+ \$22,000,000 for the gravity probe (B) mission. This is the same level proposed by the House and restores this important basic science program to the level requested by NASA in their budget submission to the Office of Management and Budget.

- \$15,000,000 from the \$23,000,000 requested for space station integrated planning and attached payloads. This will still guarantee the same level for this activity as was funded in fiscal 1989. Any additional funds needed for this work should be provided from the space station program.

- \$15,000,000 from the \$124,200,000 requested for life sciences. The Committee recommends a general reduction of \$10,000,000. In addition, the Committee proposes a reduction of \$5,000,000 in the Search for Extra Terrestrial Intelligence (SETI) Program. While the Committee appreciates the potential value of this project, it believes that tripling the size of its budget, in light of the severe budget constraints facing NASA, is unjustified. The Committee recommends the full appropriation request of \$3,000,000 for specialized centers of research within the life sciences budget.

The bill also includes the full budget request for the LIFESAT Program.

\$10,000,000 from the proposed initiation of the Comet Rendezvous Asteroid/Flyby (CRAF)/Cassini Program. The Committee recommends this action, without prejudice, in light of the severe constraints it faces in the subcommittee's 302(b) outlay allocation. NASA has testified before the Committee that maintaining its core programs, its personnel and institutions, the space shuttle, basic space science, and the space station are its highest priority. Since the Committee is recommending a reduction in the agency's budget request of over \$900,000,000, it believes this reduction in this new start in the planetary program is justified at this time. The Committee notes, however, that the House has fully funded the CRAF-Cassini mission and fully expects this issue to be addressed in conference with the House. Should additional outlay relief be provided for NASA prior to that time, the Committee would entertain a complete or partial restoration of this reduction.

+ \$15,000,000 to the \$131,300,000 requested for Earth sciences. Given the growing awareness of the problems we face as a result of global change and the potential for global warming, the Committee believes it is essential to sustain a high level of effort in this area. Of this increase, \$5,000,000 is to be applied to the \$2,300,000 requested for interdisciplinary research and analysis for further research on global change. This is \$1,000,000 above the House request. The remaining \$10,000,000 of this increase is for continued development of the instruments for the total ozone mapping spectrometer satellite [TOMS].

- \$2,000,000 from the \$92,700,000 requested for materials processing in space. This reduction is consistent with the Senate authorization bill. The reduction is to be taken at the agency's discretion.

+ \$62,000,000 for the advanced communications technology satellite [ACTS] experiment. The House recommendation provides no funds for this program. The Committee continues to express its frustration that the Office of Management and Budget continues to remove this project from the President's budget despite the fact that it is scheduled to launch in 1992. The Committee believes that the ACTS program will provide the United States with valuable communications satellite technology which will strengthen our competitiveness and thus, its restoration in the budget is essential.

- \$5,000,000 from the \$34,100,000 requested for information systems. This is the same level proposed by the House.

The Committee has included bill language delaying the availability of but \$1,000,000,000 of the \$2,047,300,000 appropriated for space science and applications until April 1, 1990. The Committee does not expect this to have any significantly detrimental programmatic effect.

For commercial programs, the Committee recommends the following:

- \$5,000,000 from the \$61,000,000 requested for this activity. This reduction is to be applied at the agency's discretion. The House had proposed that this activity be reduced by \$10,000,000, with all funds to be taken from the commercial use of space element in this activity.

From within this amount the Committee recommends the full budget request of \$3,000,000 for the AdaNET project. The agency included \$2,700,000 in its fiscal 1989 operating plan to begin development of this program. AdaNET will allow the transfer of Ada software to the commercial sector. This will stimulate the reuse of software applications into the manufacturing, automation, and robotics sectors. It will also eliminate duplication of software and program efforts by Government and industry.

In addition, the Committee recommends \$4,000,000 from within the commercial programs budget be allocated to initiate and establish the National Technology Transfer Center [NTTC] at Wheeling College in Wheeling, WV. The Committee included funds in fiscal 1989 to do a definition/design study for the NTTC. That study has now been completed and its results demonstrate the many benefits which would result from such a center. The NTTC would promote

the private sector use of federally funded and developed technologies. This effort should help stimulate economic development on a nationwide basis and enhance the ability of the United States to compete in world markets.

The Committee does not concur with the House earmark of \$625,000 for Rural Enterprises, Inc.

The Committee recommends \$3,000,000 within the technology utilization element for an expanded multiengine environmental demonstration of the Stirling engine. NASA should consult with other Federal agencies to determine if there is the potential for interagency cost sharing for this effort before finalizing plans for this initiative.

Finally, the Committee has transferred the \$2,500,000 requested in commercial programs for the development of a wake shield facility to the "Construction of facilities" account.

For aeronautics research and technology, the Committee expects NASA to provide the full budget request, including \$3,100,000 for the rotary engine technology development program. In addition, the Committee notes NASA's interests in efforts to develop materials and structures technology necessary for advanced high temperature propulsion and thermal protective systems for use in interplanetary exploration and Earth reentry. The Committee urges NASA to review the need for advanced civil propulsion and reentry vehicles with a particular focus on new fibers and composite materials systems. Should NASA determine that this proposal merits funding, the Committee encourages NASA to initiate planning for this program in fiscal year 1990. The Committee expects NASA to report back to it on this subject by February 1, 1990.

For space research and technology, the Committee recommends the following:

- \$17,500,000 from the \$144,500,000 requested for the civil space technology initiative, the same level as proposed by the House. The reduction may be taken at the agency's discretion.

- \$15,700,000 from the \$47,300,000 requested for the Pathfinder program. This reduction may be taken at the agency's discretion. This reduction is \$9,300,000 less than was proposed by the House.

\$6,000,000 from the \$16,200,000 requested for in-space flight experiments. This reduction is consistent with the Senate authorization bill and should be taken at the agency's discretion.

The Committee is concerned that NASA's space technology programs are not sufficiently focused to meet the needs of long-term space exploration as outlined in the President's speech in July. As a result, the Committee directs NASA to provide it with a report on what specific technologies will be needed to meet the development and operational requirements of the President's space initiative by February 1, 1989. This report should prioritize these technologies from both a technical and financial standpoint. In addition, the report should contain a funding profile for the next 5 years on what these technologies will require to meet the Nation's future space exploration needs.

Additional recommendations by the Committee in research and development include the following:

—\$127,000,000 from the \$127,000,000 requested for transatmospheric research and technology for the continued development of the national aerospace plane (NASP). The House provided \$98,000,000 for this program. The Committee has reluctantly taken this step because of pressures on the NASA budget due to the subcommittee's 302(b) outlay allocation. In addition, the House figures come at the expense of adequately funding the space station at a level which will enable it to maintain sufficient power and scientific capability for use early in its scheduled deployment.

†\$4,000,000 to the \$35,000,000 requested for university programs. Of this amount, †\$1,000,000 to expand the NASA Aerospace Education Services Program, commonly known as the spacemobile program. This program has been highly successful in helping to enhance teacher and student education in science, mathematics, and technology. The remaining \$3,000,000 above the request is for additional space grant college and fellowship designation awards from applications submitted by colleges/consortia in the original competition.

—\$13,000,000 general reduction in research and development activities, to be taken at the agency's discretion, subject to the normal reprogramming guidelines, except for those programs or activities specified for increases in the Committee's recommendations.

From within amounts made available for educational programs, the Committee concurs in the House earmark of \$1,400,000 to Wheeling College to establish and equip a computer software program which will be used to develop software for space science education at the college and other sites throughout the Nation.

The Committee continues to be interested in the development of appropriate research and training initiatives associated with expanded space station operations activity. To better apprise the Committee of the potential need for support activities, NASA is directed to prepare and submit to the Committee not later than February 15, 1990, an assessment of the design and need for a space operations research and training center. It is anticipated that such a center may be needed as a means of aiding in the training and the conduct of research or activities related to the operation of ground systems associated with concentrated manned activity on space station *Freedom* and ultimately in extraterrestrial-based, manned activity. There has been some discussion about the need for a space operations research center, but its character and cost remain unclear. It is expected that as a part of the report, a plan for the establishment of the center in fiscal year 1991 will also be presented.

The Committee is concerned that NASA's university research and support activities are unduly limited in their geographical distribution. In part, this is understandable due to the limited experience the agency has had in nonmission oriented research and development programming. It is clear, however, that there is widespread and growing recognition of the value and importance of aerospace technology and many institutions which have traditionally not competed for NASA grants are now seeking such support.

While in the past it was permissible to simply demand quality and experience in scientific proposals, it now is more important that the agency should be mindful that a national space program broaden participation in these expanding activities.

The Committee is highly supportive of the National Science Foundation EPSCOR program because it addresses this very critical requirement. That program is focused toward identifying and assisting institutions which have traditionally not participated in the competitive basic research programs of the Foundation. This is an especially meritorious approach because it does not involve a diminishment of the application of competitive standards in the determination of research awards, but rather assists potential participants to compete more effectively.

The Committee there urges NASA to review its current research program to identify how barriers to effective participation of such institutions can be expanded and to consider adopting strategies such as EPSCOR to promote greater geographical diversity in its research awards.

The Committee does not concur in the House language directing NASA to add an additional criteria in selecting schools for participation in the Space Grant College and Fellowship Program. The legislative history on this program makes clear that research should, in fact, be de-emphasized to avoid competition with university research programs in NASA's program offices.

The Committee is concerned about both the development and operational costs which NASA incurs due to the loss of, or risk of losing, sole source suppliers whose work has not been previously identified as a single-point-of-failure by the agency. A study of this risk to the entire Federal Government was begun last year at the direction of the National Security Council. The Committee encourages NASA to continue to monitor this problem carefully and to submit a report to the Committee on those known single-points-of-failure, particularly in the space station program, by March 1, 1990. This report should carefully identify vital subcontractors and their respective activities in addition to other readily identifiable major program activities. In the event that NASA faces threats from the loss of a vital sole source supplier in the future, whether in development or operational programs, the Committee expects notification prior to the expenditure of funds to alleviate this problem, unless such a notification would create a delay that would pose a threat to the integrity of the program or a risk to the Nation's security.

Finally, the Committee concurs with the House in capping 1990 amounts for certain NASA programs with the exception of the Hubble space telescope. The Committee is particularly distressed that since enactment of last year's appropriations bill, no less than five space science development projects have required raising the cap included in the fiscal 1989 conference report. Given the extremely tight budget constraints which both NASA and the Congress face in light of a large structural Federal deficit coupled with specific Gramm-Rudman-Hollings targets, the Committee continues to emphasize to NASA the need to keep development projects ontime and within cost. The only alternative is to require NASA to

live within statutory caps which would force projects that risk running over their cap to either descope or be canceled.

Gamma ray observer.....	\$26,700,000
Galileo.....	17,100,000
AXAF.....	41,000,000
Mars observer.....	100,500,000
Upper atmospheric research satellite.....	73,900,000
CRAF/Cassini.....	20,000,000

SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS

Appropriations, 1989.....	\$1,361,200,000
Budget estimate, 1990.....	5,139,600,000
House allowance.....	4,709,600,000
Committee recommendation.....	4,639,600,000

PROGRAM DESCRIPTION

The space flight, control and data communications appropriation provides for the production and operational activities for the space transportation system and the tracking, telemetry, command, and data acquisition support of all NASA flight projects.

Shuttle production and operational capability and space transportation operations are the key elements of the space transportation system that are contained within this appropriation. The shuttle production and capability development program provides for the national fleet of space shuttle orbiters including main engines, launch site and mission operational control requirements, initial structural and operational spares, production tooling, and related supporting activities. Design and development activities will continue to complete those activities associated with the redesigned solid rocket motor, and to develop the advanced solid rocket motor. Development of improvements to the Shuttle for extending the stay time in orbit will be continued, and for expendable launch services for selected space science and applications missions consistent with implementation of the mixed fleet concept.

The space tracking and data acquisition program, using ground-based and satellite (tracking and data relay satellite system) components, provides vital tracking, telemetry, command, and data acquisition support for Earth-orbital spacecraft, planetary missions, sounding rockets, balloons, and research aircraft. Work will continue on the replacement tracking and data relay satellite spacecraft and on the second TDRSS ground terminal. Facilities are also provided to process into meaningful form the scientific, applications, and engineering data which are collected from flight projects.

COMMITTEE RECOMMENDATION

The Committee recommends \$4,639,600,000 for space flight, control, and data communications activities. This is \$275,400,000 above the 1989 enacted level, \$70,000,000 below the House level, and \$500,000,000 below the budget request. The recommendation includes the following increases, decreases, and changes to the program areas described below:

—\$399,200,000 from the \$4,037,500,000 for the space transportation system (space shuttle). This reduction is \$19,800,000 more

than the reduction proposed by the House. The reduction may be taken at the agency's discretion from the shuttle production or shuttle operations activities, subject to the Committee's normal reprogramming procedures. The Committee fully expects that portions of this reduction will be offset as a result of the \$217,000,000 provided in the bill for Air Force shuttle activities that will be directly transferred to NASA for its use in shuttle-related activities, again subject to the normal reprogramming procedures.

\$34,800,000 to the \$15,200,000 requested for space shuttle structural spares. The structural spares program funds major hardware components of the space shuttle orbiter such as the wings, crew module, payload bay doors, and orbital maneuvering system pods. The Committee recommendation is \$9,800,000 above the House level and will provide for a structural spares program at the original level NASA submitted in its budget to the Office of Management and Budget. The Committee is concerned that the President's request for this program, which is a reduction below the fiscal 1989 level of \$5,100,000, is insufficient to preserve critical skills and tooling that could pose serious risks to the shuttle program.

The Committee has deleted bill language, proposed by the House, directing NASA to use \$50,000,000 in funds previously appropriated for construction of orbiter 105 for activities within the "Space flight, control, and data activities" account. The House directed that \$25,000,000 of these funds go for structural spares and that \$25,000,000 be added to the \$25,000,000 requested in the budget for additional work on the extended duration orbiter (EDO). The Committee has recommended sufficient funds for structural spares independent of drawing on orbiter 105 funds. In addition, NASA has indicated to the Committee that prospects for commercializing partial development of the EDO should eliminate the need for funds above the budget request for this activity. While construction of orbiter 105 is proceeding on time and with some apparent cost savings, the Committee believes it is more prudent to hold any excess funds in reserve for this activity.

—\$35,000,000 from the \$121,300,000 requested for the advanced solid rocket motor program. This is made possible by a larger than expected carryover of fiscal 1989 funding of as much as \$35,000,000 due to delays in finalizing the contract between NASA and the project's prime contractor.

—\$100,000,000 from the \$1,102,100,000 requested for tracking and data acquisition. This is a reduction of \$50,000,000 more than the House level. The Committee fully expects that portions of this reduction will be offset as a result of the \$217,000,000 provided in the bill for Air Force shuttle activities that will be directly transferred to NASA for its use in shuttle-related activities, subject to the normal reprogramming procedures. This reduction should be taken at the agency's discretion, but sufficient funds should be allocated to maintain needed levels for space network operations, engineering, and support, as well as to keep the White Sands ground terminal system replacement on schedule. Within the tracking and data acquisition activity,

the Committee has included funds to begin phase B studies on the advanced tracking and data relay satellite system (TDRSS). The Committee is concerned, however, about reports which indicate that the Department of Defense (DOD) may be considering developing its own TDRSS system. As a result, the Committee directs NASA to assure that any phase B studies begun on the advanced TDRSS include sufficient capacity and compatibility for both NASA and the DOD.

The Committee concurs with the House in recommending that NASA may withhold, until the fourth quarter of fiscal 1990, the \$227,000,000 requested for payment to the Federal Financing Bank for the TDRSS program. This payment is made annually in connection with the off-budget financing of the TDRSS program. The Committee recommends withholding payment until the fourth quarter to provide NASA the flexibility in connection with any unforeseen shuttle safety or operation costs during fiscal 1990.

The Committee also concurs with the House in recommending bill language delaying the availability of \$1,400,000,000 of shuttle production and operation funds until April 15, 1990. The Committee does not anticipate that this delay will unduly disrupt program activities.

The Committee has included bill language in the administrative provisions portion of the NASA appropriation which prevents the expenditure of any funds in the bill if such expenditure would cause total fiscal year 1990 expenditures for space flight, control, and data communications programs contained in this or prior year acts to exceed \$4,686,161,000. This will result in \$100,000,000 less in expenditures in fiscal year 1990 and is possible due to less than expected costs in the construction of orbiter 105.

CONSTRUCTION OF FACILITIES

(INCLUDING TRANSFER OF FUNDS)

Appropriations, 1989.....	\$290,100,000
Budget estimate, 1990.....	311,500,000
House allowance.....	381,300,000
Committee recommendation.....	311,000,000

PROGRAM DESCRIPTION

This appropriation provides for the contractual services for the design, repair, major rehabilitation, and modification of facilities; the construction of new facilities; minor construction; the purchase of land and equipment related to construction and modification; and advanced design related to facilities planned for future authorization.

COMMITTEE RECOMMENDATION

The Committee recommends \$341,000,000 for the construction of facilities, \$49,300,000 less than the level provided by the House and \$800,000 less than the President's budget request.

The Committee makes the following recommendations on the allocation of those funds:

\$1,500,000 for rehabilitation of the hypersonic tunnel at Plum Brook Station at the Lewis Research Center. The urgency of this project is reduced commensurate with the Committee's recommendation to delete funding for the national aerospace plane. The Committee does recommend that \$600,000 remain available within this account for asbestos and PCB removal in the tunnel.

-\$14,000,000, to be taken at the agency's discretion, subject to the normal reprogramming requirements.

The Committee concurs with the House in recommending \$15,000,000 in the "Construction of facilities" account for an orbital debris radar facility. This funding was denied under the "Research and development" account. The Committee believes that this activity is more properly funded under the "Construction of facilities" account.

In addition, the Committee recommends \$2,500,000 for a wake shield facility that was denied under the "Research and development" account in the commercial programs activity.

The Committee has also included bill language providing the Administrator of NASA with the option of transferring up to \$95,000,000 of the funds within the "Construction of facilities" account to the "Space flight, control, and data communications" account and/or the "Research and program management" account. The House provided permissive transfer authority of up to \$35,000,000. These funds may be made available at the agency's discretion subject to the normal reprogramming procedures.

In light of the significant request for construction of facilities for space flight activities in the budget request, \$53,400,000, the Committee has no objection to using a portion of the \$217,000,000 provided in the bill for Air Force shuttle activities to be used to fund some of the requested activities. Any such use shall be subject to the normal reprogramming procedures.

From within the funds for construction of facilities, the Committee has included bill language designating \$10,000,000,000 for the initial construction of facilities for the advanced solid rocket motor at Yellow Creek, MS.

Finally, the Committee does not concur with the House report language which would permit NASA to allocate up to \$15,000,000 in construction of facilities funds for initial construction of the neutral buoyancy laboratory or the space station processing facility. While the Committee does not believe that the commercialization of these projects is the preferred approach to guarantee their construction, it opposes funding them at the expense of existing NASA projects. Should commercialization efforts fail on either facility, the Committee urges the Administration to submit a supplemental appropriations request to guarantee their construction.

RESEARCH AND PROGRAM MANAGEMENT

Appropriations, 1989.....	\$1,855,000,000
Budget estimate, 1990.....	2,032,200,000
House allowance.....	1,957,200,000
Committee recommendation.....	1,982,200,000

PROGRAM DESCRIPTION

The research and program management appropriation supports the performance and management of research, technology, and test activities at NASA installations, and the planning, management, and support of contractor research and development tasks necessary to meet the Nation's objectives in aeronautical and space research. Specifically, this appropriation provides the technical and management capability of the civil service staff needed to conduct the full range of programs for which NASA is responsible; maintains facilities and laboratories in a state of operational capability and manages their use in support of research and development programs; and provides technical and administrative support for the research and development programs at NASA.

COMMITTEE RECOMMENDATION

The Committee recommends an appropriation of \$1,982,200,000 for research and program management. This is an increase of \$127,200,000 over the 1989 level, \$25,000,000 above the House request, and \$50,000,000 below the budget request.

The recommendation includes the following changes from the budget estimate:

- \$13,750,000 from the \$50,527,000 increase requested for personnel and related costs. This is a reduction of \$13,750,000 less than the House level. The Committee expects this reduction to be taken at the agency's discretion. The Committee does not concur with the House language which directs that all reductions in personnel and related costs should be taken from the space station program. Instead, the Committee expects any reduction to reflect any pro rata reduction in the agency's various proposed fiscal 1990 program activities.
- \$36,250,000 from the \$90,073,000 increase requested for travel and operation of installations. This reduction is to be taken at the agency's discretion.

The Committee concurs with the House in expressing its concern about the potential negative consequences at the Goddard Space Flight Center to employees affected by the recently proposed skill mix change at the center. As a result, in addition to the reporting requirement requested by the House on this matter, the Committee directs NASA to allocate sufficient resources to the center to avoid any negative consequences to employees due to procedures adopted to implement this change. Specifically, the Committee fully expects NASA to offer employees the appropriate training if they are offered a job in another skill or craft, and to take all necessary and reasonable steps to avoid downgrading any employees. These resources should not come at the expense of other center programs and activities. Finally, the Committee notes that Goddard will un-

dergo major changes in preparation for the start of the Earth observing system. The Committee expects NASA to be able to properly address issues related to the skill mix change during this process. The Committee expects a report on this matter from the agency by November 1, 1989.

The Committee has included bill language which permits the transfer of \$500,000 from the "Research and program management" account to the "Office of Inspector General" account, subject to the normal reprogramming procedures.

INSPECTOR GENERAL

Appropriations, 1989.....	(1)
Budget estimate, 1990.....	\$8,795,000
House allowance.....	8,795,000
Committee recommendation.....	8,795,000

¹ Previously funded in the research and program management appropriation.

PROGRAM DESCRIPTION

The Office of the Inspector General (OIG) was established by the Inspector General Act of the 1978. The Office is responsible for providing 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. In accordance with the Inspector General Act Amendments, Public Law 100-504, a separate appropriation is being requested for the OIG. Previously, such activities were funded in the research and program management appropriation.

COMMITTEE RECOMMENDATION

The Committee concurs with the House in recommending the budget estimate of \$8,975,000 for the new Office of the Inspector General in 1989.

TITLE V—GENERAL PROVISIONS

The Committee concurs with all general provisions included in the House-passed VA, HUD, and Independent Agencies appropriations bill with the following exceptions:

Section 501 has been modified to include travel performed by the Offices of Inspector General in connection with audits and investigations in the exemption from the limitation preventing expenditures for travel expenses not to exceed the levels included in budget estimates submitted to the Committees on Appropriations. The Committee has included this language at the request of the inspectors general in the departments and agencies within the bill's jurisdiction in light of the fact that this is the first year when separate appropriations accounts have been created for them after passage of the amendments to the Inspector General Act of 1978 last year. In granting this exemption, the Committee wishes to make clear that it is transitional in nature. The Committee intends to review the need for this language during next year's hearings on the fiscal year 1991 budget.

Section 506 has been modified to include a provision amending title 31 of the United States Code to permit the Administrator of the Environmental Protection Agency to receive portal to portal transportation. This language was requested by the agency.

Section 509 has been modified to include a provision that exempts appropriations made for the Offices of Inspector General personnel compensation and benefits from the limitation on transferring funds between object classifications in accounts for personnel compensation and benefits in the bill. The Committee has included this language at the request of the inspectors general in the agencies within the bill's jurisdiction in light of the fact that this is the first year when separate appropriations accounts have been created for them after passage of the amendments to the Inspector General Act of 1978 last year. Like the Committee's modification to section 501 of the general provisions, the Committee wishes to make clear that it is transitional in nature. The Committee intends to review the need for this language during next year's hearings on the fiscal year 1991 budget.

In addition, the Committee has included bill language which permits HUD to use up to \$2,000,000 for object classifications above the amounts set forth in the budget estimates for personnel compensation and benefits if it would otherwise lapse at the end of the fiscal year.

The House-passed version of section 516 has been deleted and an alternative proposal included in its place. That alternative would limit after January 1, 1990, the number of noncareer appointees to the Senior Executive Service [SES] in the Department of Housing and Urban Development and the Environmental Protection Agency to 15 percent of their SES positions, unless the Office of Personnel

Management [OPM] approves a waiver to exceed that limitation upon sufficient justification provided by the agency. OPM is required to report to the Congress prior to issuing such a waiver and certify in the report that such a waiver is essential for the agency to fulfill its basic mission and purposes.

The Committee's alternative to the House proposal was developed in consultation with the Senior Executive Association and represents an attempt to provide both HUD and EPA with reasonable flexibility, while at the same time protecting the basic integrity of each agency's career senior civil servants.

Current law provides that Government agencies may have up to 25 percent of their SES positions filled with noncareer appointees, with a 10 percent Governmentwide limitation. Allegations have been made in the past that HUD and EPA have filled SES positions with unqualified noncareer SES employees when there were sufficient, qualified career employees for the position, and that as a result, abuses occurred in program administration by some of the noncareer SES employees. In response to this concern, the House included section 516 to require that certain positions in these agencies, as well as all other agencies within the bill's jurisdiction, could only be filled by career SES employees.

The Committee's proposal, in requiring HUD and EPA to obtain the approval of OPM if they exceed the 15 percent level, is designed to require management flexibility and accountability simultaneously. The Committee expects OPM will establish criteria and standards by which to measure whether an SES position should be filled by a career or noncareer employee in these agencies. The Committee expects that those positions requiring management expertise and experience within HUD and EPA will be filled by career SES employees who have met the executive qualifications required by OPM for admission as a career appointee to the SES. Further, the Committee believes that noncareer appointees should only fill SES positions which are policymaking and directing in nature, rather than those which are predominantly managerial and operations oriented, since noncareer SES employees are not required to have specific managerial and executive experience. By establishing such standards, OPM should be able to evaluate whether or not the agencies need to exceed the 15 percent limitation on noncareer SES employees included in the bill.

In addition, the Committee expects OPM to conduct a review of HUD and EPA as required by section 3132(b) of title 5 of the United States Code to determine whether any additional SES positions at either agency should be designated as career-reserved. Such a review should be completed within 6 months after the date of enactment of this provision, and its results submitted in a report to the appropriate congressional committees.

Finally, the Committee has deleted section 517 that would prohibit any municipality from receiving community development block grant [CDBG] funds where three or more employees, acting on the orders of superiors of that municipality, have been convicted of using unnecessary force against nonviolent civil rights demonstrators. While the Committee strongly opposes the use of unnecessary force in any circumstance, it believes that the House-passed provision is an unnecessary and overreaching intrusion into the

police powers of local government. In addition, it unfairly penalizes those members of the community which benefit from the use of CDBG funds but had no knowledge, participation, or responsibility in any acts of unnecessary force. The Committee believes that the victims of any use of unnecessary force have far more effective remedies through the local legislative body or judicial review.

COMPLIANCE WITH PARAGRAPH 7, RULE XVI, OF THE STANDING RULES OF THE SENATE

Paragraph 7 of rule XVI requires that Committee reports on general appropriations bills identify each Committee amendment to the House bill "which proposes an item of appropriation which is not made to carry out the provisions of an existing law, a treaty stipulation, or an act or resolution previously passed by the Senate during that session."

An authorization for programs funded by the National Aeronautics and Space Administration has not as yet passed the Senate.

COMPLIANCE WITH PARAGRAPH 12, RULE XXVI OF THE STANDING RULES OF THE SENATE

Paragraph 12 of rule XXVI requires that Committee reports on a bill or joint resolution repealing or amending any statute or part of any statute include "(a) the text of the statute or part thereof which is proposed to be repealed; and (b) a comparative print of that part of the bill or joint resolution making the amendment and of the statute or part thereof proposed to be amended, showing by stricken-through type and italics, parallel columns, or other appropriate typographical devices the omissions and insertions which would be made by the bill or joint resolution if enacted in the form recommended by the committee."

With respect to this bill, it is the opinion of the Committee that it is necessary to dispense with these requirements in order to expedite the business of the Senate.

BUDGETARY IMPACT OF BILL

PREPARED BY THE CONGRESSIONAL BUDGET OFFICE PURSUANT TO SEC. 308(a), PUBLIC LAW 93-344, AS AMENDED

(in millions of dollars)

	Budget authority		Outlays	
	Committee allocation	Amount of bill	Committee allocation	Amount of bill
Comparison of amounts in the bill with the Committee allocation to its subcommittees of amounts in the First Concurrent Resolution for 1990. Subcommittee on HUD - Independent Agencies	65,881	* 67,038	69,774	* 70,525
Projections of outlays associated with budget authority recommended in the bill				
1990				* 38,780
1991				14,010
1992				4,097
1993				1,994
1994 and future year				7,686
Financial assistance to State and local governments for 1990 in the bill		16,665		1,478
			Direct loans	Loan guarantees
Credit authority estimates, fiscal year 1990	860	860	57,436	63,159

* Includes advance appropriation
 * Includes outlays from prior year budget authority
 * Excludes outlays from prior year budget authority

Note - The subcommittee is within its allocation for both discretionary budget authority and outlays

COMPARATIVE STATEMENT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY FOR FISCAL YEAR 1989 AND BUDGET ESTIMATES AND AMOUNTS RECOMMENDED IN THE BILL FOR FISCAL YEAR 1990—Continued

[Amounts in dollars]

Item (1)	1989 appropriation (2)	Budget estimate (3)	House allowance (4)	Committee recom- mendation (5)	Senate committee recommendation compared with (+ or -)		
					1989 appropriation (6)	Budget estimate (7)	House allowance (8)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION							
Research and development.....	4,191,700,000	5,751,600,000	5,203,100,000	5,367,600,000	+1,175,900,000	-384,000,000	+164,300,000
Rescission.....	-25,000,000	—	—	—	+25,000,000	—	—
Space flight, control and data communications.....	4,364,200,000	5,139,600,000	4,709,600,000	4,639,600,000	+275,400,000	-500,000,000	-70,000,000
Construction of facilities.....	290,100,000	341,800,000	384,300,000	341,000,000	+50,900,000	-800,000	-43,300,000
Science, space and technology education trust fund (by transfer).....	(15,000,000)	—	—	—	(-15,000,000)	—	—
Research and program management.....	1,825,000,000	2,032,200,000	1,957,200,000	1,982,200,000	+127,200,000	-50,000,000	+25,000,000
(by transfer).....	(33,000,000)	—	—	—	(-33,000,000)	—	—
Office of the Inspector General.....	—	8,775,000	8,775,000	8,775,000	+8,775,000	—	—
Total, National Aeronautics and Space Administration (net).....	10,676,000,000	13,273,995,000	12,242,995,000	12,339,195,000	+1,663,195,000	-934,800,000	+76,200,000

MAKING APPROPRIATIONS FOR THE DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING AND URBAN DEVELOPMENT, AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS, AND OFFICES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1990, AND FOR OTHER PURPOSES

OCTOBER 18, 1989.—Ordered to be printed

Mr. TRAXLER, from the committee of conference,
submitted the following

CONFERENCE REPORT

[To accompany H.R. 2916]

The committee of conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 2916) "making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes," having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its amendments numbered 11, 12, 16, 22, 24, 31, 51, 52, 61, 62, 64, 65, 66, 67, 68, 69, 72, 73, 74, 77, 78, 81, 85, 99, 101, 102, 107, 108, 111, 118, 120, 125, 126, and 127.

That the House recede from its disagreement to the amendments of the Senate numbered 1, 2, 5, 10, 14, 23, 28, 29, 33, 34, 35, 36, 44, 49, 50, 58, 59, 70, 76, 82, 96, 113, and 115, and agree to the same.

Amendment numbered 3:

That the House recede from its disagreement to the amendment of the Senate numbered 3, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$11,549,431,000*; and the Senate agree to the same.

Amendment numbered 7:

That the House recede from its disagreement to the amendment of the Senate numbered 7, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$216,000,000*; and the Senate agree to the same.

Amendment numbered 63:

That the House recede from its disagreement to the amendment of the Senate numbered 63, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$6,000*; and the Senate agree to the same.

Amendment numbered 83:

That the House recede from its disagreement to the amendment of the Senate numbered 83, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$1,000,000*; and the Senate agree to the same.

Amendment numbered 84:

That the House recede from its disagreement to the amendment of the Senate numbered 84, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$2,897,000*; and the Senate agree to the same.

Amendment numbered 87:

That the House recede from its disagreement to the amendment of the Senate numbered 87, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$2,639,000*; and the Senate agree to the same.

Amendment numbered 88:

That the House recede from its disagreement to the amendment of the Senate numbered 88, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$275,290,000*; and the Senate agree to the same.

Amendment numbered 104:

That the House recede from its disagreement to the amendment of the Senate numbered 104, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment insert *\$97,900,000*; and the Senate agree to the same.

The committee of conference report in disagreement amendments numbered 4, 6, 8, 9, 13, 15, 17, 18, 19, 20, 21, 25, 26, 27, 30, 32, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 53, 54, 55, 56, 57, 60, 71, 75, 79, 80, 86, 89, 90, 91, 92, 93, 94, 95, 97, 98, 100, 103, 105, 106, 109, 110, 112, 114, 116, 117, 119, 121, 122, 123, 124, and 128.

JOINT EXPLANATORY STATEMENT OF THE COMMITTEE OF CONFERENCE

The managers on the part of the House and the Senate at the conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 2916) making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes, submit the following joint statement to the House and the Senate in explanation of the effect of the action agreed upon by the managers and recommended in the accompanying conference report.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Amendment No. 90: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede

and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter stricken and inserted by said amendment, insert the following:

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; \$5,366,050,000, to remain available until September 30, 1991: Provided, That of the funds made available under this heading, \$1,800,000,000 is for the space station program only, \$750,000,000 of which shall not become available for obligation until June 1, 1990, 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 of the funds made available under this heading, \$320,000,000 is for space transportation capability development only, which amount shall not become available for obligation until April 15, 1990, 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 of \$2,064,600,000 made available under this heading for space science and applications, only \$1,000,000,000 shall be available prior to April 1, 1990, 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 no funds appropriated by this Act or any other Act may be used to enter into contracts of the National Aeronautics and Space Administration for the comet rendezvous and asteroid flyby and Cassini missions (CRAF-Cassini) if the estimated total budget authority for development of the two spacecraft, through launch plus 30 days of the Cassini mission, exceeds \$1,600,000,000.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate. The conferees agree to the following changes from the budget request:

- \$250,200,000 from the \$2,050,200,000 requested providing a total of \$1,800,000,000 for space station. The space station recommendation is summarized as follows:

	Request	Conference
Space station		
Development	\$1,970,200,000	\$1,720,000,000
Flight telerobotic services	15,000,000	80,000,000
Operations	25,000,000	0
Transition definition	25,000,000	0
Orbital debris radar	15,000,000	0
Total	2,050,200,000	\$1,800,000,000

* \$15,000,000 included under the Construction of Facilities Account

While the conferees have not included bill language proposed by the House requiring that not more than 50 percent of any reduction in space station development costs be taken from work package prime contracts, the conferees are concerned that excessive management costs are being incurred within the space station budget. They note, for example, that the House Committee Surveys and Investigations Staff report suggests that both NASA personnel and work package contractors believe the number of personnel and resources committed to management and integration activities are excessive. Also, the report suggests that NASA center officials and contractors believe that Level II (Reston) involvement and systems engineering and integration have unnecessarily increased space station program costs.

In this connection, the conferees expect NASA to demonstrate that a reallocation of fiscal year 1990 resources between prime and non-prime areas is occurring. A report on that issue should be made in connection with submittal of the 1990 operating plan.

Solar dynamic power development is a critical resource in the out-year growth of space station. It offers higher efficiency and lower life cycle costs. As a result, the conferees considered directing accelerated development of solar dynamic power in the fiscal year 1990 NASA budget. However, in view of a restricted 1990 station funding profile, monies have not been included in this appropriation for this accelerated development. Nevertheless, NASA is directed to continue solar dynamic power development and provide concurrent to the submission of the fiscal year 1991 budget, a funding profile which will allow for the addition of solar dynamic power as a precursor to any future moon/Mars mission.

Finally, the conferees have agreed to include bill language delaying the availability of \$750,000,000 of the \$1,800,000,000 provided for space station until June 1, 1990.

- \$10,000,000 from the \$88,600,000 requested for upper stages. The conferees direct NASA to absorb \$6,500,000 for the TOS upper stage for the ACTS satellite. If additional resources are required, the Committees on Appropriations will consider a reprogramming action at the time the 1990 operating plan is submitted. In that connection, the conferees are aware that the TOS program may be exceeding both past and current total cost projections. The conferees expect NASA to explore the question of "capping" this program at an appropriately agreed to level. Such action should be implemented in connection with the 1990 operating plans.

- \$15,00,000 from the \$189,800,000 requested for the engineering and technical base.

- \$16,300,000 from payload operation and support—including \$12,800,000 from space station support and \$3,500,000 from commercially developed space facility activities. The conferees direct that these activities be absorbed in the development costs of space station with the understanding that the shuttle program will retain control over the administration of payload operation and support activities.

- \$19,000,000 from the \$48,700,000 requested for advanced program, including a \$5,000,000 general reduction and a reduction of \$14,000,000 for space station crew rescue vehicle phase B studies from the \$15,000,000 available in fiscal year 1989 and requested in

fiscal year 1990. The conferees have agreed to provide an additional \$1,000,000 for phase A prime CERV studies. The conferees understand that no phase B money is required before fiscal year 1991.

– \$5,000,000 from the \$5,000,000 requested for advanced launch systems.

– \$10,000,000 from the \$107,000,000 requested for the orbital maneuvering vehicle (OMV).

– \$15,000,000 from the \$124,200,000 requested for life sciences.

+ \$10,500,000 for the continuation of shuttle "C" phase A/B studies.

– \$13,700,000 from the \$23,000,000 requested for space station integrated planning and attached payloads.

+ \$10,000,000 for a total ozone mapping spectrometer satellite (TOMS).

+ \$5,000,000 for interdisciplinary research and analysis for climate studies.

+ \$62,000,000 for the advanced communications technology satellite (ACTS) program.

– \$5,000,000 from the \$61,000,000 requested for commercial programs. The conferees direct that \$3,000,000 be allocated for the AdaNET project and that \$4,000,000 be absorbed from within the commercial programs budget and be allocated to initiate and establish the National Technology and Transfer Center (NTTC) at Wheeling College.

+ \$625,000 for Rural Enterprises, Incorporated from within available funds.

– \$2,500,000 requested for commercial programs for the development of a "wake shield facility." The conferees have agreed to fund this facility under the construction of facilities account.

– \$20,350,000 from the \$47,300,000 requested for the Pathfinder program.

– \$6,000,000 from the \$16,200,000 requested for in-space flight experiments.

– \$92,000,000 from the \$127,000,000 requested for the National Aerospace Plane (NASP). In addition, the conferees have provided for a transfer of up to \$25,000,000 from the NASA construction of facilities account for the NASP program. This would provide for a total program level of \$60,000,000.

+ \$3,000,000 to the \$35,000,000 requested for university programs. In addition, the conferees have earmarked \$1,000,000 under the research and program management account to expand the NASA aerospace education services program.

+ \$4,000,000 for a university consortium study of an international earth science information network.

The conferees strongly support the Earth Observation System (EOS) program. The remote sensing of earth, on the major scale envisioned by EOS, will provide vital information on future global environmental trends. This information can be utilized to promote global and national security, extend international cooperation, and improve our ability to understand and manage global environmental, economic, and social problems. In the past, NASA has often concentrated on data acquisition rather than data assimilation and dissemination. Other federal agencies are also collecting earth monitoring data for specific, narrowly focused missions. Although

the Federal government has spent billions of dollars to acquire data, very little has been done to promote technology transfer and data analyses by enabling a broad cross-section of scientists to easily access the available information.

The conferees believe that NASA should take the lead in broadening the work now planned for EOS to create a network and the required associated facilities to integrate and facilitate the use of information from government-wide earth monitoring systems. Therefore, the conferees have agreed to include \$4,000,000 to contract with a newly created consortium for international earth science information network. The consortium should be tasked to (1) analyze extant earth science information resources and those planned to be available from future efforts, (2) convene key present and potential users to assess the need for investment in integration of this information and support of its use, (3) analyze, based on this assessment, the current state of national and international plans for data integration and accompanying support for analysis and modeling, (4) develop recommendations and draft plans to achieve the appropriate level of effort in the utilization of earth science data for research and public policy purposes, and (5) outline the desirable pattern of interaction with the scientific and policy community to insure that the effort is responsible to their needs in the short and long term. These tasks should be carried out through broad consultation of the scientific and policy community internationally and should take into account the probable evolution of remote sensing technology and recognize the broadly interdisciplinary nature of the future research and public policy agenda for earth sciences.

The conferees have agreed to provide the \$30,000,000 requested for initiation of the CRAF/Cassini program. The conference agreement includes a statutory "cap" of \$1,600,000 on the program. In that connection, the conferees have recommended this amount for the CRAF/Cassini program with the understanding that the total budget authority for development of the two spacecraft, through launch plus 30 days of the Cassini mission, will not exceed \$1,600,000. Recognizing normal budget constraints, the conferees expect to recommend the annual level required for this program. It will, however, "cap" each annual appropriation at such amount, provided that the accumulated sum of these amounts does not exceed the \$1,600,000,000. In the event that it is determined during the course of this program that the total budget will exceed \$1,600,000,000, NASA will be required to descope the program to fit within the total funding limit. If the descoping includes the cancellation of one of the missions, the mission to be cancelled is CRAF. The \$1,600,000,000 estimate is based on the standard NASA inflation model. If such model proves to under run actual inflation, the conferees will consider revising the annual and total caps. The conferees expect NASA to submit with the fiscal year 1990 operating plan the projected annual funding requirements for each year of development of the CRAF/Cassini program. These annual funding requirements should be updated on January 31 and July 31 of each subsequent fiscal year based on the most recent data available, including the program operating plan (POP) results.

The conferees have no objection to the House language directing NASA to establish criteria for funding a university grant which would promote research in the areas of application of advanced electronics and dynamic control of lightweight structures, nondestructive testing during space manufacturing of crystals, and new lightweight composite materials for advanced space systems.

Both the Senate and House recommended bill language delaying the obligation of \$384,000,000 of space transportation capability development funds. The conferees have agreed to reduce the delayed obligation to \$320,000,000.

Finally, the conferees agree with the program "caps" as enumerated in the House report.

Amendment No. 91: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the sum proposed by said amendment, insert the following: *\$4,614,600,000*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees agree to the following changes from the budget request:

—\$425,000,000 from the \$4,037,500,000 requested for the space transportation system (space shuttle).

—\$100,000,000 from the \$1,102,100,000 requested for tracking and data acquisition.

The conferees agree that within the funds made available, a total of \$121,000,000, the budget request, has been provided for the advanced solid rocket motor program. In addition, the committee of conference has included bill language providing for the transfer of up to \$85,000,000 from the construction of facilities account to the space flight, control and data communications account. Of this amount, the conferees agree that up to \$35,000,000 may be used for development of the advanced solid rocket motor program and up to \$50,000,000 may be used for tracking and data acquisition activities.

Amendment No. 92: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

Restore the matter stricken by said amendment, amended as follows: In lieu of the sum named, insert: *\$75,000,000*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees agree that a total of \$75,000,000 shall be derived from the funds previously appropriated for the construction of orbiter 105. The use of those funds is delineated as follows:

+ \$25,000,000 for the space shuttle "structural spares program."

+ \$25,000,000 for continued development of an extended duration orbiter (EDO).

+ \$25,000,000 for space transportation system requirements.

The conferees also agree that if negotiations currently under way concerning the proposal to "commercialize" the EDO renders unnecessary the use of all or part of the \$25,000,000 added above, the

Committees on Appropriations will consider a reprogramming of such funds at the appropriate time.

Amendment No. 93: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the sum proposed by said amendment, insert the following: *\$601,300,000*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees agree to the following changes from the budget request:

+ \$15,000,000 for the space station orbital debris radar.

+ \$90,000,000 for construction of an advanced solid rocket motor facility at Yellow Creek, Mississippi.

In addition, the conferees have agreed, under amendments numbered 94 and 95, to permit the transfer of \$85,000,000 to the space flight, control, and data communications account; \$67,000,000 to the research and program management account; and \$25,000,000 to the research and development account.

Amendment No. 94: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the sum proposed by said amendment, insert the following: *\$152,000,000*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

Amendment No. 95: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter proposed by said amendment, insert the following: *Provided further, That of the amounts transferred under the authority of the foregoing proviso, not to exceed \$85,000,000 may be for "Space flight, control and data communications", and not to exceed \$67,000,000 may be for "Research and program management". Provided further, That in addition to the foregoing transfers, up to \$25,000,000 of the funds provided by this paragraph may be transferred to and merged with sums appropriated for "Research and development"*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The \$85,000,000 that may be transferred to the space flight, control and data communications account is available for tracking and data acquisition activities (\$50,000,000) and the advanced solid rocket motor program (\$35,000,000). The \$67,000,000 that may be transferred to the research and program management account is available for the activities of that account—except that such funds may not be used to restore any reductions enumerated under the research and program management account; and the \$25,000,000 that may be transferred to the research and development account is available for the national aerospace plane.

Amendment No. 96: Appropriates \$1,982,200,000 for research and program management as proposed by the Senate, instead of \$1,957,200,000 as proposed by the House.

The conferees have agreed to the following changes from the budget request:

- \$9,000,000 and 178 FTE requested for space station activities at Level II. This will provide for a total 1990 NASA FTE level of 23,522 and a total 1990 space station level of 2,428.

- \$6,000,000 from the \$90,073,000 requested for travel and operation of facilities.

+ \$1,000,000 to expand the NASA aerospace education services program.

In addition, the conferees have agreed to provide transfer authority of \$67,000,000 from the construction of facilities account.

Amendment No. 97: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter inserted by said amendment, insert the following: *Provided further, That of the funds made available under this heading, up to \$195,000 may be transferred to the "Office of Inspector General": Provided further, That the grade retention provisions of 5 U.S.C. 5362 shall remain available to Goddard Space Flight Center employees of the National Aeronautics and Space Administration, displace by the conversion on September 3, 1989, of their civil service positions to private sector positions, from the time an affected employee is placed in a lower graded position until one or more of the conditions of 5 U.S.C. 5362(d) is met.*

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees agree that this permissive transfer authority will be made available only for fiscal year 1990. In the future, the Office of Inspector General will be expected to budget resources from within the separate account requested for that purpose.

Amendment No. 98: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter stricken and inserted by said amendment, insert the following:

SMALL AND DISADVANTAGED BUSINESS

The NASA Administrator shall annually establish a goal of at least 8 per centum of the total value of prime and subcontracts awarded in support of authorized programs, including the space station by the time operational status is obtained, which funds will be made available to small business concerns or other organizations owned or controlled by socially and economically disadvantaged individuals (within the meaning of section 8(a) (5) and (6) of the Small Business Act (15 U.S.C. 637(a) (5) (6)), including Historically Black Colleges and Universities and minority educational institutions (as defined by the Secretary of Education pursuant to the General Education Provisions Act (20 U.S.C. 1221 et seq.)).

To facilitate progress in reaching this goal, the NASA Administrator shall submit within one year from enactment of this Act a plan describing the process to be followed to achieve the prescribed level of participation in the shortest practicable time.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees are strongly committed to increasing the role of minority- and women-owned businesses in the aerospace industry, particularly in NASA-related procurement. For this reason, the conferees have modified the Senate provision to increase NASA's annual goal for minority- and women-owned businesses to eight percent. While the conferees fully expect the agency to reach this level, they recognize that NASA should be given a reasonable period of time to reach this goal. As a result, the conferees expect that the Administrator's report due one year after enactment will demonstrate NASA's good faith effort to work towards this eight percent level as quickly as is possible.

Amendment No. 99: Deletes language proposed by the Senate "capping" the level of outlays for the space flight, control, and data communications account at \$4,681,161,000.

TITLE V

GENERAL PROVISIONS

Amendment No. 117: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate exempting travel performed by the Offices of Inspector General in connection with audits and investigations from the travel limitation established by section 501 of the General Provisions.

The conferees have agreed to include this language only for fiscal year 1990 to assist in the transition to the separate IG account structure.

Amendment No. 118: Deletes language inserted by the Senate amending 31 U.S.C. 1344 to permit the EPA Administrator portal to portal transportation.

Amendment No. 119: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate exempting the Offices of Inspector General from the limitation on personnel compensa-

tion and benefits funds in Section 509 of the General Provisions. The conferees have agreed to include this language only for fiscal year 1990 to assist in the transition to the separate IG account structure.

Amendment No. 120: Deletes language inserted by the Senate permitting the use of up to \$2,000,000 of HUD personnel compensation and benefits funds for other object classifications.

Amendment No. 121: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate changing reference to a section number.

Amendment No. 122: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter stricken and inserted by said amendment, insert the following:

After January 1, 1990, and for the duration of fiscal year 1990, within the Department of Housing and Urban Development, the number of noncareer appointees to the Senior Executive Service shall not exceed 13 percent of the total number of Senior Executive Service positions in such department, unless the Office of Personnel Management approves a waiver to exceed that limitation in accordance with 5 U.S.C. 3134. The Office of Personnel Management, in consultation with the Office of Management and Budget, shall undertake an expedited review of Senior Executive Service positions in the Department of Housing and Urban Development and report its findings, recommendations, and justification for any waiver determination to the Congress by December 15, 1989.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees are in agreement that adjusting the balance of HUD's Senior Executive Service in favor of career positions will improve departmental management and the effectiveness of housing and community development programs. For the past several years, the number of political SES appointees at HUD has approached 25 percent of the total—in sharp contrast to the government-wide ceiling of 10 percent. The conferees agree that the percentage of noncareer SES staff at HUD should be reduced to 13 percent by January 1, 1990, unless a waiver is granted by OPM and clearly justified to the Congress. The conferees expect OPM to apply the general principles set forth in the Senate report in distinguishing between noncareer positions that are policymaking and directing in nature and career positions that are predominantly managerial and operations oriented.

The compromise bill language also calls for a report to the Congress by December 15, 1989, by the Office of Personnel Management, in consultation with the Office of Management and Budget, on the classification of SES positions at HUD. The conferees expect that, among other things, this report will examine the increasing number of deputy assistant secretary positions and the justification for 22 such positions within the department.

The conferees have agreed to drop bill language prohibiting non-career deputy assistant secretaries and deputy assistant administrators. However, the conferees want to make clear their opposition to the conversion of career deputy positions to noncareer status. Of particular concern are suggestions that the character of the Environmental Protection Agency and its longstanding traditions of professional management may be undergoing changes. The conferees direct the EPA Administrator to seek the concurrence of the Committees on Appropriations before establishing any additional noncareer deputy assistant administrator positions. The conferees note that EPA's noncareer SES staff has remained stable over the past decade at approximately six percent. The Agency is expected to maintain this level and to report statistics to the Committees quarterly on the number of non-career SES, Schedule C, and administratively appointed positions.

Amendment No. 123: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter stricken by said amendment, insert the following:

SEC. 517. Notwithstanding any other provision of this Act, amounts otherwise provided by this Act for the following accounts and activities are reduced by the following amounts:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

*"Research and development", \$84,174,000;
"Space flight, control and data communications", \$71,526,000;
"Construction of facilities", \$9,320,000;
"Research and program management", \$30,724,000;
"Office of Inspector General", \$136,000;*

In carrying out these reductions, each amount earmarked in this Act and not otherwise specified in this section shall be reduced in proportion to the overall reduction in the applicable account with the exception of the earmarking for personnel compensation and benefits costs carried in the Department of Veterans Affairs "Medical care" appropriating paragraph which shall not be reduced.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The across-the-board reductions carried in section 517 are necessary to bring the bill totals for budget authority and outlays within the revised section 302(b) allocations. These overall decreases include a 43 percent reduction in each account to offset the additional funding carried in the 1990 Transportation and Related Agencies Appropriations Act to fight the war on drugs.

The conferees agree that the reductions be applied to each program, project, or activity in each appropriation, definitions of which are carried elsewhere in the statement. To permit the reductions to be applied to each program, project, or activity, bill language has been included requiring proportional reductions in each

individual earmarking of funds included in such appropriating paragraphs.

The conferees further agree that each department and agency is to submit its fiscal year 1990 operating plan to the Committees on Appropriations within thirty days of enactment of this appropriations bill. This directive applies to all discretionary appropriations. For the purposes of program execution, it is not intended that normal reprogramming between programs, projects, or activities be precluded after reductions required under this section or sequestration are implemented.

BALANCED BUDGET AND EMERGENCY DEFICIT CONTROL ACT

During fiscal year 1990, for purposes of the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177), the following information provides the definition of the term "program, project, and activity" for departments and agencies carried in the accompanying bill. The term "program, project, and activity" shall include the most specific level of budget items identified in the 1990 Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, the accompanying House and Senate Committee reports, the conference report or the joint explanatory statement of the managers of the committee of conference.

In applying any sequestration reductions, departments and agencies shall apply the percentage of reduction required for fiscal year 1990 pursuant to the provisions of Public Law 99-177 to each program, project, activity and subactivity contained in the budget justification documents submitted to the Committees on Appropriations of the House and Senate in support of the fiscal year 1990 budget estimates, as amended, for such departments and agencies as subsequently altered, modified or changed by Congressional action identified by the aforementioned Acts, resolutions and reports. Further, it is intended that in implementing the Presidential order, (1) no program, project, or activity should be eliminated, (2) no re-ordering of funds or priorities occur, and (3) no unfunded program, project, or activity be initiated. However, for the purposes of program execution, it is not intended that normal reprogramming between programs, projects, and activities be precluded after reductions required under the Balanced Budget and Emergency Deficit Control Act are implemented.

Amendment No. 124: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter proposed by said amendment, insert the following:

Sec. 518. The authority of the Department of Veterans Affairs in section 618 of Public Law 100-440 to operate a leave transfer program for employees subject to section 4103 of title 38, United States Code, is extended through December 31, 1989. The provisions of the final sentence of such section 618 shall apply to transferred leave that is unused as of December 31, 1989.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

Amendment No. 125: Deletes language inserted by the Senate expressing the sense of the Congress in support of joint medical research ventures.

Amendment No. 126: Deletes language inserted by the Senate permitting the HUD Secretary to adjust the level of assistance payments to reflect additional benefits provided in connection with housing assisted under the section 8 moderate rehabilitation program.

Amendment No. 127: Deletes language inserted by the Senate limiting amounts available for procurement of advisory or assistance services by the Department of Veterans Affairs, the Department of Housing and Urban Development, the Environmental Protection Agency, and the National Aeronautics and Space Administration.

Amendment No. 128: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment as follows:

In lieu of the matter proposed by said amendment, insert the following:

Sec. 519. None of the funds appropriated under title II of this Act under the heading entitled Community Planning and Development, Community Development Grants, to any department, agency, or instrumentality of the United States may be obligated or expended to any municipality that fails to adopt and enforce a policy prohibiting the use of excessive force by law enforcement agencies within the jurisdiction of said municipality against any individuals engaged in nonviolent civil rights demonstrations.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conference agreement inserts a new general provision as proposed by the Senate which denies CDBG funds to municipalities that permit the use of excessive force against nonviolent civil rights demonstrators. The conference agreement also changes the section number designation of this provision.

The conferees agree that a municipality be penalized only for acts of law enforcement agencies under its jurisdiction and control, and not be held responsible for such abusive misconduct by any other law enforcement entity occurring within its geographical boundaries.

The conferees strongly deplore reported instances of the use of excessive force by law enforcement agencies in arresting nonviolent civil rights demonstrators. Such misconduct by official governmental instrumentalities is exceedingly objectionable and offensive, and must be condemned and curbed with the imposition of effective policies to prevent any further occurrences. The Secretary of the Department of Housing and Urban Development is therefore directed to formulate adequate reporting and certification standards by municipalities receiving Federal assistance to assure that policies against such use of unwarranted police force are adopted and enforced. Such guidelines will further assure that no municipality

is unfairly penalized for actions outside its control or which occur despite good faith efforts to prohibit such abuses.

CONFERENCE TOTAL—WITH COMPARISONS

The total new budget (obligational) authority for the fiscal year 1990 recommended by the Committee of Conference, with comparisons to the fiscal year 1989 amount, the 1990 budget estimates, and the House and Senate bills for 1990 follow:

New budget (obligational) authority, fiscal year 1989	\$60,620,881,000
Budget estimates of new (obligational) authority, fiscal year 1990.....	62,620,258,365
House bill, fiscal year 1990	65,143,950,000
Senate bill, fiscal year 1990	67,159,679,978
Conference agreement, fiscal year 1990	66,961,691,000
Conference agreement compared with:	
New budget (obligational) authority, fiscal year 1989	16,340,810,000
Budget estimates of new (obligational) authority, fiscal year 1990	14,441,432,635
House bill, fiscal year 1990	11,817,741,000
Senate bill, fiscal year 1990	198,188,978

BOB TRAXLER,
 LOUIS STOKES,
 LINDY BOGGS,
 ALAN B. MOLLOHAN,
 JIM CHAPMAN,
 CHESTER G. ATKINS,
 JAMIE L. WHITTEN,
 BILL GREEN,
 LAWRENCE COUGHLIN,
 JERRY LEWIS,
 SILVIO O. CONTE,

Managers on the Part of the House.

BARBARA MIKULSKI,
 PATRICK LEAHY,
 J. BENNETT JOHNSTON,
 FRANK R. LAUTENBERG,
 WYCHIE FOWLER, Jr.,
 J. ROBERT KERREY,
 ROBERT C. BYRD,
 JAKE GARN,
 ALFONSE M. D'AMATO,
 CHARLES E. GRASSLEY,
 DON NICKLES,
 PHIL GRAMM,
 MARK HATFIELD,

Managers on the Part of the Senate.

○

PUBLIC LAW 101-144--NOV. 9, 1989

Public Law 101-144
101st Congress

An Act

Making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1990, and for other purposes, namely:

Nov. 9, 1989
(11 U. 2916)

Departments of
Veterans Affairs
and Housing and
Urban
Development,
and Independent
Agencies
Appropriations
Act, 1990.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

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; \$5,366,050,000, to remain available until September 30, 1991: *Provided*, That of the funds made available under this heading, \$1,800,000,000 is for the Space Station Program only, \$750,000,000 of which shall not become available for obligation until June 1, 1990, 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 of the funds made available under this heading, \$320,000,000 is for space transportation capability development only, which amount shall not become available for obligation until April 15, 1990, 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 of \$2,064,600,000 made available under this heading for space science and applications, only \$1,000,000,000 shall be available prior to April 1, 1990, 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 no funds appropriated by this Act or any other Act may be used to enter into contracts of the National Aeronautics and Space

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Administration for the comet rendezvous and asteroid flyby and Cassini missions (CRAF/Cassini) if the estimated total budget authority for development of the two spacecraft, through launch plus 30 days of the Cassini mission, exceeds \$1,600,000,000.

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; \$4,614,600,000, to remain available until September 30, 1991: *Provided*, That of the funds made available under this heading, \$1,400,000,000 is for space transportation system only, which amount shall not become available for obligation until April 15, 1990, 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 \$75,000,000 of the funds appropriated in section 101(g) of Public Law 99-591 for orbiter production shall be available until September 30, 1991, for all expenses of this account.

CONSTRUCTION OF FACILITIES

(INCLUDING TRANSFER OF FUNDS)

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, \$601,300,000, to remain available until September 30, 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

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would be inconsistent with the interest of the Nation in aeronautical and space activities: *Provided further*, That up to \$152,000,000 of the funds provided by this paragraph may be transferred to and merged with sums appropriated for "Space flight, control and data communications" and/or "Research and program management": *Provided further*, That of the amounts transferred under the authority of the foregoing proviso, not to exceed \$85,000,000 may be for "Space flight, control and data communications", and not to exceed \$67,000,000 may be for "Research and program management": *Provided further*, That in addition to the foregoing transfers, up to \$25,000,000 of the funds provided by this paragraph may be transferred to and merged with sums appropriated for "Research and development".

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; \$1,982,200,000: *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: *Provided further*, That of the funds made available under this heading, up to \$195,000 may be transferred to the "Office of Inspector General": *Provided further*, That the grade retention provisions of 5 U.S.C. 5362 shall remain available to Goddard Space Flight Center employees of the National Aeronautics and Space Administration, displaced by the conversion on September 3, 1989, of their civil service positions to private sector positions, from the time an affected employee is placed in a lower graded position until one or more of the conditions of 5 U.S.C. 5362(d) is met.

OFFICE OF INSPECTOR GENERAL

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

ADMINISTRATIVE PROVISIONS

SMALL AND DISADVANTAGED BUSINESS

The NASA Administrator shall annually establish a goal of at least 8 per centum of the total value of prime and subcontracts awarded in support of authorized programs, including the space

Government organization and employees.

Minorities
42 USC 2473b.

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station by the time operational status is obtained, which funds will be made available to small business concerns or other organizations owned or controlled by socially and economically disadvantaged individuals (within the meaning of section 8(a) (5) and (6) of the Small Business Act (15 U.S.C. 637(a) (5) (6)), including Historically Black Colleges and Universities and minority educational institutions (as defined by the Secretary of Education pursuant to the General Education Provisions Act (20 U.S.C. 1221 et seq.)).

To facilitate progress in reaching this goal, the NASA Administrator shall submit within one year from enactment of this Act a plan describing the process to be followed to achieve the prescribed level of participation in the shortest practicable time.

POLAR PLATFORM

Of the funds made available in this Act for space station development, not more than \$10,700,000 shall be reduced from the \$107,000,000 requested for work performed on or under the work package numbered 3 prime contract (polar platform).

TITLE V

GENERAL PROVISIONS

SECTION 501. Where appropriations in titles I, II, and III of this Act are expendable for travel expenses and no specific limitation has been placed thereon, the expenditures for such travel expenses may not exceed the amounts set forth therefor in the budget estimates submitted for the appropriations: *Provided*, That this section shall not apply to travel performed by uncompensated officials of local boards and appeal boards of the Selective Service System; to travel performed directly in connection with care and treatment of medical beneficiaries of the Department of Veterans Affairs; to travel performed in connection with major disasters or emergencies declared or determined by the President under the provisions of the Disaster Relief Act of 1974; to site-related travel performed in connection with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended; to site related travel under the Solid Waste Disposal Act, as amended; to travel performed by the Offices of Inspector General in connection with audits and investigations; or to payments to interagency motor pools where separately set forth in the budget schedules: *Provided further*, That if appropriations in titles I, II, and III exceed the amounts set forth in budget estimates initially submitted for such appropriations, the expenditures for travel may correspondingly exceed the amounts therefor set forth in the estimates in the same proportion.

SEC. 502. Appropriations and funds available for the administrative expenses of the Department of Housing and Urban Development and the Selective Service System shall be available in the current fiscal year for purchase of uniforms, or allowances therefor,

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us authorized by law (5 U.S.C. 5901-5902); hire of passenger motor vehicles; and services as authorized by 5 U.S.C. 3109.

Sec. 503. Funds of the Department of Housing and Urban Development subject to the Government Corporation Control Act or section 402 of the Housing Act of 1950 shall be available, without regard to the limitations on administrative expenses, for legal services on a contract or fee basis, and for utilizing and making payment for services and facilities of Federal National Mortgage Association, Government National Mortgage Association, Federal Home Loan Mortgage Corporation, Federal Financing Bank, Federal Reserve banks or any member thereof, Federal Home Loan banks, and any insured bank within the meaning of the Federal Deposit Insurance Corporation Act, as amended (12 U.S.C. 1811-1831).

Sec. 504. No part of any appropriation contained in this Act shall remain available for obligation beyond the current fiscal year unless expressly so provided herein.

Sec. 505. No funds appropriated by this Act may be expended—
(1) pursuant to a certification of an officer or employee of the United States unless—

(A) such certification is accompanied by, or is part of, a voucher or abstract which describes the payee or payees and the items or services for which such expenditure is being made, or

(B) the expenditure of funds pursuant to such certification, and without such a voucher or abstract, is specifically authorized by law; and

(2) unless such expenditure is subject to audit by the General Accounting Office or is specifically exempt by law from such audit.

Sec. 506. None of the funds provided in this Act to any department or agency may be expended for the transportation of any officer or employee of such department or agency between his domicile and his place of employment, with the exception of any officer or employee authorized such transportation under title 31, United States Code, section 1344.

Sec. 507. None of the funds provided in this Act may be used for payment, through grants or contracts, to recipients that do not share in the cost of conducting research resulting from proposals not specifically solicited by the Government: *Provided*, That the extent of cost sharing by the recipient shall reflect the mutuality of interest of the grantee or contractor and the Government in the research.

Sec. 508. None of the funds provided in this Act may be used, directly or through grants, to pay or to provide reimbursement for payment of the salary of a consultant (whether retained by the Federal Government or a grantee) at more than the daily equivalent of the maximum rate paid for GS-18, unless specifically authorized by law.

Sec. 509. No part of any appropriation contained in this Act for personnel compensation and benefits shall be available for other object classifications set forth in the budget estimates submitted for the appropriations: *Provided*, That this section shall not apply to any part of the appropriations (including transfers) contained in this Act for Offices of Inspector General personnel compensation and benefits.

Sec. 510. None of the funds in this Act shall be used to pay the expenses of, or otherwise compensate, non-Federal parties interven-

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ing in regulatory or adjudicatory proceedings. Nothing herein affects the authority of the Consumer Product Safety Commission pursuant to section 7 of the Consumer Product Safety Act (15 U.S.C. 2056 et seq.).

Sec. 511. Except as otherwise provided under existing law or under an existing Executive order issued pursuant to an existing law, the obligation or expenditure of any appropriation under this Act for contracts for any consulting service shall be limited to contracts which are (1) a matter of public record and available for public inspection, and (2) thereafter included in a publicly available list of all contracts entered into within twenty-four months prior to the date on which the list is made available to the public and of all contracts on which performance has not been completed by such date. The list required by the preceding sentence shall be updated quarterly and shall include a narrative description of the work to be performed under each such contract.

Sec. 512. Except as otherwise provided by law, no part of any appropriation contained in this Act shall be obligated or expended by any executive agency, as referred to in the Office of Federal Procurement Policy Act (41 U.S.C. 401 et seq.) for a contract for services unless such executive agency (1) has awarded and entered into such contract in full compliance with such Act and the regulations promulgated thereunder, and (2) requires any report prepared pursuant to such contract, including plans, evaluations, studies, analyses and manuals, and any report prepared by the agency which is substantially derived from or substantially includes any report prepared pursuant to such contract, to contain information concerning (A) the contract pursuant to which the report was prepared, and (B) the contractor who prepared the report pursuant to such contract.

Sec. 513. Except as otherwise provided in section 506, none of the funds provided in this Act to any department or agency shall be obligated or expended to provide a personal cook, chauffeur, or other personal servants to any officer or employee of such department or agency.

Sec. 514. None of the funds provided in this Act to any department or agency shall be obligated or expended to procure passenger automobiles as defined in 15 U.S.C. 2001 with an EPA estimated miles per gallon average of less than 22 miles per gallon.

Sec. 515. Such sums as may be necessary for fiscal year 1990 pay raises for programs funded by this Act shall be absorbed within the levels appropriated in this Act.

Sec. 516. After January 1, 1990, and for the duration of fiscal year 1990, within the Department of Housing and Urban Development, the number of noncareer appointees to the Senior Executive Service shall not exceed 13 per centum of the total number of Senior Executive Service positions in such department, unless the Office of Personnel Management approves a waiver to exceed that limitation in accordance with 5 U.S.C. 3134. The Office of Personnel Management, in consultation with the Office of Management and Budget, shall undertake an expedited review of Senior Executive Service positions in the Department of Housing and Urban Development and report its findings, recommendations, and justification for any waiver determination to the Congress by December 15, 1989.

Sec. 517. Notwithstanding any other provision of this Act, amounts otherwise provided by this Act for the following accounts and activities are reduced by the following amounts:

Contracts.
Public
information.

Contracts.
Reports.

Wages.
Government
organization and
employees.
Government
organization and
employees.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

"Research and development", \$84,174,000;
 "Space flight, control and data communications", \$71,526,000;
 "Construction of facilities", \$9,320,000;
 "Research and program management", \$30,724,000;
 "Office of Inspector General", \$136,000;

In carrying out these reductions, each amount earmarked in this Act and not otherwise specified in this section shall be reduced in proportion to the overall reduction in the applicable account with the exception of the earmarking for personnel compensation and benefits costs carried in the Department of Veterans Affairs "Medical care" appropriating paragraph which shall not be reduced.

SEC. 518. The authority of the Department of Veterans Affairs in section 618 of Public Law 100-440 to operate a leave transfer program for employees subject to section 4108 of title 38, United States Code, is extended through December 31, 1989. The provisions of the final sentence of such section 618 shall apply to transferred leave that is unused as of December 31, 1989.

SEC. 519. None of the funds appropriated under title II of this Act under the heading entitled Community Planning and Development, Community Development Grants, to any department, agency, or instrumentality of the United States may be obligated or expended to any municipality that fails to adopt and enforce a policy prohibiting the use of excessive force by law enforcement agencies within the jurisdiction of said municipality against any individuals engaged in nonviolent civil rights demonstrations.

This Act may be cited as the "Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 1990".

Approved November 9, 1989.

Government
 organization and
 employees
 5 USC 6302 note.

LEGISLATIVE HISTORY—H.R. 2916:

HOUSE REPORTS: No. 101-160 (Comm. on Appropriations) and No. 101-297 (Comm. of Conference).

SENATE REPORTS: No. 101-128 (Comm. on Appropriations).

CONGRESSIONAL RECORD, Vol. 135 (1989):

July 20, considered and passed House.

Sept. 18, 19, 28, considered and passed Senate, amended.

Oct. 24, 25, House agreed to conference report; receded and concurred in certain Senate amendments, in others with amendments.

Oct. 27, Senate agreed to conference report; concurred in certain House amendments and disagreed to another.

Oct. 31, House receded and concurred in Senate amendment.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 25 (1989):

Nov. 9, Presidential statement.