NASA
National Aeronautics and
Space Administration

Chronological History
Fiscal Year 1985
Budget Submission

Prepared by:
Comptroller
Institutional Program Analysis Division
Code BI

ADJUSTED FINAL

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1985

Item	Statistics	LEGISLATIVE REFERENCE								
		Authorization Page Numbers				Appropriation Page Numbers				
		House Auth Comm	Senate Auth Comm	Conference Comm (Auth)	P.L. 98-361	House Approp Comm	Senate Approp Comm	Conference Comm Approp	P.L. 98-371	Suppl. P.L. 98-88
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Research and Development	1,2,3	8,23	32-35	67	75	---	87-89	93-94	95	98
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Space Transportation Capability Development	2,3	9	33-35	67	---	---	---	---	---	98
Physics and Astronomy	2,3,4	9	38-42	67,72	---	80	89	---	---	---
Life Sciences	2,4	---	42-43	67						
Planetary Exploration	2,4	10	43-45	67-72	---	---	89	---	---	---
Space Applications	2,4	10	45-50	67-73	---	---	88	---	---	---
Technology Utilization	2,4	---	50-52	67	---	---	88	---	---	---
Aeronautical Research and Technology	2,4	11	52-54	67-73	---	80	88	---	---	---
Space Research and Technology	2,5	11	54-55	67-73	---	---	88	---	---	---
Tracking and Data Acquisition	2,5	---	55	67-74	---	---	88-90	---	---	---
Space Commercialization	---	---	50-52	---	---	---	---	---	---	---
Space Flight, Control and Data Communications	1,2,5	12	55-58	67	75	81	88-90	---	95	---
Space Transportation Capability Development	2,5,6	12	55	69,72	---	---	89	---	---	---
Space Transportation Systems Operations	2,6	12	57,58	69,74	---	---	88	---	---	---
Construction of Facilities	1,2,5	---	59-60	67,68,74	75	82	90-91	94	95	---
Space Shuttle Facilities	2,6	12,23	59	67	---	---	---	---	---	---
Shuttle Payload Facilities	2,6	23	59	67	---	---	---	---	---	---
Ames Research Center	2,6	23	60	67	---	---	---	---	---	---
Goddard Space Flight Center	2,6	23	59	67	---	---	---	---	---	---
Jet Propulsion Laboratory	2,6	23	59	67	---	---	---	---	---	---
Langley Research Center	2,6	24	60	67	---	---	---	---	---	---
Marshall Space Flight Center	2,6	23	60	67	---	---	---	---	---	---
Various Locations	2,6	24	60	67	---	---	---	---	---	---
Repair	2,6	24	60	67	---	---	---	---	---	---
Rehabilitation and Modification	2,7	24	60	67	---	---	---	---	---	---
Minor Construction	2,7	24	60	68	---	---	---	---	---	---
Facility Planning and Design	2,7	24	60	68	---	---	---	---	---	---
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Chronological History of the FY 1985 Budget Submission
(In thousands of dollars)

Item	Initial Budget Submission to Congress	AUTHORIZATION: House Comm. H.R. 5154 Rpt. 98-629 3-20-84 Appd. 3-21-84	AUTHORIZATION: House Floor[1] H.R. 5154 Rpt. 98-629 3-21-84 Appd. 3-27-84	AUTHORIZATION: Sen. Comm. H.R. 5154 Rpt. 98-873 6-27-84 Appd. 7-16-84	AUTHORIZATION: Conf. Comm. P.L. 98-361 Rept. 98-873 6-27-84 Appd. 7-16-84	Differences from Budget Submission	APPROPRIATION: House Comm. H.R. 5713 Rpt. 98-803 5-23-84 Appd. 5-30-84	APPROPRIATION: Sen. Comm. H.R. 5713 Rpt. 98-506 6-7-84 Appd. 6-21-84	APPROPRIATION: Conf. Comm. P.L. 98-371 Rpt. 98-867 6-26-84 Appd. 7-18-84	APPROPRIATION: Supplemental H.R. 2577 P.L. 98-88 Appd. 8-15-85	Difference from Budget Submission	Difference from Budget Authorization
TOTAL APPROPRIATIONS:												
Research and Development	2,400,100	2,450,100	2,436,770	2,516,100	2,475,100	75,000	2,422,600	2,424,100	2,422,600	2,468,100[2]	68,000	-7,000
Space Flight, Control and Data Communications	3,600,300	3,600,300	3,580,500	3,585,300	3,585,300	-15,000	3,602,800	3,600,300	3,601,800	3,601,800	1,500	16,500
Construction of Facilities	160,000	150,000	149,200	150,000	150,000	-10,000	150,000	150,000	150,000	150,000	-10,000	---
Research and Program Management	1,331,000	1,331,000	1,323,700	1,331,000	1,316,000	-15,000	1,316,000	1,317,000	1,317,000	1,332,300[3]	1,300	16,300
TOTAL, NASA	7,491,400	7,531,400	7,490,170	7,582,400	7,526,400	35,000	7,491,400	7,491,400	7,491,400	7,552,200	60,800	25,800
R&D Appropriation:												
SSTF	150,000	150,000	149,200	150,000	150,000	---	150,000	150,000	150,000	155,500	5,500	5,500
OSF	361,400	346,400	344,500	356,400	351,400	-10,000	371,400	361,400	367,400	407,400[2]	46,000	56,000
OSSA	1,371,500	1,431,500	1,423,700	1,472,500	1,446,500	75,000	1,421,500	1,421,500	1,421,500	1,421,500	50,000	-25,000
OER	9,500	9,500	9,450	9,500	9,500	---	9,500	9,500	9,500	9,500	---	---
OAST	492,400	497,400	494,700	507,400	502,400	10,000	492,400	496,400	496,400	496,400	4,000	-6,000
OSTDS	15,300	15,300	15,220	15,300	15,300	---	15,300	15,300	15,300	15,300	---	---
Space Commercialization	---	---	---	5,000	---	---	---	---	---	---	---	---
General Reduction	---	---	---	---	---	---	-37,500	-30,000	-37,500	-37,500	-37,500	-37,500
TOTAL, R&D	2,400,100	2,450,100	2,436,770	2,516,100	2,475,100	75,000	2,422,600	2,424,100	2,422,600	2,468,100	68,000	-7,000
SFC&DC Appropriation:												
OSTS	2,804,600	2,819,600	2,804,100	2,789,600	2,789,600	-15,000	2,844,600	2,854,600	2,849,600	2,849,600	45,000	60,000
OSTDS	795,700	780,700	776,400	795,700	795,700	---	795,700	795,700	795,700	795,700	---	---
General Reduction	---	---	---	---	---	---	-37,500	-50,000	-43,500	-43,500	-43,500	-43,500
SFC&DC	3,600,300	3,600,300	3,580,500	3,585,300	3,585,300	-15,000	3,602,800	3,600,300	3,601,800	3,601,800	1,500	16,500
CoF Appropriation:												
OSF	37,400	37,400	37,210	37,400	37,400	---	37,400	37,400	37,400	37,400	---	---
OSSA	12,200	12,200	12,130	12,200	12,200	---	12,200	12,200	12,200	12,200	---	---
OAST	32,400	27,400	27,260	27,400	27,400	-5,000	27,400	27,400	27,400	27,400	-5,000	---
OSTDS	16,000	16,000	15,920	16,000	16,000	---	16,000	16,000	16,000	16,000	---	---
OM	62,000	57,000	56,680	62,000	62,000	---	62,000	62,000	62,000	62,000	---	---
General Reduction	---	---	---	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	---
TOTAL, CoF	160,000	150,000	149,200	150,000	150,000	-10,000	150,000	150,000	150,000	150,000	-10,000	---
R&PM Appropriation - Total	1,331,000	1,331,000	1,323,700	1,331,000	1,316,000	-15,000	1,316,000	1,317,000	1,317,000	1,332,300[3]	1,300	16,300
TOTAL, NASA	7,491,400	7,531,400	7,490,170	7,582,400	7,526,400	35,000	7,491,400	7,491,400	7,491,400	7,552,200	60,800	25,800

1/ .55% reduction to Committee recommendations per Walker Amendment.

2/ +40M additional R&D funding for Upper Stages; deferred, and not available until March 1, 1986; and 5.5M for Space Station.

3/ -6M rescission; along with a supplemental of +$21,300M for R&PM.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Chronological History of the FY 1985 Budget Submission
(In thousands of dollars)

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	RESEARCH AND DEVELOPMENT.....	2,400,100	2,450,100	2,436,770	2,516,100	2,475,100	75,000	2,422,600	2,424,100	2,422,600	2,468,100	68,000	-7,000
253	SPACE STATION.....	150,000	150,000	149,200	150,000	150,000	---	150,000	150,000	150,000	155,500	5,500	5,500
253	SPACE TRANSPORTATION CAPABILITY DEVELOPMENT...	361,400	346,400	344,500	356,400	351,400	-10,000	371,400	361,400	367,400	407,400[2]	46,000	56,000
254	PHYSICS AND ASTRONOMY.....	677,200	687,200	683,400	705,200	696,200	19,000	687,200	687,200	687,200	680,200	3,000	-16,000
254	LIFE SCIENCES.....	63,300	63,300	63,000	63,300	63,300	---	63,300	63,300	63,300	63,300	---	---
254	PLANETARY EXPLORATION.....	286,900	296,900	295,300	296,900	296,900	10,000	286,900	286,900	286,900	293,900	7,000	-3,000
254	SPACE APPLICATIONS.....	344,100	384,100	382,000	407,100	390,100	46,000	384,100	384,100	384,100	384,100	40,000	-6,000
254	TECHNOLOGY UTILIZATION.....	9,500	9,500	9,450	9,500	9,500	---	9,500	9,500	9,500	9,500	---	---
402	AERONAUTICAL RESEARCH AND TECHNOLOGY.....	342,400	347,400	345,500	357,400	352,400	10,000	342,400	342,400	342,400	342,400	---	-10,000
254	SPACE RESEARCH AND TECHNOLOGY.....	150,000	150,000	149,200	150,000	150,000	---	150,000	154,000	154,000	154,000	4,000	4,000
255	TRACKING AND DATA ACQ.....	15,300	15,300	15,220	15,300	15,300	---	15,300	15,300	15,300	15,300	---	---
	GENERAL REDUCTION.....	---	---	---	---	---	---	-37,500	-30,000	-37,500	-37,500	-37,500	-37,500
	SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS.....	3,600,300	3,600,300	3,580,500	3,585,300	3,585,300	-15,000	3,602,800	3,600,300	3,601,800	3,601,800	1,500	16,500
253	SHUTTLE PRODUCTION AND OPERATIONAL CAPABILITY..	1,465,600	1,490,600	1,482,400	1,470,600	1,470,600	5,000	1,505,600	1,515,600	1,510,600	1,510,600	45,000	40,000
253	SPACE TRANSPORTATION OPERATIONS.....	1,339,000	1,329,000	1,321,700	1,319,000	1,319,000	-20,000	1,339,000	1,339,000	1,339,000	1,339,000	---	20,000
255	TRACKING AND DATA ACQ.....	795,700	780,700	776,400	795,700	795,700	---	795,700	795,700	795,700	795,700	---	---
255	GENERAL REDUCTION.....	---	---	---	---	---	---	-37,500	-50,000	-43,500	-43,500	-43,500	-43,500
	CONSTRUCTION OF FACILITIES..	160,000	150,000	149,200	150,000	150,000	-10,000	150,000	150,000	150,000	150,000	-10,000	---
	SPACE SHUTTLE FACILITIES..	31,200	31,200	31,040	31,200	31,200	---	31,200	31,200	31,200	31,200	---	---
	SPACE SHUTTLE PAYLOAD FACILITIES.....	6,700	6,700	6,670	6,700	6,700	---	6,700	6,700	6,700	6,700	---	---
	AMES RESEARCH CENTER.....	16,500	11,500	11,450	11,500	11,500	-5,000	11,500	11,500	11,500	11,500	-5,000	---
	GODDARD SPACE FLIGHT RESEARCH CENTER.....	2,200	2,200	2,190	2,200	2,200	---	2,200	2,200	2,200	2,200	---	---
	JET PROPULSION LABORATORY.	12,200	12,200	12,130	12,200	12,200	---	12,200	12,200	12,200	12,200	---	---
	LANGLEY RESEARCH CENTER...	13,800	13,800	13,720	13,800	13,800	---	13,800	13,800	13,800	13,800	---	---
	MARSHALL SPACE FLIGHT CENTER.....	1,600	1,600	1,590	1,600	1,600	---	1,600	1,600	1,600	1,600	---	---
	VARIOUS.....	13,800	13,800	13,730	13,800	13,800	---	13,800	13,800	13,800	13,800	---	---
	REPAIR.....	20,000	20,000	19,890	20,000	20,000	---	20,000	20,000	20,000	20,000	---	---
	REHABILITATION AND MODIFICATION.....	25,000	20,000	19,890	25,000	25,000	---	25,000	25,000	25,000	25,000	---	---
	MINOR CONSTRUCTION.....	5,000	5,000	4,970	5,000	5,000	---	5,000	5,000	5,000	5,000	---	---
	FACILITY PLANNING AND DESIGN.....	12,000	12,000	11,930	12,000	12,000	---	12,000	12,000	12,000	12,000	---	---
	CONGRESSIONAL ACTION.....	---	---	---	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	---
	RESEARCH AND PROGRAM MANAGEMENT.....	1,331,000	1,331,000	1,323,700	1,331,000	1,316,000	-15,000	1,316,000	1,317,000	1,317,000	1,332,300[3]	1,300	16,300
	TOTAL, NASA.....	7,491,400	7,531,400	7,490,170	7,582,400	7,526,400	35,000	7,491,400	7,491,400	7,491,400	7,552,200	60,800	25,800

1/ .55% reduction to Committee recommendations per Walker Amendment.

2/ +40M additional R&D funding for Upper Stages; deferred, and not available until March 1, 1986; and 5.5M for Space Station.

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	RESEARCH AND DEVELOPMENT....	2,400,100	2,450,100	2,436,770	2,516,100	2,475,100	75,000	2,422,600	2,424,100	2,422,600	2,468,100[2]	68,000	-7,000
253	SPACE STATION TASK FORCE....	150,000	150,000	149,200	150,000	150,000	---	150,000	150,000	150,000	155,500	5,500	5,500
	SPACE STATION.....	150,000	150,000	149,200	150,000	150,000	---	150,000	150,000	150,000	155,500	5,500	5,500
	Utilization Requirements..	14,100	14,100	*	14,100	14,100	---	14,100	14,100	14,100	14,100	---	---
	Supporting Studies and Program Support.....	12,200	12,200	*	12,200	12,200	---	12,200	12,200	12,200	12,200	---	---
	Focused Technology.....	34,200	34,200	*	34,200	34,200	---	34,200	34,200	34,200	34,200	---	---
	Advanced Development.....	20,200	20,200	*	20,200	20,200	---	20,200	20,200	20,200	20,200	---	---
	Flight Experiments.....	11,000	11,000	*	11,000	11,000	---	11,000	11,000	11,000	11,000	---	---
	Systems Definition/ Integration.....	58,300	58,300	*	58,300	58,300	---	58,300	58,300	58,300	63,800	5,500	5,500
253	OFFICE OF SPACE FLIGHT.....	361,400	346,400	344,500	356,400	351,400	-10,000	371,400	361,400	367,400	407,400[2]	46,000	56,000
	SPACE TRANSPORTATION CAPABILITY DEVELOPMENT....	361,400	346,400	344,500	356,400	351,400	-10,000	371,400	361,400	367,400	407,400	46,000	56,000
	Spacelab.....	69,300	69,300	*	69,300	69,300	---	69,300	69,300	69,300	69,300	---	---
	Upper Stages.....	92,400	92,400	*	92,400	92,400	---	92,400	02,400	92,400	132,400[2]	40,000	40,000
	Engineering and Technical Base.....	105,700	95,700	*	105,700	100,700	-5,000	105,700	105,700	105,700	105,700	---	5,000
	Payload Operations and Support Equipment.....	61,300	56,300	*	56,300	56,300	-5,000	61,300	61,300	61,300	61,300	---	5,000
	Advanced Programs.....	14,500	14,500	*	14,500	14,500	---	24,500	14,500	20,500	20,500	6,000	6,000
	Tethered Satellite System.	18,200	18,200	*	18,200	18,200	---	18,200	18,200	18,200	18,200	---	---
	OFFICE OF SPACE SCIENCE AND APPLICATIONS.....	1,371,500	1,431,500	1,423,700	1,472,500	1,446,500	75,000	1,421,500	1,421,500	1,421,500	1,421,500	50,000	-25,000
254	PHYSICS AND ASTRONOMY.....	677,200	687,200	683,400	705,200	696,200	19,000	687,200	680,200	680,200	680,200	3,000	-16,000
	Space Telescope.....	195,000	195,000	*	195,000	195,000	---	195,000	195,000	195,000	195,000	---	---
	Gamma Ray Observatory Development.....	120,200	120,200	*	120,000	120,000	---	120,200	120,200	120,200	120,200	---	---
	Shuttle/Spacelab Payload Development and Mission Management.....	105,400	109,400	*	115,400	113,400	8,000	105,400	105,400	105,400	105,400	---	-8,000
	Explorer Development.....	51,900	51,900	*	51,900	51,900	---	51,900	51,900	51,900	51,900	---	---

* Undistributed

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(In thousands of dollars)

		AUTHORIZATION						APPROPRIATION					
	Item	Initial Budget Submission to Congress	House Comm. H.R. 5154 Rpt. 98-629 3-20-84 Appd. 3-21-84	House Floor[1] H.R. 5154 Rpt. 98-629 3-21-84 Appd. 3-27-84	Sen. Comm. H.R. 5154 Rpt. 98-873 6-27-84 Appd. 7-16-84	Conf. Comm. P.L. 98-361 Rept. 98-873 6-27-84 Appd. 7-16-84	Differences from Budget Submission	House Comm. H.R. 5713 Rpt. 98-803 5-23-84 Appd. 5-30-84	Sen. Comm. H.R. 5713 Rpt. 98-506 6-7-84 Appd. 6-21-84	Conf. Comm. P.L. 98-371 Rpt. 98-867 6-26-84 Appd. 7-18-84	Supplemental H.R. 2577 P.L. 98-88 Appd. 8-15-85	Difference from Budget Submission	Difference from Budget Authorization
	Mission Operations and Data Analysis	109,100	109,100	*	109,100	109,100	---	109,100	109,100	109,100	109,100	---	---
	Research and Analysis	36,900	42,900	*	54,900	47,900	11,000	46,900	39,900	39,900	39,900	3,000	-8,000
	Suborbital Program	58,700	58,700	*	58,700	58,700	---	58,700	58,700	58,700	58,700	---	---
254	LIFE SCIENCES	63,300	63,300	63,000	63,300	63,300	---	63,300	63,300	63,300	63,300	---	---
	Life Sciences Flight Experiments	27,100	27,100	*	27,100	27,100	---	27,100	27,100	27,100	27,100	---	---
	Research and Analysis	36,200	36,200	*	36,200	36,200	---	36,200	36,200	36,200	36,200	---	---
254	PLANETARY EXPLORATION	286,900	296,900	295,300	296,900	296,900	10,000	286,900	293,900	293,900	293,900	7,000	-3,000
	Galileo Development	56,100	56,100	*	56,100	56,100	---	56,100	56,100	56,100	56,100	---	---
	Venus Radar Mapper	92,500	92,500	*	92,500	92,500	---	92,500	92,500	92,500	92,500	---	---
	International Solar Polar Mission	9,000	9,000	*	9,000	9,000	---	9,000	9,000	9,000	9,000	---	---
	Mars Geoscience/ Climatology Orbiter	16,000	16,000	*	16,000	16,000	---	16,000	16,000	16,000	16,000	---	---
	Mission Operations and Data Analysis	58,800	58,800	*	58,800	58,800	---	58,800	58,800	58,800	58,800	---	---
	Research and Analysis	54,500	64,500	*	64,500	64,500	10,000	54,500	61,500	61,500	61,500	7,000	-3,000
254	SPACE APPLICATIONS	344,100	384,100	382,000	407,100	390,100	46,000	384,100	384,100	384,100	384,100	40,000	-6,000
	Solid Earth Observations	63,600	63,600	*	63,600	63,600	---	63,600	63,600	63,600	63,600	---	---
	Environmental Observations	220,700	220,700	*	228,700	221,700	1,000	220,700	220,700	220,700	220,700	---	-1,000
	Materials Processing in Space	23,000	23,000	*	33,000	28,000	5,000	23,000	23,000	23,000	23,000	---	-5,000
	Communications	20,600	60,600	*	65,600	60,600	40,000	60,600	60,600	60,600	60,600	40,000	---
	Information Systems	16,200	16,200	*	16,200	16,200	---	16,200	16,200	16,200	16,200	---	---
	OFFICE OF EXTERNAL RELATIONS	9,500	9,500	9,450	9,500	9,500	---	9,500	9,500	9,500	9,500	---	---
254	TECHNOLOGY UTILIZATION	9,500	9,500	9,450	9,500	9,500	---	9,500	9,500	9,500	9,500	---	---
	Technology Dissemination	5,800	5,800	*	5,800	5,800	---	5,800	5,800	5,800	5,800	---	---
	Technology Applications	3,700	3,700	*	3,700	3,700	---	3,700	3,700	3,700	3,700	---	---
	OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY	492,400	497,400	494,700	507,400	502,400	10,000	492,400	496,400	496,400	496,400	4,000	-6,000
402	AERONAUTICAL RESEARCH AND TECHNOLOGY	342,400	347,400	345,500	357,400	352,400	10,000	342,400	342,400	342,400	342,400	---	-10,000
	Research and Technology Base	233,300	228,300	*	233,300	233,300	---	223,300	233,300	223,300	223,300	-10,000	-10,000
	Systems Technology Programs	109,100	119,100	*	124,100	119,100	10,000	119,100	109,100	119,100	119,100	10,000	---

* Undistributed

1/ .55% reduction to Committee recommendations per Walker Amendment.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Chronological History of the FY 1985 Budget Submission
(In thousands of dollars)

	Item	Initial Budget Submission to Congress	AUTHORIZATION: House Comm. H.R. 5154 Rpt. 98-629 3-20-84 Appd. 3-21-84	AUTHORIZATION: House Floor 1/ H.R. 5154 Rpt. 98-629 3-21-84 Appd. 3-27-84	AUTHORIZATION: Sen. Comm. H.R. 5154 Rpt. 98-873 6-27-84 Appd. 7-16-84	AUTHORIZATION: Conf. Comm. P.L. 98-361 Rept. 98-873 6-27-84 Appd. 7-16-84	Differences from Budget Submission	APPROPRIATION: House Comm. H.R. 5713 Rpt. 98-803 5-23-84 Appd. 5-30-84	APPROPRIATION: Sen. Comm. H.R. 5713 Rpt. 98-506 6-7-84 Appd. 6-21-84	APPROPRIATION: Conf. Comm. P.L. 98-371 Rpt. 98-867 6-26-84 Appd. 7-18-84	APPROPRIATION: Supplemental H.R. 2577 P.L. 98-88 Appd. 8-15-85	Difference from Budget Submission	Difference from Budget Authorization
254	SPACE RESEARCH AND TECHNOLOGY	150,000	150,000	149,200	150,000	150,000	---	150,000	154,000	154,000	154,000	4,000	4,000
	Research and Technology Base	136,000	136,000	*	136,000	136,000	---	136,000	140,000	140,000	140,000	4,000	4,000
	Systems Technology Programs	9,100	9,100	*	9,100	9,100	---	9,100	9,100	9,100	9,100	---	---
	Standards and Practices	4,900	4,900	*	4,900	4,900	---	4,900	4,900	4,900	4,900	---	---
	OFFICE OF SPACE TRACKING AND DATA SYSTEMS	15,300	15,300	15,220	15,300	15,300	---	15,300	15,300	15,300	15,300	---	---
255	TRACKING AND DATA ADVANCED SYSTEMS	15,300	15,300	15,220	15,300	15,300	---	15,300	15,300	15,300	15,300	---	---
	Advanced Systems	15,300	15,300	15,220	15,300	15,300	---	15,300	15,300	15,300	15,300	---	---
	General R&D Reduction	---	---	---	---	---	---	-37,500	-30,000	-37,500	-37,500	-37,500	-37,500
	SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS	3,600,300	3,600,300	3,580,500	3,585,300	3,585,300	-15,000	3,602,800	3,600,300	3,601,800	3,601,800	1,500	16,500
	OFFICE OF SPACE FLIGHT	2,804,600	2,819,600	2,804,100	2,789,600	2,789,600	-15,000	2,844,600	2,854,600	2,849,600	2,849,600	45,000	60,000
253	SPACE PRODUCTION AND OPERATIONAL CAPABILITY	1,465,600	1,490,600	1,482,400	1,470,600	1,470,600	5,000	1,505,600	1,515,600	1,510,600	1,510,600	45,000	40,000
	Orbiter	606,800	656,800	*	651,800	651,800	45,000	646,800	656,800	651,800	651,800	45,000	---
	Launch and Mission Support	234,800	219,800	*	219,800	219,800	-15,000	234,800	234,800	234,800	234,800	---	15,000
	Propulsion Systems	599,000	599,000	*	599,000	599,000	---	599,000	599,000	599,000	599,000	---	---
	Changes and Systems Upgrading	25,000	15,000	*	---	---	-25,000	25,000	25,000	25,000	25,000	---	25,000
253	SPACE TRANSPORTATION OPERATIONS	1,339,000	1,329,000	1,321,700	1,319,000	1,319,000	-20,000	1,339,000	1,339,000	1,339,000	1,339,000	---	20,000
	Flight Operations	316,000	316,000	*	316,000	316,000	---	316,000	316,000	316,000	316,000	---	---
	Flight Hardware	758,000	758,000	*	758,000	758,000	---	758,000	758,000	758,000	758,000	---	---
	Launch and Landing Operations	265,000	265,000	*	265,000	265,000	---	265,000	265,000	265,000	265,000	---	---
	Congressional Action	---	-10,000	*	-20,000	-20,000	-20,000	---	---	---	---	---	20,000
	OFFICE OF SPACE TRACKING AND DATA SYSTEMS	795,700	780,700	776,400	795,700	795,700	---	795,700	795,700	795,700	795,700	---	---
255	TRACKING AND DATA ACQ	795,700	780,700	776,400	795,700	795,700	---	795,700	795,700	795,700	795,700	---	---
	Space Network	386,500	386,500	*	386,500	386,500	---	386,500	386,500	386,500	386,500	---	---
	Ground Network	223,600	223,600	*	223,600	223,600	---	223,600	223,600	223,600	223,600	---	---
	Communication and Data Systems	185,600	185,600	*	185,600	185,600	---	185,600	185,600	185,600	185,600	---	---
	General SFC&DC Reduction	---	-15,000	*	---	---	---	-37,500	-50,000	-43,500	-43,600	-43,500	-43,500
	CONSTRUCTION OF FACILITIES	160,000	150,000	149,200	150,000	150,000	-10,000	150,000	150,000	150,000	150,000	-10,000	---
253	SPACE SHUTTLE FACILITIES	31,200	31,200	31,040	31,200	31,200	---	31,200	31,200	31,200	31,200	---	---
	M-Modification of Site Electrical Substation (JSC)	3,200	3,200	3,190	3,200	3,200	---	3,200	3,200	3,200	3,200	---	---
	M-Modifications for Single Engine Testing (NSTL)	3,000	3,000	2,980	3,000	3,000	---	3,000	3,000	3,000	3,000	---	---

* Undistributed

1/ .55% reduction to Committee recommendations per Walker Amendment.

Chronological History of the FY 1985 Budget Submission
(In thousands of dollars)

	Item	AUTHORIZATION: Initial Budget Submission to Congress	AUTHORIZATION: House Comm. H.R. 5154 Rpt. 98-629 3-20-84 Appd. 3-21-84	AUTHORIZATION: House Floor[1] H.R. 5154 Rpt. 98-629 3-21-84 Appd. 3-27-84	AUTHORIZATION: Sen. Comm. H.R. 5154 Rpt. 98-873 6-27-84 Appd. 7-16-84	AUTHORIZATION: Conf. Comm. P.L. 98-361 Rept. 98-873 6-27-84 Appd. 7-16-84	AUTHORIZATION: Differences from Budget Submission	APPROPRIATION: House Comm. H.R. 5713 Rpt. 98-803 5-23-84 Appd. 5-30-84	APPROPRIATION: Sen. Comm. H.R. 5713 Rpt. 98-506 6-7-84 Appd. 6-21-84	APPROPRIATION: Conf. Comm. P.L. 98-371 Rpt. 98-867 6-26-84 Appd. 7-18-84	APPROPRIATION: Supplemental H.R. 2577 P.L. 98-88 Appd. 8-15-85	Difference from Budget Submission	Difference from Budget Authorization
	CONSTRUCTION OF FACILITIES (Cont'd.)												
	M-Construction of Launch Complex 39 Logistics Facility (KSC).....	10,000	10,000	9,950	10,000	10,000	---	10,000	10.000	10,000	10,000	---	---
	M-Construction of Solid Rocket Booster Assembly and Refurbishment Facility (KSC).....	15,000	15,000	14,920	15,000	15,000	---	15,000	15,000	15,000	15,000	---	---
254	SPACE SHUTTLE PAYLOAD FACILITIES.....	6,700	6,700	6,670	6,700	6,700	---	6,700	6,700	6,700	6,700	---	---
	M-Construction of Additions to Cargo Hazardous Servicing Facility (KSC).....	4,600	4,600	4,580	4,600	4,600	---	4,600	4,600	4,600	4,600	---	---
	R-Construction of Biomedical Research Facility (ARC).....	2,100	2,100	2,090	2,100	2,100	---	2,100	2,100	2,100	2,100	---	---
402	AMES RESEARCH CENTER.....	16,500	11,500	11,450	11,500	11,500	-5,000	11,500	11,500	11,500	11,500	-5,000	---
	R-Construction of Numerical Aerodynamic Simulation Facility.....	16,500	11,500	11,450	11,500	11,500	-5,000	11,500	11,500	11,500	11,500	-5,000	---
255	GODDARD SPACE FLIGHT FACILITY	2,200	2,200	2,190	2,200	2,200	---	2,200	2,200	2,200	2,200	---	---
	T-Construction of Addition to Network Control Center	2,200	2,200	2,190	2,200	2,200	---	2,200	2,200	2,200	2,200	---	---
255	JET PROPULSION LABORATORY...	12,200	12,200	12,130	12,200	12,200	---	12,200	12,200	12,200	12,200	---	---
	E-Construction of Earth and Space Science Laboratory.....	12,200	12,200	12,130	12,200	12,200	---	12,200	12,200	12,200	12,200	---	---
402	LANGLEY RESEARCH CENTER.....	13,800	13,800	13,720	13,800	13,800	---	13,800	13,800	13,800	13,800	---	---
	R-Modifications to 8-Foot High Temperature Tunnel.	13,800	13,800	13,720	13,800	13,800	---	13,800	13,800	13,800	13,800	---	---
254	MARSHALL SPACE FLIGHT CENTER	1,600	1,600	1,590	1,600	1,600	---	1,600	1,600	1,600	1,600	---	---
	M-Repairs to Test Stand 500.....	1,600	1,600	1,590	1,600	1,600	---	1,600	1,600	1,600	1,600	---	---
255	VARIOUS LOCATIONS.....	13,800	13,800	13,730	13,800	13,800	---	13,800	13,800	13,800	13,800	---	---
	T-Construction of 34-Meter Antenna, Madrid, Spain (JPL).....	6,000	6,000	5,970	6,000	6,000	---	6,000	6,000	6,000	6,000	---	---
	T-Modifications of 64-Meter Antenna, DSS-63, Madrid, Spain (JPL).....	7,800	7,800	7,760	7,800	7,800	---	7,800	7,800	7,800	7,800	---	---
255	N-REPAIR OF FACILITIES.....	20,000	20,000	19,890	20,000	20,000	---	20,000	20,000	20,000	20,000	---	---

1/ .55% reduction to Committee recommendations per Walker Amendment.

Chronological History of the FY 1985 Budget Submission
(In thousands of dollars)

Item	Initial Budget Submission to Congress	AUTHORIZATION: House Comm. H.R. 5154 Rpt. 98-629 3-20-84 Appd. 3-21-84	AUTHORIZATION: House Floor 1/ H.R. 5154 Rpt. 98-629 3-21-84 Appd. 3-27-84	AUTHORIZATION: Sen. Comm. H.R. 5154 Rpt. 98-873 6-27-84 Appd. 7-16-84	AUTHORIZATION: Conf. Comm. P.L. 98-361 Rept. 98-873 6-27-84 Appd. 7-16-84	Differences from Budget Submission	APPROPRIATION: House Comm. H.R. 5713 Rpt. 98-803 5-23-84 Appd. 5-30-84	APPROPRIATION: Sen. Comm. H.R. 5713 Rpt. 98-506 6-7-84 Appd. 6-21-84	APPROPRIATION: Conf. Comm. P.L. 98-371 Rpt. 98-867 6-26-84 Appd. 7-19-84	APPROPRIATION: Supplemental H.R. 2577 P.L. 98-88 Appd. 8-15-85	Difference from Budget Submission	Difference from Budget Authorization
CONSTRUCTION OF FACILITIES (Cont'd.)												
255 N-REHABILITATION AND MODIFICATION OF FACILITIES.....	25,000	20,000	19,890	25,000	25,000	---	25,000	25,000	25,000	25,000	---	---
255 N-MINOR CONSTRUCTION AND ADDITIONS TO FACILITIES.....	5,000	5,000	4,970	5,000	5,000	---	5,000	5,000	5,000	5,000	---	---
255 N-FACILITY PLANNING AND DESIGN.....	12,000	12,000	11,930	12,000	12,000	---	12,000	12,000	12,000	12,000	---	---
CONGRESSIONAL ACTION.....	---	---	---	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	---
RESEARCH AND PROGRAM MANAGEMENT...	1,331,000	1,331,000	1,323,700	1,331,000	1,316,000	-15,000	1,316,000	1,317,000	1,317,000	1,332,300 2/	1,300	16,300
BY INSTALLATION:												
Johnson Space Center.....	214,105	214,105	*	214,105	214,105	---	214,105	214,105	214,105	215,357	1,252	1,252
Kennedy Space Center.....	180,849	180,849	*	180,849	180,849	---	180,849	180,849	180,849	181,079	230	230
Marshall Space Flight Center....	195,264	195,264	*	195,264	195,264	---	195,264	195,264	195,264	198,074	2,810	2,810
National Space Technology Laboratories.....	10,905	10,905	*	10,905	10,905	---	10,905	10,905	10,905	10,669	-236	-235
Goddard Space Flight Center.....	199,290	199,290	*	199,290	199,290	---	199,290	199,290	199,290	196,353	-2,937	-2,937
Ames Research Center.....	123,116	123,116	*	123,116	123,116	---	123,116	123,116	123,116	120,344	-2,772	-2,772
Langley Research Center.....	148,037	148,037	*	148,037	148,037	---	148,037	148,037	148,037	148,077	40	40
Lewis Research Center.....	140,503	140,503	*	140,503	140,503	---	140,503	140,503	140,503	138,564	-1,939	-1,939
Headquarters.....	118,931	118,931	*	118,931	118,931	---	118,931	118,931	118,931	123,783	4,852	4,852
Congressional Action.....	---	---	*	---	-15,000	-15,000	-15,000	-14,000	-14,000	---	---	15,000
BY FUNCTION:												
Personnel and Related Costs.....	935,928	935,928	*	935,928	935,928	---	935,928	935,928	935,928	935,228	-700	-700
Travel.....	28,000	28,000	*	28,000	28,000	---	28,000	28,000	28,000	30,000	2,000	2,000
Facilities Services.....	198,679	198,679	*	198,679	198,679	---	198,679	198,679	198,679	198,679	---	---
Technical Services.....	57,765	57,765	*	57,795	57,795	---	57,795	57,795	57,795	57,765	---	---
Management and Operations Support.....	110,628	110,628	*	110,628	110,628	---	110,628	110,628	110,628	110,628	---	---
Congressional Action.....	---	---	*	---	-15,000	-15,000	-15,000	-14,000	-14,000	---	---	15,000

* Undistributed

1/ .55% reduction to Committee recommendations per Walker Amendment.

2/ -6M rescission; along with a supplemental of +$21,300M for R&PM.

98TH CONGRESS 2d Session | HOUSE OF REPRESENTATIVES | REPORT 98-629

AUTHORIZING APPROPRIATIONS TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR FISCAL YEAR 1985

MARCH 21, 1984.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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

REPORT

together with

MINORITY VIEWS

[To accompany H.R. 5154]

Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 5154) 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 amendments (shown in italic in the bill accompaning by this report) and recommends that the bill, as amended, do pass.

The amendments are as follows:

The amendments, stated in terms of the page and line numbers of the introduced bill, are as follows:

On page 12, line 1, insert "(a)" after "Sec. 109." and after line 14, insert the following new subsection:

> (b) Section 102(d)(1) of the National Aeronautics and Space Act of 1958, as amended (and as redesignated by subsection (a) of this section), is amended by inserting "of the Earth and" after "knowledge".

On page 14, line 1, strike out "the United States civilian space program" and insert in lieu thereof the following:

> The National Aeronautics and Space Administration, the lead civilian space agency, as established in the National Aeronautics and Space Act of 1958, as amended, has conducted a space program that

On Page 14, strike lines 21 through 23, and insert in lieu thereof the following:

> (5) the Nation is committed to a permanently manned space station in low earth orbit, and future national efforts in space will benefit from the presence of such a station;

On Page 15, beginning on line 13, strike out "fifteen" and insert in lieu thereof "fourteen" and on line 15, after "subsection" insert the following:

> , the Administrator of the National Aeronautics and Space Administration,

On Page 15, line 23, strike out "one of the members to" and insert in lieu thereof:

> the Administrator of the National Aeronautics and Space Administration shall

On Page 16, line 1, after "appointed" insert the following: "by the President".

On Page 16, strike lines 20, 21 and 23, and redesignate the succeeding subparagraphs accordingly.

On Page 17, after line 3, add a new subparagraph as follows:

> (G) Office of Science and Technology Policy.

On Page 19, before line 1, insert the following new paragraph:

> (1) the commitment by the Nation to a permanently manned space station in low earth orbit;

and redesignate the succeeding paragraphs and references thereto accordingly.

On Page 19, line 2, after "environmental" insert "and" and strike out ", and national security".

PURPOSE OF THE BILL

TITLE I

The purpose of title I is to authorize appropriations to the National Aeronautics and Space Administration for fiscal year 1985 as follows:

Programs	Authorization fiscal year 1985	Page No.
Research and development	$2,450,100,000	7
Space flight, control and data analysis	3,600,300,000	12
Construction of facilities	150,000,000	13

Programs	Authorization fiscal year 1985	Page No.
Research and program management	1,331,000,000	14
Total	7,531,400,000	

TITLE II

The purpose of title II is to establish a National Commission on Space to assist in the formulation of long range goals for civilian space activity.

COMMITTEE ACTIONS

TITLE I

RESEARCH AND DEVELOPMENT

SPACE TRANSPORTATION CAPABILITY DEVELOPMENT

NASA requested $361,400,000 for space transportation capability development activities in fiscal year 1985. The committee decreased funding for the engineering and technical base activities by $10,000,000 and decreased funding for payload operations and support equipment by $5,000,000 resulting in a total recommended authorization of $346,400,000 in fiscal year 1985.

Engineering and technical base. NASA requested $105,700,000 for engineering and technical base activities in fiscal year 1985. The engineering and technical base program provides the core capability required to sustain an engineering and development base for support of the STS development and operations program. Since STS development is nearing completion, a reduction can be sustained in this program with no significant impact. The Committee, therefore, recommends a funding decrease of $10,000,000 resulting in a total authorization of $95,700,000 in fiscal year 1985.

Payload operations and support equipment. NASA requested $61,300,000 for payload operations and support in fiscal year 1985. The payload operations and support equipment funding provides for the development and placing into operational status the ground and flight systems necessary to support Space Transportation System payloads during prelaunch processing, on-orbit mission operations, and post-landing processing. Delays in Tracking and Data Relay Satellite (TDRS), Space Telescope, and other payload flight schedules permit a $5,000,000 funding reduction resulting in a total authorization of $56,300,000 in fiscal year 1985.

PHYSICS AND ASTRONOMY

NASA requested $677,200,000 for physics and astronomy activities in fiscal year 1985. The Committee increased funding for research and analysis by $6,000,000 and increased funding for Shuttle/Spacelab payload development and mission management by $4,000,000, resulting in a total recommended authorization of $687,200,000 for fiscal year 1985.

Research and Analysis. NASA requested $36,900,000 for research and analysis activities in fiscal year 1985. An increase of $6,000,000 was adopted resulting in a total recommended authorization of $42,900,000. These activities provide the scientific support for the space flight missions that NASA conducts. This budget element supports early development work on instruments that will be flown

on missions and it supports the eventual analysis which turns data into information.

The Committee heard considerable testimony that this research infrastructure has not been adequately supported, especially in two areas—development work on new instruments and university research capital equipment. Accordingly, the increase would be apportioned as follows: $3,000,000 for laboratory equipment for universities to enhance their ability to conduct supporting basic research in the physics and astronomy program; and $3,000,000 to support advanced technology development on the advanced x-ray astronomy facility (AXAF) which was the highest priority mission recommended by the Astronomy Survey Committee of the National Academy of Sciences. The "Hearth Committee" study on NASA program management (a study requested by your Committee) found that NASA should fund more experimental and definition work early in a project's life in order to reduce technical, cost, and schedule risk when full development is underway. Based on this finding, which the Committee shares, more funding is needed for AXAF at this time. In addition, the Committee wants to signal its commitment to maintain a healthy astronomy program.

The Committee requests that within available funds NASA study the usefulness and feasibility of a shuttle-borne test of the Gravity Probe-B experiment.

Shuttle/Spacelab payload development and mission management. NASA requested $105,400,000 for Shuttle/Spacelab payload development and mission management activities in fiscal year 1985. These activities provide for development of experiments to go on the Shuttle, support the flights, and support the eventual data analyses. To date, a large fraction of the resources in this program has gone into the development of hardware such as pallets to mount experiments. The Committee urges that more emphasis be given to develop the scientific experiments to fly on the Shuttle, including (within available funds) smaller payloads which can serve university researchers. The Committee urges NASA to proceed with development of two larger payloads, the Solar Optical Telescope (SOT) and the Shuttle Infrared Telescope Facility (SIRTF). The Committee notes with concern that whereas these two projects were already approved when the Astronomy Survey Committee issued its 1982 report, nevertheless in fiscal year 1985 their full development is still not underway. This is particularly disturbing in the case of SIRTF which would be a fruitful follow-on to the Infrared Astronomical Satellite mission. The Committee further notes that SOT has been delayed largely because of development problems in the Space Telescope program, and hopes that this adverse interaction between the two programs is now past, and that SOT can proceed. Accordingly, the Committee added $4,000,000 for advanced technology development for SOT and SIRTF resulting in a total recommended authorization of $109,400,000 for Shuttle/Spacelab payload development and mission management for fiscal year 1985.

The Committee further urges that NASA give SOT favorable consideration if other programs can be accomplished at less than planned costs, thereby generating possible reprogramming opportunities.

PLANETARY EXPLORATION

NASA requested $286,900,000 for planetary exploration activities in fiscal year 1985. The Committee increased funding for research and analysis by $10,000,000 making a total recommended authorization of $296,900,000 for fiscal year 1985.

Research and Analysis. NASA requested $54,500,000 for research and analysis activities for fiscal year 1985. The Committee added $10,000,000 resulting in a recommended total authorization of $64,500,000. The NASA Advisory Council study on the Mission of NASA found that NASA is "the only agency with the charter and skills" for planetary exploration, and that this should be a primary mission of the agency, if not "the overarching theme to guide . . . the agency for the years ahead." The Committee heard testimony to the effect that the request is too low to support a healthy program. NASA's own Solar System Exploration Committee also found the level of support too low in a study reported to the agency in 1983. Accordingly, the Committee has recommended that: $2,000,000 be added for laboratory equipment for universities to enhance their ability to conduct supporting basic research; and that $8,000,000 be added for supporting research and technology to support basic planetary research at universities. The fiscal year 1985 request for supporting research and technology is $37,900,000 while the 1981 level (in 1985 dollars) would be $49,300,000. Thus, while the increase would still leave the program below the 1981 level in purchasing power, it would move the program toward a more healthy level of support.

SPACE APPLICATIONS

NASA requested $344,100,000 for space applications activities in fiscal year 1985. The Committee recommended that within available funding for solid earth observation/geodynamics activities $2,000,000 was authorized for measurement of crustal movements in the Caribbean Basin. Within Earth Observation activities the Committee recommended an increase of $5,000,000 for Space Physics Research and Analysis activities and a decrease of $5,000,000 in the Upper Atmospheric Research Satellite program. The Committee also recommended an increase of $40,000,000 for Communications activities. The total recommended authorization for space application activities in fiscal year 1985 is $384,100,000.

Solid Earth Observations. Within the funds available for Geodynamics activities, the Committee recommended an authorization of $2,000,000 to fund additional efforts on crustal dynamics. The Committee recognizes a need to make measurements of crustal movements in the Caribbean basin, a particularly active area, in order to better understand plate tectonics and improve methodology for earthquake predictions. These funds would permit completion of the acquisition of instrumentation and initiation of measurements in the field.

Environmental Observations. NASA requested $220,700,000 for environmental observations for fiscal year 1985. The Committee added $5,000,000 for space physics/research and analysis and reduced $5,000,000 from the Upper Atmosphere Research Satellite (UARS) mission for no net change.

The Space Physics/research and analysis increase is for advanced technology development for the International Solar Terrestrial Physics (ISTP) program, formerly called OPEN (Origin of Plasmas in the Earth's Neighborhood). This area of science potentially has important practical fallout because of its relationship to weather, climate, communications and other sun-related phenomena, and has been somewhat neglected by the agency. This is discussed more fully in Committee Views.

The Committee fully endorses the new initiative on the UARS mission and believes that the $5,000,000 reduction in the budget can be sustained with no significant affect on the UARS schedule. The Committee is aware that UARS experiments have been underway for some time, that they are relatively mature, and that spacecraft development must begin for most effective development. The Committee notes, however, that even after the reduction, $55,700,000 would remain in the budget for the mission and that the Agency would be free to strike the most appropriate and efficient balance between support of experiments and spacecraft.

The increase for ISTP advanced technical development activities when combined with the funds already in the budget request should serve to reduce the technical and schedule risk for this program. The Committee expresses again its interest in interdisciplinary research, and in Sun-Earth Interaction, and notes the complementary nature of the UARS and ISTP missions.

Communications. NASA requested $20,600,000 for communications activities including $5,000,000 for the restructure of the Advanced Communications Technology Satellite (ACTS) program by eliminating the flight portion while continuing the technology development and ground testing portion. The Committee disagrees with the restructuring and accordingly recommends an increase of $40,000,000 to continue the ACTS flight program as previously planned. The Committee recognizes that this amount is less than required for full funding of the flight program; nevertheless, the Committee directs NASA to proceed with the flight program and make the necessary future requests for budget authority as required. The Committee notes with concern the on-again, off-again agency posture with regard to flight demonstration of advanced satellite communications technology. Therefore, the Committee requests that NASA examine the question of recompetition at the outset to assure orderly and timely progress toward successful accomplishment of a flight demonstration program in concert with the user community. Therefore, the total recommended authorization for communications activities in fiscal year 1985 is $60,600,000.

AERONAUTICAL RESEARCH AND TECHNOLOGY

NASA requested $342,400,000 for Aeronautical Research and Technology. This amount represents an increase of 13.3 percent over the Fiscal Year 1984 appropriation.

While this increase reflects substantial real growth from the previous year, the Committee notes that the long-term trend has not been adequate to keep pace with inflation, much less with the increasing sophistication of aeronautics. For example, the request for FY 1985 is only 10 percent greater than the actual amount spent in FY 1980, without considering inflation.

The Committee notes that once again the Administration has failed to request funds to carry out Congressional intent in validating the Prop Fan technology. Accordingly, the Committee recommends that within the total authorization for Aeronautical R&D, $24,000,000 be authorized only for activities in the Advanced Turboprop program which are designed to lead to a flight test no later than 1987 and for supporting research and technology. This amount consists of $14,000,000 which is contained in the request under the Advanced Propulsion Systems Technology line item plus an augmentation of $10,000,000. Although the new authorization falls short of NASA's original request to the Administration, the Committee believes that essential program objectives can be achieved through a combination of cost reduction possibilities, including increased contractor cost sharing, greater in-house participation in flight test activities, and stretch out of non-time-critical supporting research. The Committee further recommends that NASA proceed with the parallel development of counter rotation technology so as not to let the promising new concept languish. Should further funds be needed NASA should reprogram from the R&D Base. The Committee wishes to reemphasize its intention that a flight test of the Prop Fan be performed in 1987.

The Committee is also concerned about a virtual abandonment, since 1981, by NASA of research focused on the disciplines related to high-speed aeronautics. Advances in this area will be the key to improved military and civil aircraft in the next century. Therefore, the Committee recommends an increase of $5,000,000 to be applied to research on variable cycle engine concepts, laminar flow, advanced materials and systems analyses.

The request contains $2,100,000 for research on alternative fuels for general aviation. To stress the importance of this work to the future of air transportation, the Committee recommends an increase of $1,000,000. The recommended authorization for Aeronautical R&D is $347,400,000.

To partially offset these increases, the Committee recommends a general reduction of $11,000,000 from the R&T base. Under Construction of Facilities, the Committee will recommend a further offsetting reduction to keep the total authorization for aeronautics at the level proposed by the Administration.

SPACE RESEARCH AND TECHNOLOGY

NASA requested $150,000,000 for space research and technology activities in fiscal year 1985. The Committee recommended a $2,000,000 funding increase to support the tri-agency (NASA, DOE, and DARPA) SP-100 Program to develop a 100 kilowatt class space electric nuclear power system. The current funding level of $3,900,000 is inadequate to assure an orderly and efficient transition of this program into engineering development in FY 1986. The additional funds will be used to support a more thorough evaluation of the technological, safety, and mission related issues prior to concept selection for this program that may prove to be a valuable source of the high electrical power levels ultimately required by

manufacturing activities on the space station. The Committee recommends that the $2,000,000 increase in funding level be accommodated through a redistribution of available space research and technology funds resulting in a total authorization of $150,000,000 in fiscal year 1985.

SPACE FLIGHT, CONTROL, AND DATA COMMUNICATIONS

SHUTTLE PRODUCTION AND OPERATIONAL CAPABILITY

NASA requested $1,465,600,000 for Shuttle production and operational capability in fiscal year 1985. The Committee increased funding for the Orbiter by $50,000,000; decreased funding for launch and mission support by $15,00,000; and decreased funding for changes and system upgrading by $10,000,000 resulting in a total recommended authorization of $1,490,600,000 in fiscal year 1985.

Orbiter. NASA requested $606,800,000 for Orbiter production and related support in fiscal year 1985. The Committee recommends an increase of $50,000,000 for Orbiter funding to augment the structural spares activities (particularly critical skills needed for production and installation of electrical, mechanical, and fluid systems) and to avoid further erosion of the production base thereby maintaining production readiness for an additional orbiter vehicle. Therefore, the total recommended authorization for Orbiter activities in fiscal year 1985 is $656,800,000.

Launch and mission support. NASA requested $234,800,000 for launch and mission support activities in fiscal year 1985. Launch and mission support funding provides for a variety of improvements in such areas as mission preparation, mission operation, astronaut training, and launch and recovery operations. The Committee recommends a funding decrease of $15,000,000 which can be accomplished through the deferral of less critical activities that can be accommodated without a degradation of mission capability. This results in a total authorization of $219,800,000 in fiscal year 1985.

Changes and system upgrading. NASA requested $25,000,000 for changes and system upgrading in fiscal year 1985. These funds provide for potential changes and system modifications as well as unanticipated new requirements not covered in the budget estimates for Shuttle production and operational capability development. In view of the fact that Shuttle development is nearing completion, the Committee recommends a funding decrease of $10,000,000 resulting in a total authorization of $15,000,000 in fiscal year 1985.

SPACE TRANSPORTATION OPERATIONS

NASA requested $1,339,000,000 for space transportation operations in fiscal year 1985. The Committee believes that increased operational efficiencies beyond those currently planned can be achieved and recommends a $10,000,000 funding decrease resulting in a total authorization of $1,329,000,000 in fiscal year 1985.

SPACE AND GROUND NETWORK, COMMUNICATIONS AND DATA SYSTEMS

For fiscal year 1985, NASA requested $795,700,000 for space and ground network communications and data systems. The Committee

recommended a decrease of $15,000,000 resulting in a total recommended authorization of $780,700,000 for space and ground network, communications and data systems.

The recommended decrease of $15,000,000 would be applied at NASA's discretion within the line item. The Committee notes that the space tracking and data systems programs are oriented toward providing NASA with a general tracking, communications, and data processing capability. Thus, it is reasonable to expect funding reductions to be offset by improved operating efficiencies without a degradation in overall system capability and service. The Committee recognizes that NASA will be tempted to absorb the entire reduction through short-term, temporary curtailment in services. The Committee strongly urges NASA to avoid actions that degrade basic capabilities and jeopardize existing missions. In particular, NASA should not respond to this Committee budget action by taking steps that would delay or reduce efforts pertaining to development of the TDRSS or Deep Space Network or to acquisition and support of computational equipment (i.e., computers). Instead, the Committee directs NASA to pursue initiatives that will yield improved efficiencies and reduced funding requirements in the long term. Such actions may include, for example, initiatives to increase reimbursables, revised mission coverage policies, extend data processing turnaround time to coincide with a customer's ability to analyze data, curtail unnecessary communications traffic, and obtain greater funding contributions from other program offices for mission unique requirements.

CONSTRUCTION OF FACILITIES

NASA requested $160,000,000 for the Construction of Facilities in fiscal year 1985. The Committee reduced the construction of the Numerical Aerodynamic Simulation Facility by $5,000,000 and reduced rehabilitation and modification of facilities at various locations by $5,000,000 resulting in a total recommended authorization of $150,000,000 in fiscal year 1985.

Construction of Numerical Aerodynamics Simulation Facility. NASA requested $16,500,000 in fiscal year 1985 for the construction of the Numerical Aerodynamic Simulation Facility at the Ames Research Center. The Committee reduced funding for this facility by $5,000,000 resulting in a total authorization of $11,500,000 in fiscal year 1985. The Committee expects NASA to reschedule the construction of the Numerical Aerodynamic Simulation Facility in a way which will facilitate the completion of this facility with fiscal year 1986 funds.

Rehabilitation and modification of facilities at various locations. NASA requested $25,000,000 in fiscal year 1985 for the rehabilitation and modification of facilities at various locations. The Committee continues to believe that it is essential that NASA maintain its property in a timely and economical manner. However, because of the restricted Federal budget for fiscal year 1985 and the urgent need to proceed with certain research activities in the space program, the Committee decided to reduce funding for the rehabilitation and modification of facilities at various locations by $5,000,000

resulting in a total authorization for these activities of $20,000,000 in fiscal year 1985.

RESEARCH AND PROGRAM MANAGEMENT

NASA requsted $1,331,000,000 for Research and Program Management in fiscal year 1985. The Committee adopted the requested amount but directed that $1,000,000 be made available for the activities of the National Commission on Space, established pursuant to Title II of this bill.

LANGUAGE AMENDMENTS

SECTION 106

The Committee added a new Section 106 to clearly show the Committee's intent that NASA maintain production readiness for a fifth orbiter vehicle.

SECTION 107

The Committee added a new Section 107 to direct NASA to continue and enhance the agency's programs of remote sensing research and development.

SECTION 108

The Committee adopted a new Section 108 which expresses the intent of Congress that government expenditures in supporting the development of prop fan technology be repaid by firms in the aircraft manufacturing industry when and if commercially successful products employing that technology are produced by such firms.

The Committee is aware that cost recoupment has been a condition of certain research and technology contracts in the past where the objective was improvement of existing aircraft engines. In those instances the NASA research effort was expected to lead directly to specific product improvements and cost recoupment arrangments were relatively easy to design. While the "audit trail" from research to product is likely to be less apparent in the Prop Fan program, the Committee believes that any successful Prop Fan aircraft must draw heavily upon the current NASA research effort. For this reason, the concept of cost recoupment appears to be workable in this case.

Accordingly, the Committee recommends that NASA develop a plan for repayment of the Government's investment by firms in the aircraft manufacturing industry when a commercially successful Prop Fan aircraft is produced by any of those firms.

SECTION 109

The Committee adopted a new Section 109, which would amend section 102 of the National Aeronautics and Space Act of 1958, as amended.

Sec. 109(a) would add a new subsection (c) to Sec. 102 of the National Aeronautics and Space Act, as amended, to require that the "National Aeronautics and Space Administration . . . seek and encourage, to the maximum extent possible, the fullest commercial use of space."

The Committee wishes to emphasize that this language is intended to encourage NASA to aggressively pursue all areas of potential commercialization.

The Committee commends the Executive Branch for its forward looking policies on the commercialization of space, which include the establishment of an office within the Department of Transportation for the commercialization of expendable launch vehicles. The Committee feels strongly that NASA, as the lead civilian space agency, should be encouraged to focus on commercialization opportunities. Toward this end, the Committee looks forward to the establishment of a focal point within NASA for space commercialization activities.

Sec. 109(b) would amend Sec. 102(d)(1) of the National Aeronautics and Space Act of 1958, as amended (and as redesignated by subsection (a) of Sec. 109), to reflect as an objective of the United States aeronautical and space activities "the expansion of human knowledge of the Earth and of phenomena in the atmosphere and space."

The addition of the words "of the Earth and" to the current language in the Act reflects the Committee's firm belief that research conducted in space, from space, or using space technology can greatly expand our understanding of the Earth and both natural and man-made process on it. The amendment is intended to encourage NASA's expanded activity in the Earth sciences.

SECTION 110

NASA requested an amendment to Title III of the National Aeronautics and Space Act of 1958, as amended, to allow the NASA Administrator to transfer title to personal property loaned by NASA to academic institutions or non-profit organizations, once NASA is sure that it no longer needs the property. The Committee adopted a technical amendment to the language (Sec. 110).

TITLE II

The Committee adopted a new Title II as amended to the bill which would establish a National Commission on Space whose purpose is to formulate a long-range agenda for United States civilian space activity, identifying long-range goals, opportunities and policy options for U.S. civilian space activity for the next 20 years.

The bipartisan Commission would be comprised of 14 Members selected by the President and the Administrator of the National Aeronautics and Space Administration. Other Federal Departments and agencies involved in civilian space policy, and Members of Congress would also be represented on the Commission in an ex officio capacity.

The Commission would report to the President and the Congress its findings and recommendations within a year following its establishment. The Commission would terminate 60 days following release of its findings and recommendations.

One million would be authorized under section 101(d) of Title I of this Act for the Commission's activities for fiscal year 1985.

COMMITTEE VIEWS

U.S. CIVILIAN SPACE POLICY

The next few years will be particularly important in establishing man's future in space. The placement in orbit of a permanent, manned space station will begin a new era, changing forever man's notion of space from someplace distant and unknown, to a place for scientific, economic and social gain. New technologies are enabling us to explore and utilize the space environment in altogether new ways.

These developments are reflected in the changing character of national and international space activity. Many more participants are entering the space arena, including government agencies, the private sector and foreign entities. Space commercialization activities are increasing and generating the need for new business and legal understandings and institutional arrangements. The Space Transportation System has emerged as a new national resource which vastly expands opportunities for space development. The evolution of space activities is also resulting in space policy considerations that command a presence in foreign policy. Tensions have also emerged from the growing perception of an increasing military involvement in space.

These changing trends translate into issues and policy considerations of increasing breadth and complexity. As policymakers, our ability to chart a course for U.S. civilian space activity will depend to a great extent on the presence of numerous conditions. Included among these are our ability to mobilize and utilize fully available scientific, engineering and technical resources, expertise and advice. The presence of an institutional organization and coordination that permits timely, informed and thorough debate and evaluation of, as well as an anticipatory responsiveness to, space policy considerations will be critical. Also essential will be the assurance of an open forum, particularly in the Executive Branch, in which civilian space policy considerations receive the priority and attention that are warranted.

During the next year, the committee intends to look in greater depth at the elements and character of the current institutional apparatus for setting space policy in order to ensure a foundation for more knowledgeable and confident decision making on U.S. space policy issues. In addition, the Committee will be examining the process by which decisions and policies are reached on civil space issues. In achieving these ends, the Committee invites the participation and advice of all parties interested in the future of U.S. civilian space activity.

THE MISSION OF NASA

In the past, the Committee has voiced concern over the absence of long range goals to guide the U.S. civilian space program, and has encouraged NASA to enhance its long range planning efforts in order that a program direction for civilian space activity can be charted by the nation with greater confidence and commitment. It was with special interest, then, that the Committee received, in October of 1983, the report of the NASA Advisory Council on the Study of the Mission of NASA. The one and a half year long study on the long range missions of NASA, including science, exploration, technology, applications, and operations recommended a future course and direction for the agency over the next 20-40 years. The Council's report was a complement to hearings conducted by the Committee in October 1983 that reviewed the adequacy of the National Aeronautics and Space Act of 1958 as a policy framework for the next quarter century.

The Committee commends the NASA Advisory Council for initiating this exercise of such scope and introspection. The findings of the Council will provide useful reference and valuable insights as discussions of NASA's responsibilities and the objectives of our civilian space program proceed over the next several years.

The Committee believes that NASA's thorough scrutiny of the NASA Advisory Council's Mission of NASA study would be worthwhile and particularly appropriate as the agency postures itself to meet civil space objectives over the next several decades. Since the release of the Council's report in October 1983, the Committee has on several occasions queried NASA on its reactions to specific aspects of the Council's recommendations. These discussions have occurred primarily during the course of hearings on the agency's fiscal year 1985 budget request. Consequently, the Committee has not been able to explore the recommendations with NASA in as much depth as may be warranted.

Therefore, NASA is requested to submit to the Committee by September 1, 1984, its formal response to the NASA Advisory Council's study on the Mission of NASA.

SPACE STATION DEVELOPMENT

Continued strength of our Nation's civil space program is dependent on a broadly based growth in the scientific and technological capability of NASA in the years head. The advent of a Space Transportation System has enabled both launch and retrieval of payloads in space as well as extended the time available for manned operations in space. Even though further extension of the orbital duration of the Space Shuttle can be expected, efficient longer term manned operations (beyond 18-20 days) indicates a requirement for a habitable, low-earth orbit station. Although any single objective (commercial, scientific or international) may not justify such a facility, when such objectives are considered as a whole, the development of a manned space station capability appears justified on the basis that such a capability will be of long duration (in excess of 10 years), expandable (adapted to changing requirements) and accessible (useable by commercial, scientific and international interests). Given these conditions, the Committee

fully endorses the Administration's request for definition studies for the Space Station program.

The Committee commends NASA in its decision to establish a Space Station Task Force and the resulting significant preliminary planning already conducted. This planning, in the Committee's view, has led to an improved basis for establishing a space station development program. Certain aspects of the planning for the development program, however, are of concern to the Committee, based on the testimony of NASA and others. NASA has expressed a determination to conduct the system engineering and integration activity as an internal NASA effort and to co-locate the program management (Level "B") with a NASA center. The Committee does not wish to attempt to "manage-at-a-distance" the space station program but does want to be assured that fundamental aspects of space station management have been exhaustively examined by senior NASA management. To this end, the Committee requests that NASA submit to the Committee not later than December 15, 1984, the NASA Space Station development management plan and procurement strategies with a description of the alternatives available and the basis for the choices taken. This management plan should include the approach planned for contracting, test-bed philosophy and facility planning, and other salient management considerations. The Committee believes that through development of this plan, the NASA and the Committee can better focus on management issues which may need further attention at the outset of the space station development program.

SPACE SHUTTLE ORBITER

In the past year, the Space Shuttle has continued to prove its reliability, flexibility, and efficiency in serving as the Nation's primary space transportation system. However, a number of key policy issues relating to the Orbiter remain unresolved. NASA should continue to play an active role in addressing and resolving these issues in an expeditious manner.

Orbiter Fleet Size. The Committee continues to believe that an additional Orbiter beyond the currently planned four will be needed to accomplish civil, commercial, and defense missions and space station-related activities; to exploit the Shuttle's potential for extended on-orbit life, and to provide adequate backup to the currently planned fleet.

Extended Duration Orbiter. Spacelab users have emphasized that an extended on-orbit capability by the Orbiter would be very beneficial for their research efforts. An additional advantage of an extended duration Orbiter would be its ability to readily enter and use orbital inclinations that are different from the single inclination that will be occupied by the space station. Also, the cost of developing this extended on-orbit capability is of the same magnitude as the cost of a single Space Shuttle flight. The Committee believes that there is significant justification for developing an extended duration capability for the Orbiter and requests that NASA provide the Committee by September 1, 1984, a report on the costs and technical aspects of undertaking the development of an extended duration Orbiter. This report should address the following: (1) NASA's recommendation of how the extended on-orbit capability of the Orbiter can best be accomplished; (2) the cost and schedule that would be required to implement the recommended technique; (3) identification of potential missions that would use the capability; and (4) NASA's views of whether an effort to extend the Orbiter's flight duration should be pursued or foregone.

Other Orbiter Improvements. A number of modifications have been suggested for the Orbiter to improve its performance, reliability, or cost efficiency. These have included potential improvements in the main engines, landing gear, brakes, wings, auxiliary power units (APU's), and thermal protection system. The Committee requests that NASA provide the Committee by September 1, 1984, a prioritized list of the improvements that are underway or are being considered for implementation along with estimates of their R&D and production/retrofitting costs and schedules.

Spares and Logistics. The Committee applauds the initiatives that have been taken by NASA to augment the spares budget in an effort to ensure the availability of an adequate supply of repair and replacement parts. The Committee is also pleased with NASA's efforts to ensure that those parts are purchased at a fair and reasonable price. Outstanding issues include: (1) the size and professional background of the staff required to oversee the Orbiter logistics program; (2) when all STS logistics oversight will shift to a single NASA field center; and (3) where depot-level maintenance will be conducted on the Orbiter. The Committee requests that it be kept informed of NASA's progress in resolving these issues.

FENCED SHUTTLE OPERATIONS

In October 1983, the NASA Advisory Council recommended that the operating budgets, facilities, and personnel required to support an operational Space Shuttle be "fenced" from the rest of NASA's programs. The Council argued that such an action would: speed the transition to more efficient operations; help reduce costs; and ease the transfer of STS operations to the private sector or some new government operating agency, should such a transfer be desired. At issue is the rate at which this fencing effort should be undertaken—some government officials and outside experts believe that it should be undertaken soon while others feel that it should not be done until the late 1980s or early 1990s.

The Committee endorses the view that Space Shuttle operations should ultimately be separated from the rest of NASA's activities and believes that this should be done at the most rapid rate that can be accommodated without causing harm to the program.

In light of the current divergence of views regarding the completion of fencing efforts, the Committee requests that NASA develop a preliminary timetable for the completion of activities to fence all of the shuttle's operating budgets, facilities, and personnel. This preliminary timetable should include a rationale for the timing of each milestone and should be submitted to the Committee by December 31, 1984.

IMPACT OF GOVERNMENT USE OF EXPENDABLE LAUNCH VEHICLES ON THE SPACE SHUTTLE PROGRAM

When the decision was made to develop the Shuttle, the policy of the United States Government was to have the Shuttle replace government expendable launch vehicles and satisfy all the launch needs of the United States Government, commercial, and foreign users. This policy, however, appears to be changing as the Shuttle nears full operational status. In a June 14, 1982 letter to NASA, the Office of Management and Budget articulated a position that the Shuttle fleet should be sized to accommodate only the needs of the Federal Government and that an appropriate price to charge commercial and foreign customers for any excess Shuttle launch capacity would be the highest price at which sufficient users will be available to utilize excess capacity. More recently, the Department of Defense has initiated steps to acquire a launch capability in the form of expendable launch vehicles that is supplementary to the Shuttle.

In view of the initial Shuttle policy and the apparent subsequent changes thereto, the Committee believes it is appropriate to examine the long-range implications of these changes on the Space Shuttle program. The Committee, therefore, directs NASA to undertake a study on government purchase of commercial launch services and to submit its findings to the Committee by October 1, 1984. This report shall identify and assess the impact on the total United States space program and on the operations, cost, and utilization of the Shuttle resulting from government use of expendable launch vehicles.

SELECTION OF SUPPORT PLATFORMS FOR PAYLOADS

Expanded utilization of space and a proliferation in the number and kinds of payloads placed into space are inevitable future events made possible by the development of the Shuttle and various space technologies. The purpose and requirements of these payloads will differ widely and dictate the support configuration offering the greatest suitability and return-on-investment. Payloads may be placed on and supported by a freeflyer (i.e., a dedicated bus), an unmanned platform (i.e., a shared bus), the Space Station, or the Shuttle's Spacelab. Efficient and effective utilization of space resources depends on a proper matching between a payload and support platform.

To ensure the best use of space resources, the Committee believes that it is necessary to establish guidelines for determining when it makes sense to put payloads on either a freeflyer, unmanned platform, the Space Station, or Spacelab. The Committee, therefore, directs NASA to develop selection criteria for each available support platform to better serve the payload community. These guidelines should be submitted to the Committee by January 1, 1985.

SPACE SCIENCE

Health of the Space Sciences Program. The Committee has received much testimony over the past year which has expressed concern for the health of the space sciences program. Although there is a degree of balance in the space science program in the fiscal year 1985 budget request and no major ongoing initiatives are threatened with demise, this reflects stability at a low-level of support rather than the growth deemed necessary to have a truly vigorous space science program. The Committee believes that there is a need to increase support for basic research at universities and to develop new missions that expand our capabilities in order to maintain our world leadership position.

It is particularly important to preserve a commitment to achieve a healthy science program in view of the future resources that may be necessary for the development of the Space Station proposed in the fiscal year 1985 budget. The start of any major new engineering program generates a concern because of its potential for diverting resources from other programs including science-based programs, as developmental problems arise.

Astronomy. In 1982 the National Academy of Sciences published a report entitled, "Astronomy and Astrophysics for the 1980's" popularly referred to as the Field Study after its leader, professor George Field. This report, based on a consensus of the United States astronomical community, is of great value in laying out a blueprint for astronomy and astrophysics for the coming decade. The recommendations in this report deserve serious and prompt attention by NASA with a view towards implementation. Indeed, the Committee believes that NASA should have very good, explicit, and sound reasons for any deviation from the plan laid out in the Field Study.

The Committee notes that the Field Study endorsed two major projects which were assumed to be firm commitments. That is, these projects were taken as already approved, and the study focussed on the follow-on projects. These two major projects were the Shuttle Infrared Telescope Facility (SIRTF) and the Solar Optical Telescope (SOT). It is of concern, however, that neither of these programs are progressing at a satisfactory rate towards the dates originally projected. Cost overruns in other programs such as the Space Telescope have impacted the resources available for concept definition and preliminary studies.

Another major emphasis of the Field Study was the need to strengthen the infrastructure of the astronomy and astrophysical sciences. Vigorous basic research programs at United States universities are essential for training future scientists and engineers and ultimately, for dissemination of the latest scientific results to university students and the general public. Grants awarded through NASA's Research and Analysis program provide a direct stimulus to the academic community and are the mainstay for the infrastructure in the astronomical and astrophysical sciences. The Committee believes that NASA should reexamine its need to maintain the scientific infrastructure in this area.

In examining NASA's proposal to initiate the construction of a permanent manned Space Station, the Committee has recognized that this may have far-reaching implications for many other NASA program areas. The Committee believes that the conclusions of the Field Study may need to be reexamined by NASA and the astronomy community in view of the capabilities that the Space Station may offer. It is evident that missions previously planned for Shut-

tle or unmanned platforms may achieve different long-term utility if designed with the Space Station in mind.

The Committee directs that NASA undertake a review of current and future planned astronomical missions and assess the cost, schedule, engineering and scientific implications of evolutionary designs which may lead to installation on the Space Station. This study should be done in conjunction with a group analogous to the Astronomy Survey Committee of the National Academy of Sciences and should be reported to Congress by May 1, 1985.

Space Telescope. The Committee continues to be concerned over the progress toward completion of the Hubble Space Telescope. Although there are no "show stoppers" that can be identified, at present, the Committee believes that the schedule and cost risks associated with the remaining tasks are inappropriately high for a project of this magnitude and maturity and do not reflect well on program management. The fairly rigid schedule for the systems integration phase may inhibit the engineering quality control that the major investment in this project merits.

The Committee recognizes the management and organizational difficulties presented by the recommendations of the National Academy of Sciences report on Institutional Arrangements for the Space Telescope (the "Hornig" report). Notwithstanding these difficulties the Committee intends that NASA maintain its commitments to carrying out the spirit of the Hornig report in establishing and maintaining a dedicated Science Institute. This report clearly points out that the science data management system and ground control operations related to science should be at the Science Institute so they can be responsive to the needs of the science community. It seems that the complete scope of responsibilities of the Science Institute is only now being adequately defined because of earlier deficiencies in overall project definition and planning for the Space Telescope project. Delays and revisions in the Science Operations Ground System may be attributable, in part, to the difficulties NASA has had in sharing responsibilities with an external organization such as the Science Institute. The Committee urges NASA to reaffirm its commitment to the Science Institute and to provide to it the support necessary for the Institute to fulfill its role. The Committee points out that the true measure of accomplishment for the Space Telescope will be neither its fabrication nor orbital operation but the scientific progress that it will stimulate and that will be achieved for the most part by the external astronomy community. NASA should avoid the temptation to be "penny wise and pound foolish" in withholding the small amount of organizational and resource support to the Science Institute that would be necessary to fully develop the vision of the National Academy report. Perhaps more importantly the agency should give the Science Institute the kind of institutional breathing room necessary to allow a very dynamic program.

Planetary Exploration. Planetary Exploration constitutes a mission of NASA which is not shared with any other agency. Over the past two decades under NASA's leadership there have been over 40 encounters with planets and satellites by unmanned spacecraft. Through the exploration of other planets we have begun to better understand our own planet, Earth, and our place in the universe. Each successive mission has in some way, added to our knowledge of fundamental planetary processes which have shaped our own land masses, our oceans and atmosphere.

The increased austerity of the NASA budget has, however, necessitated a new examination of our intellectual objectives and the need for an affordable approach to planetary exploration. It is crucial to capitalize on our 20-year investment and continue a robust and scientifically dynamic program with more modest outlays. In 1983 the Solar System Exploration Committee of the NASA Advisory Council completed a strategy report which provides a sound basis for structuring such a program. This strategy emphasizes mission continuity in a core program and low-cost innovative approaches to implementation of this core program.

The Committee urges NASA to adopt and strongly implement this core program or to explain clearly reasons for any deviation. The core program recommended supports the minimum level of continuity that will enable progress toward our major scientific objectives and retain the U.S. leading position in solar system exploration. One element of this strategy, the Planetary Observer series, constitutes a program of low-cost, modestly scaled missions using technology already developed for Earth orbital spacecraft. The Committee notes that the first of these, the Mars Geoscience/Climatology Orbiter (MG/CO) has been proposed as a new start in fiscal year 1985. The SSEC has emphasized, however, that the Planetary Observers should be a level-of-effort program that will require a commitment to follow-on missions after MG/CO. The success of this strategy will depend in large part on NASA's ability to constrain costs by maximizing the hardware and software inheritance, controlling the scientific mission scope, and minimizing changes after mission definition. Only in this way will the mission costs be controllable so that the Planetary observer program can be conducted like the Explorer program.

Although the core program represents the lowest level of support necessary for a healthy program base, NASA's goals should include the expanded scope outlined by the SSEC. One ongoing effort within NASA that may significantly contribute to future programs is the Research and Technology for Solar System Exploration Missions study reported to the Committee in January 1984. This effort examines the generic technologies needed for the low cost improvement of derivative spacecraft systems for the inner planet exploration mission, the Mariner Mark II systems for the outer planetary programs, and the advanced technologies for the larger scope missions. The Committee directs that NASA continue to pursue these technology developments in close coordination with the Solar System Exploration Committee of the NASA Advisory Council.

University Support. A common need in both the Physics and Astronomy program and the Planetary Exploration program is the infrastructure provided by the academic community. As noted above this community is both the training ground of the future and a constant source of intellectual stimulus that has proven to be a major strength of the U.S space science program. The university environment has fostered cross-fertilization of ideas between traditional disciplines which has resulted in abundant rewards. Although NASA does not have a direct mission to support academic

institutions, the return on investments made in universities are clear and of long-lasting benefit.

The Committee believes the recommendations of the NASA University Relations Study Group (which pointed out the need for equipment grants, augmented budgets for data analysis, and NASA-sponsored graduate student study programs) are of great value and should be implemented by NASA. The Research and Analysis budgets within the Astronomy and Astrophysics and Planetary Exploration programs provide direct support for universities. The Committee has taken actions in the fiscal year 1985 authorization to augment the Research and Analysis budgets in both programs by amounts somewhat less than responsive to the recommended needs but as much as could be found in this year of restraint.

NASA should take steps to ensure that the spirit of these recommendations are fulfilled by encouraging the acquisition of capital equipment of broad utility and fostering close relations between NASA centers and universities that will improve the access of university researchers to NASA equipment and facilities. NASA would also benefit from the cross fertilization resulting from such improved relations.

Another concern related to the health of the university space sciences is the failure of the Space Shuttle to offer low-cost and easily achieved access to space for individual experiments. The Committee has maintained an interest in programs such as Spartan and the Getaway Specials which could remedy this situation. In so far as there is demand for them they should be given a higher priority by NASA and implemented at a faster pace without development of additional large hardware items. The Committee believes that such efforts to diversify the opportunities to accomplish small-scale experiments in space will have scientific benefits and will stimulate the health of university space sciences.

International Cooperation in Space Science. The Committee believes that the goals of maintaining U.S. preeminence in the space sciences and fostering international cooperation are compatible and should be pursued with vigor. NASA must retain strength in all major areas but at the same time recognize the potential contributions of other nations in achieving mutually desirable goals. In particular, it must be noted that support of a vigorous university-based research program in the United States is a very inexpensive way of maintaining strength and flexibility so that we can react to and capitalize on foreign advances. It also puts the Nation in a better position to bargain for cooperative opportunities to fly instruments on foreign missions.

One example of such cooperation is the International Solar Terrestrial Physics program in which the United States, Japan, and the European Space Agency are contributing different satellite platforms to collect data on Sun-Earth interaction in a complementary way.

Another approach which should be explored by NASA is the concept of coordinating missions whose objectives are complementary. For example, a follow-on mission by the European Space Agency or Japan to continue mapping the infrared sources in the universe would greatly augment the data base collected by IRAS. This is not to condone the slow development of SIRTF, but to recognize it and try to minimize its impact, and perhaps keep the United States researchers involved and supplied with data by getting an instrument aboard European or Japanese missions. This approach might be applied to many other astronomy missions to maintain a flow of data and support continuity in data analysis programs which would improve the long-term stability of the space sciences.

The Committee believes that in any international cooperative effort, NASA should achieve some degree of overall reciprocity. For example, the European Space Agency instrument carried aboard the Space Telescope might be complemented by a United States instrument aboard some European Space Agency platform such as ISO.

Program Balance. The major resource commitments that will be necessary in order to develop and construct a permanent manned Space Station have raised the concerns of many in the scientific community for the maintenance of a balanced program in the space sciences. This concern arises from a perception of the Shuttle development history. The Committee echoes this concern and will continue to examine the relative priority given to the space sciences to assure a vital and healthy program.

As NASA begins its transition into the Space Station era several considerations are of importance. Neither the Space Station nor the Space Transportation System must be allowed to divert resources from the space sciences. There must be available resources in which new starts can be accommodated through the developmental phase of the Station.

There is also a need to begin integrating the space sciences into the Space Station and its design as it evolves. The lessons learned from the Space Shuttle are of great relevance. Notwithstanding the original intention to design the Shuttle with science as a user, NASA did not maintain in place an institutional or organizational arrangement to ensure that this intention was carried through the protracted development period. Although NASA has established a useful task force structure to focus the views of the science community for the Space Station planners, the Committee is not satisfied that this constitutes an adequate institutional arrangement. For example, this body is advisory only, and advises the Associate Administrator for Space Science and Applications who will have relatively little control over Station development. The Committee considers the establishment of a permanent organizational framework to be necessary to fully integrate the needs of science into other engineering, economic and human factor considerations for the Space Station design and development.

Antecedent to this, and of equal importance, is that the space sciences should not be forced onto any specific platform which is not appropriate. The Committee recognizes that many missions will not benefit from the characteristics of the Space Station or the Space Shuttle and can achieve a greater effectiveness and increased scientific return on some other platform. All missions should receive equitable priority based on their scientific merits and should not be penalized because of any inherent incompatibility with elements of the Space Transportation System.

The Committee also emphasizes the necessity of maintaining balance within the space sciences between new missions and ongoing support of data analysis though the Research and Analysis budgets. Often the scientific community itself, in its desire for new missions, is responsible for the diversion of resources away from the Research and Analysis program elements. This results in a weakening of the university based infrastructure largely supported by these resources.

New Missions. At the time of its recent review of the NASA Five Year Plan, the Committee was given assurances that a sufficient number of new missions could be accommodated within the projected 5 year budget to maintain continuity and dynamic growth in all the space sciences. This requires that adequate resources be committed to project definition phases in order "the new start" schedules can be met with reliability. These project definition phases are contained in the Supporting Research and Technology and Advanced Technology Development programs within the major disciplinary programs.

The Committee is concerned that the resources available for such work may be so small as to lead to inappropriate competition among the new mission concepts. It is essential to maintain a balance among priorities both on the basis of scientific merit and according to project maturity.

Gravity Probe-B is, by any measure, a project with a potential for profound scientific return. The Committee has voiced support for this project and believes that it should be given serious consideration by NASA. The recent discussion of a Shuttle-based demonstration phase should lead to a full technical evaluation of this possibility.

The Committee would like to comment on Gravity Probe-B as a representative of a class of missions characterized by high risk with potential for great, fundamental scientific payoffs. Such missions should always be a part of NASA's goals and consciousness.

In its support for the Planetary Observer program, the Committee does not intend to signal that it feels these missions alone are enough for a vigorous exploration of the solar system. The Observers would be a *core* program with additional, much more ambitious missions. Specifically, as recommended by the Solar System Exploration Committee, NASA should develop the Mariner Mark II spacecraft. The purpose of a low-cost core program is to maintain balance and vigor in the space sciences in the intervals between the necessarily less frequent but much more ambitious missions that will be funded as resources are available. Thus, the Committee wishes to emphasize that new missions should form the expanded goals of NASA and will ultimately be the basis for quantum increases in our understanding of the processes which have shaped our universe.

SPACE APPLICATIONS

The Mission of NASA in Applications. The Committee is cognizant of the fact that NASA has not yet satisfactorily defined its role in space applications. The trend towards commercialization of space, together with an overall redefining of the Federal role in research and development, raises questions about the traditional scope of the NASA mission.

The Committee is also concerned that NASA's organizational approach to applications involves fundamentally dissimilar elements which may have further confused its role. That is, the application of basic science to broader uses (such as weather research) is very different from activities which seek to apply or demonstrate NASA technologies with direct commercial implications (such as the Advanced Communications Technology Satellite, or ACTS, program). The danger exists that the latter might receive a disproportionate emphasis due to a clearer short-term economic value, or that the former might be pressed inappropriately to demonstrate an economic value that would be hard to prove.

Technology Demonstration. The emerging interest of the private sector in investing in space systems and applications suggests that NASA's mandate to provide for the widest practicable dissemination of its technologies must be viewed very flexibly. Although a duplication of the private sector's capabilities is clearly inappropriate, the need remains to undertake a level of "follow through" activities that will ensure a smooth and efficient transition to the private sector. This necessitates some degree of overlap in which NASA and the private sector work in coordination in order to ensure that NASA's role can be successfully ended without loss of the potential benefits. The Committee notes that NASA has established an Office of Commercialization in order to be responsive to this need. The Committee believes that there should be close coordination between this Office and the Applications program. Of course, in pursuing commercialization of space technologies, NASA must avoid competing with private sector efforts.

Recently, the NASA decision to reduce the scope of the ACTS program to exclude a flight demonstration has raised concern over the ability to effect a smooth transition of these valuable NASA-developed technologies to the private sector. The ACTS program is an innovative approach toward expanding communications capacity and conserving the communications frequency spectrum. Without a flight demonstration, however, neither industry nor the potential users may be willing to take on the risks inherent in establishing a commercial operational system. The Committee believes that the benefits to society which would result from the implementation of these technologies merit the restoration of a flight demonstration program. Accordingly, the Committee has taken action to maintain the scope of ACTS to include such a flight demonstration.

NASA's continuing vacillation in the area of satellite communications probably exemplifies the worst possible situation in which industry is not supported by promised technical results, but is led to invest in proposals for NASA-sponsored work that may not materialize. The Committee is of course aware that the Agency is to some extent at the mercy of events beyond its control. Nevertheless, the Committee is also aware of the Agency's ability to influence events. With respect to satellite communications, the agency should take steps to create a situation which will not generate turnarounds such as almost occurred with ACTS. It is of utmost importance that NASA take full account of this when procuring sup-

port from the private sector in collaborative communications demonstration projects.

The Committee is also concerned that in some other applications areas NASA has failed to develop an adequate science base before undertaking expensive demonstration programs. There is not an easily identifiable program continuity to support many demonstration projects. NASA should examine its approach to technology demonstrations in order to place such efforts in an overall context consistent with its mission. A comprehensive plan is needed whereby each demonstration project would have well-defined objectives—that is a beginning, a middle, and an ending that would be a turnover to the private sector, operation by another agency (e.g., NOAA operating weather satellites) or another understanding of where the demonstration project should lead. Projects should be planned to accomplish some well-defined objective. Without such a plan NASA's role is confused, because it seems to be pushing technologies for their own sake, without connection to other values. The Committee notes the difference between applications and science programs—planetary exploration, for example, can be considered a value in itself.

Applied Science. One major element in NASA's application program which has received inadequate attention is related to the applied sciences. This is often interdisciplinary research and is a potentially fruitful source of technological progress. The Committee is cognizant of the fact that the benefits will be long-term rather than of immediate economic value. For example, NASA's weather research programs cannot be expected to solve all problems of weather prediction in any foreseeable timeframe, but the Committee should expect, even insist, that these programs continue to accrete knowledge and understanding. NASA should remain committed in these areas and should not associate low perceived commercial potential with low priority for these programs.

The Committee notes that two such program areas—microgravity science and information science—seem not to have received proper emphasis by NASA. The Agency should build strong scientific and technical programs in these areas, and let commercical applications and opportunities arise from the wellspring of knowledge developed. Indeed, if NASA develops a strong base, private industry may develop commercial applications on its own, as is being done with electrophoresis. Indeed, the potential for commercial application in these areas is so clear that the Committee urges the agency to be particularly careful not to inadvertently impede commercial activities. The Committee further urges NASA to augment the basic science in these areas and to assume a leadership role in advancing scientific progress.

TECHNOLOGY UTILIZATION

Over the years, the Committee has maintained an active interest in NASA's commitment to provide the broadest practical dissemination and application of aerospace technology. In particular, the Committee has encouraged NASA to address the needs of small and minority firms located in rural, economically depressed areas. The establishment of NASA's Rural Applications Teams appears to

be responsive to this need. Within the funds authorized for Technology Utilization, the Committee directs NASA to continue operation of its Rural Applications Team. It is the intent of the Committee to promote national productivity, and to stimulate economic growth in all aspects of the private sector through the infusion of high technology applications.

INTERDISCIPLINARY COOPERATIVE RESEARCH AND INFORMATION EXCHANGE IN EARTH SCIENCE

Need for Interdisciplinary Cooperative Research. The Committee recognizes the linkages that exist between the Earth, its atmosphere and oceans, the Sun, and the space plasma between the Earth and the Sun. Because of the interactive nature of the physical, chemical, and biological processes in these systems, an understanding of major ecological and environmental phenomena depends on full knowledge of the system interfaces. For example, the large uncertainties that exist in assessing the effect of rising carbon dioxide levels on global climate stem in large part from the unknown responses of the oceans and biological organisms to this change. Because much of science is based on breaking complex systems down into easily understood parts, traditional disciplinary research typically cannot develop an understanding of processes which take place at the interfaces between systems.

In addition to interdisciplinary research, there is also much to be gained from international cooperation. An earlier example of such research was the International Geophysical Year of 1957-58, during which thousands of scientists from over sixty nations participated in a dedicated geophysical research and observation program that yielded a wealth of data. This example is a valuable precedent, not only because of the knowledge gained, but also because it demonstrated that such efforts can transcend politics.

The Committee supports and endorses scientific initiatives that promote interdisciplinary and international cooperative research programs aimed at addressing significant global problems. Only through such programs can the necessary view of Earth as a system be obtained.

At the Unispace '82 conference in Vienna, the United States proposed a study called "Global Habitability," which would address the interaction between the atmosphere, biosphere, and oceans. This would reduce uncertainties which are common to many global environmental problems. The United States should fulfill this commitment by taking the lead in formulating a visible, coordinated program with an identifiable focus. Within the Federal Government, NASA should be very active, if not the leader, in formulating such a program.

Indeed, the Committee adopted an amendment to the National Aeronautics and Space Act of 1958 to add impetus to NASA's mission concerning the "expansion of human knowledge of the earth." This amendment to NASA's basic statutory direction is intended to formally reflect in NASA's charter the Committee's firm belief that research conducted in space, from space, or using space technology in one way or another can greatly expand our understanding of the Earth and both natural and man-made processes on it,

and that this expanded understanding can and will benefit all mankind.

Solar-Terrestrial Research. The Committee is concerned with the present state of intra-agency organization and support as well as interagency, and interdisciplinary cooperation for the study of Sun-Earth interactions. A greater degree of interaction in this regard would be of special importance in uniting different disciplinary groups such as solar physicists, space-plasma physicists, meteorologist, climatologists, atmospheric chemists, and others toward a common goal of increasing understanding.

In the legislative report accompanying the NASA FY 1984 authorization bill, the Committee directed that NASA initiate a study through the National Research Council of the scientific connections and importance of Sun-Earth interactions. The underlying objective of this study was to develop an overall plan for Federal research which would serve to coordinate the activities of NASA, NOAA, NSF, DOD, DOE, and USGS. Although each of these agencies have missions that properly have shaped their respective research programs, such a coordinated plan would enable a more structured approach which would most efficiently direct federal resources to those science areas in greatest need. The Committee is aware that NASA cannot direct its sister agencies, but hoped that NASA would lead by example and logical persuasion.

Notwithstanding the Committee's request, NASA has not assumed the leadership role envisioned. Perhaps the Committee's intent that NASA lead only by example and persuasion was not clear, or perhaps NASA has been focused on achieving better interdisciplinary coordination within its own activities rather than on the need for coordination of other federal efforts. Nevertheless, the Committee is not fully satisfied that the intent of the study requested last year will be achieved. The goals of interdisciplinary and international coordination should include interagency coordination.

International Geosphere Biosphere Program. The International Geosphere Biosphere Program (IGBP) recently described by the National Academy of Sciences, offers the opportunity to develop a higher level of cooperation between traditional scientific disciplines, between Federal Agencies having appropriate research mandates, and between other participating countries. Although based in concept on the International Geophysical Year, the IGBP recognized the need to extend the scope of effort to include Sun-Earth interactions as well as interrelationships between the lithosphere, biosphere, and atmosphere. IGBP will build on existing cooperative efforts such as the Middle Atmosphere Program, the Global Environmental Monitoring System, and World Climate Research Program, and many others to strengthen existing observation and monitoring systems.

For example, a coordinated observation and monitoring system would ensure that participants strive for the optimum scientific return from each system component. This would promote complementary measurements and avoid duplication of efforts.

The Committee notes, however, that at this time, the IGBP lacks a sufficiently crisp focus to achieve the stature needed. A substantial input and commitment by the science community and involved Federal agencies is needed to achieve the degree of program definition desired if IGBP is to become a reality.

The Committee has examined NASA's research programs in Solid Earth Observations and Environmental Observations and concluded that these have the potential to make major contributions to IGBP. Missions such as the Upper Atmosphere Research Satellite and the anticipated International Solar Terrestrial Program could be the cornerstones to a successful IGBP. Resources spent by NASA in these areas might achieve greater results if coordinated within an overall international measurement and observation program.

The Committee urges NASA to support the IGBP in defining the scope and objectives and in developing future plans. The Committee anticipates that NASA will play a major role in evolving such future plans. NASA's active support of and participation in IGBP would go far toward meeting the Committee's desires for the study of Sun-Earth interactions described above. Over the next year, the IGBP will be defined in specific terms and its scientific goals will be formulated in preparation for its presentation to the International Council of Scientific Unions. The Committee looks with anticipation to the international acceptance of IGBP as a meaningful framework within which resources can be focused.

Global Resource Information System. The Committee has strongly encouraged the establishment of a global resources information system. The Committee considers such a system to be fundamental to the success of IGBP through facilitating information exchange. Data collected in both experimental and operational programs should be made available in a timely fashion and in a usable format to the scientific and technical community.

In the April 1981 Report on United States Civilian Space Policy, the Committee recommended that NASA develop a program plan for a Global Resource Information System (GRIS) utilizing an interactive network of relevant data bases. This sytem would be based on information needs of the world science community.

In February 1983, NASA responded with a plan outline which clearly emphasized computer hardware development rather than user needs or accessibility. In the FY 1984 Authorization Report, the Committee recommended an increased level of funding for the implementation of GRIS in the Space Applications Program in order to make clear that the focus should be on user-involvement applications rather than any new systems or hardware development.

Since this time, there has been little, if any, visible progress toward implementation of GRIS. The goal should be to assess user needs and to review existing data bases and information systems which may be better utilized. The scope should encompass not only systems and data bases developed by NASA, but also those of other relevant agencies. NASA should take the lead in developing such a system as a component of and support for IGBP.

Report. The Committee requests that, by May 1, 1985, NASA submit to Congress a report that reviews NASA's support and contributions to the IGBP, potential missions that can be coordinated through IGBP, and a data management plan that carries out the intent to improve accessibility to global resource information.

HIGH-SPEED AERONAUTICAL RESEARCH

The Committee finds that NASA's aeronautical research efforts are generally applied to flight disciplines and categories in a manner consistent with the potential for future benefits. A notable exception is the area of high-speed aeronautics.

In the next century, the distinction between aircraft and spacecraft will become far less obvious than it is today. For example, it is possible to foresee the development of "aerospacecraft" that can operate both in the atmosphere and in space. Also, requirements for faster military aircraft, cruise missiles and civil transports are likely to emerge.

To prepare the technology base for these possibilities, NASA must expand its research in high-speed propulsion, aerodynamics, materials, structures and systems analysis. To begin this effort, the Committee requests that NASA prepare and submit, by November 30, 1984, a long-range technical and budget plan for a focused research program in these areas.

ALTERNATIVE FUELS FOR GENERAL AVIATION

The price and availability of fuel continues to be a major barrier to the free expansion of general aviation. Since general aviation fuel represents less than one percent of the petroleum consumed in the United States, the production of general aviation fuels (80 grade avgas and 100 LL avgas) is the most severely impacted by fuel shortages. Forecasters now predict that one severe fuel disruption can be expected in the next five years, and that three such disruptions can be expected in any given ten-year period of time. Fuel shortages in the decade from 1972 to 1982 resulted in an increase in aviation fuel prices ranging from 600 to 1000 percent. Thus, fuel consumption has become an even more dominant factor in aviation economics.

The Committee has been particularly interested in the recent flight testing of a number of near-term alternative fuels for general aviation such as liquid methane, methanol, ethanol, gasohol, automobile gasoline and others. Independent test programs on many such alternative fuels have reached the point where their technical feasibility could be validated by research to determine the limits of detonation in high compression aircraft engines and the development of design parameters to permit the sound engineering of fuel supply systems for highly volatile fuel.

Therefore, the Committee requests that NASA prepare and submit to the Committee a technology readiness plan for alternative fuels for general aviation by December 31, 1984.

STRENGTHENING INSTITUTIONS EDUCATING THE UNDERREPRESENTED IN SCIENCE AND ENGINEERING

The FY 1983 Annual Performance Report submitted by NASA in response to President Reagan's Executive Order 12320 to strengthen Historically Black Colleges and Universities indicates significant effort by NASA to develop a very effective program. The Committee is encouraged by the response of NASA. Testimony received by the Committee in the course of the FY 1985 authorization process has clearly indicated, however, that other institutions serving significant numbers of black and other minority students have not evolved in the same way as have the historically black colleges. These other institutions tend to serve a diverse group of minorities and tend not to be the major research universities. In view of this finding, the Committee encourages NASA to look at those institutions of higher learning having significant minority enrollments in an effort to find ways to build closer relations with such schools, meet NASA's research objectives, and increase the number of individuals from underrepresented groups in the pool of graduate researchers. The Committee instructs NASA to develop a plan containing options by which it might build a closer relationship with institutions serving significant numbers of minorities while not diminishing its efforts toward the Historically Black Colleges and Universities. The Committee further instructs NASA to report this plan to the Committee not later than January 31, 1985.

SOLID ROCKET PROPULSION TECHNOLOGY R&D

During the past year, a number of events occurred which demonstrated that some elements of solid rocket propulsion technology are still more of an art than an exact science. These events include: failure of an Inertial Upper Stage (IUS) nozzle during its second flight; unusually high erosion rates, and near failure, of the solid rocket booster nozzles during the flight of STS–8; failure of the rocket motor nozzles on each Payload Assist Module (PAM) used recently to launch the WESTAR VI and PALAPA B–2 communications satellites; and similar problems with MX upper stages. These events underscore the broad scope of the technological difficulties being faced by the solid rocket propulsion industry which jeopardizes a multitude of national interests. The Committee urges NASA to take a leadership role in identifying the causes of and solutions to the persistent solid rocket propulsion problems that have occurred recently. This may require that the agency pursue research efforts in the areas of basic materials characteristics, design models, manufacturing processes, and inspection and testing techniques. As a part of its annual budget process, NASA should report to the Committee its progress on these problems until they are resolved.

INTERNATIONAL PARTICIPATION IN FINANCING OF ADDITIONAL ORBITERS

The Committee directs the Administrator to undertake an immediate study on the potential for international financial contributions toward the construction and operation of additional space shuttle orbiters. This study shall be completed and submitted to the Committees of the House of Representatives and the Senate with appropriate jurisdiction within 180 days of the enactment of this legislation and shall address the following:

The potential degree of financial support available from the international community;

Areas of appropriate international cooperation in the construction and operations of additional space shuttle orbiters; and,

Any other areas of NASA activities which could be supported, at least in part, through an international effort, thus making existing funding available for space shuttle orbiter procurement and operations.

EXPLANATION OF THE BILL

TITLE I

The bill authorizes Research and Development in section 101(a), Space Flight, Control and Data Communications in section 101(b), Construction of Facilities in section 101(c), and Research and Program Management in section 101(d). These activities are explained below:

RESEARCH AND DEVELOPMENT

SUMMARY

	Authorization fiscal year 1985	Page No.
1. Space transportation capability development	$346,400,000	37
2. Space station	150,000,000	48
3. Physics and astronomy	687,200,000	51
4. Life sciences	63,300,000	63
5. Planetary exploration	296,900,000	68
6. Space applications	384,100,000	76
7. Technology utilization	9,500,000	102
8. Aeronautical research and technology	347,400,000	105
9. Space research and technology	150,000,000	134
10. Tracking and data advanced systems	15,300,000	156
Total	2,450,100,000	

CONSTRUCTION OF FACILITIES

SUMMARY

Projects	Authorization fiscal year 1985	Page No.
1. Repairs to Test Stand 500 George C. Marshall Space Flight Center	$1,600,000	194
2. Space Shuttle Facilities, at various locations, as follows:		
A. Modification of Site Electrical Substation, Lyndon B. Johnson Space Center	3,200,000	195
B. Modifications for Single Engine Testing, National Space Technology Laboratories	3,000,000	195
C. Construction of Launch Complex 39 Logistics Facility, John F. Kennedy Space Center	10,000,000	196
D. Construction of Solid Rocket Booster Assembly and Refurbishment Facility, John F. Kennedy, Space Center	15,000,000	196
3. Space Shuttle Payload Facilities, at various locations, as follows:		
A. Construction of Additions to Cargo Hazardous Servicing Facility, John F. Kennedy Space Center	4,600,000	197
B. Construction of Biomedical Research Facility, Ames Research Center	2,100,000	198
4. Construction of Addition to the Network Control Center, Goddard Space Flight Center	2,200,000	198
5. Construction of Earth and Space Science Laboratory, Jet Propulsion Laboratory	12,200,000	199
6. Construction of Numerical Aerodynamic Simulation Facility, Ames Research Center	11,500,000	200

SUMMARY—Continued

Projects	Authorization fiscal year 1985	Page No.
7. Modifications to 8-Foot High Temperature Tunnel, Langley Research Center	13,800,000	200
8. Construction of 34-Meter Antenna Madrid, Spain (Jet Propulsion Laboratory)	6,000,000	202
9. Modifications of 64-Meter Antenna, DSS–63, Madrid, Spain (Jet Propulsion Laboratory)	7,800,000	202
10. Repairs of facilities at various locations, Not In Excess of $750,000 Per Project	20,000,000	203
11. Rehabilitation and Modification of Facilities at Various Locations, Not In Excess of $750,000 Per Project	20,000,000	204
12. Minor Construction of New Facilities and Additions to Existing Facilities at Various Locations, Not In Excess of $500,000 Per Project at Various Locations	5,000,000	205
13. Facility Planning and Design	12,000,000	206
Total, construction of facilities	150,000,000	

RESEARCH AND PROGRAM MANAGEMENT, $1,331,000,000

SUMMARY OF BUDGET PLAN BY FUNCTION

Personnel and related costs	$935,928,000
Travel	28,000,000
Operation of installation	367,072,000
Total	1,331,000,000

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 the many and varied contractor research and development tasks necessary to meet the Nation's ongoing objectives in aeronautical and space research. Objectives of the efforts funded by the Research and Program Management appropriation are to (1) provide the technical and management capability of the civil service staff needed to conduct the full range of programs for which NASA is responsible, (2) provide base maintenance of facilities and manage their use in support of research and development programs, and (3) provide effective and efficient technical and administrative support for the research and development programs. For 1985, an appropriation of $1,331,000,000 is requested.

PERSONNEL AND RELATED COSTS, $935,928,000

COMPENSATION AND BENEFITS

1. Compensation

a. Permanent positions.—This part of Personnel and Related Costs covers the salaries of the full-time permanent civil service workforce and is the largest part of this functional category.

b. Other than full-time permanent positions.—This category includes the salaries of NASA's non-permanent workforce. Programs such as students participating in cooperative training, summer employment, youth opportunity, and temporary clerical support are covered in this category.

c. Reimbursable detailees.—In accordance with existing agreements, NASA reimburses the parent Federal organization for the salaries and related costs of persons detailed to NASA.

d. Overtime and other compensation.—Overtime, holiday, post and night differential, and hazardous duty pay are included in this category. Also included are incentive awards for outstanding achievement and superior performance awards.

2. Benefits

In addition to compensation, NASA makes the employer's contribution to personnel benefits as authorized and required by law. These benefits include contributions to the Civil Service Retirement Fund, employees' life and health insurance, payments to the Medicare fund for permanent employees, and social security contributions for non-permanent personnel. Payments to the civil service retirement fund for re-employed annuitants and for severance pay to former employees involuntarily separated through no fault of their own are also included.

SUPPORTING COSTS

1. Transfer of personnel.—Relocation costs, such as the expenses of selling and buying a home, and the movement and storage of household goods are provided under this category.

2. Office of Personnel Management Services.—The Office of Personnel Management is reimbursed for certain activities such as security investigations on new hires, recruitment advertising, and career-maturity surveys.

3. Personnel training.—Training is provided within the framework of the Government Employees Training Act of 1958. Part of the training costs consists of courses offered by other Government agencies, and the remainder provides for training through non-government sources.

TRAVEL, $28,000,000

Program travel

The largest part of travel is for direction, coordination and management of program activities including international programs and activities. The complexity of the programs and the geographical distribution of NASA installations and contractors necessitate the need for this category of travel. As projects reach the flight

stage, support is required for prelaunch activities, including overseas travel to launch and tracking sites. The amount of travel required for flight projects is significant as it is directly related to the number of systems and subsystems, the number of design reviews, and the number and complexity of the launches and associated ground operations.

Scientific and technical development travel

Travel to scientific and technical meetings and seminars permits employees engaged in research and development to participate at both Government-sponsored and nongovernment-sponsored seminars. This participation allows personnel to benefit from exposure to technological advances which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates and provides for the dissemination of technical results to the U.S. community. Many of the Government-sponsored meetings are working panels convened to solve certain problems for the benefit of the Government.

Management and operations travel

Management and operations travel provides for the direction and coordination of general management matters and travel by officials to review the status of programs. It includes travel by functional managers in such areas as personnel, financial management and procurement. This category also includes the cost of travel in and around the Installations; travel of unpaid members of research advisory committees; and initial duty station, permanent change of assignment, and other family travel expenses. Payments to interagency motor pools are included in the Operation of Installation function (Management and Operations subfunction).

OPERATION OF INSTALLATION, $367,072,000

FISCAL YEAR 1985 BUDGET PLAN

Facilities services	$198,679,000
Technical services	57,765,000
Management and operations	110,628,000
Total	367,072,000

Operation of Installation provides a broad range of services, supplies, and equipment in support of the centers' institutional activities. These are divided into three major subfunctional areas: Facilities Services (the cost of renting real property, maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities); Technical Services (the cost of automatic data processing for management activities, and the cost of educational and information programs and technical shops supporting institutional activities), and Management and Operations (the cost of administrative communications, printing, transportation, medical, supply, and related services). A description of each major subfunction follows:

Facilities Services

1. Rental of real property.—Rental of real property includes the rental of building space directly by NASA or through the General Services Administration to meet offsite office, warehousing, and other requirements which cannot otherwise be provided in existing buildings at the NASA Installation. Most of the funding is required for rental of the NASA Headquarters complex of buildings in the District of Columbia, and nearby Maryland and Virginia that are either Government-owned or leased for which NASA must provide rental payments to the General Services Administration in accordance with P.L. 92-313. Also included in this item is rental of trailers required to accommodate special short-term needs.

2. Maintenance and related activities.—Maintenance and related activities include the recurring day-to-day maintenance of facilities (ground, buildings, structures, etc.) and equipment which is accomplished by non-Civil Service personnel. This involves the mowing and care of grassy areas, care of trees and shrubs, elevators, cranes, pressure vessel inspections, painting and protective coatings, general buildings maintenance, and the maintenance of installed mechanical, electrical, and other systems. In addition, this item includes feasibility studies, project design, construction supervision, inspection, and other institutional facility engineering functions. Included also are any applicable costs associated with recurring facility work as well as materials, hardware, and equipment used in facility maintenance activities, whether accomplished by civil service personnel or contractors. In the cost of equipment, related maintenance and other services are reflected for office, shop, laboratory and other facilities equipment as well as administrative internal communications and television monitoring equipment.

3. Custodial services.—Custodial services include janitorial and building cleaning services, pest control, fire protection services, security services including badging and identification, lock and safe repair, trash and refuse handling, window blinds and light fixture cleaning, and laundry and dry cleaning of facility related items.

4. Utilities services.—Utilities services include the purchase of utilities such as electricity, natural gas, fuel oil, coal, steam, propane, and other fuel commodities as well as water and sewage treatment services. Also included are the related maintenance and operating costs of the utility plants and systems.

Technical services

1. Automatic data processing

a. Equipment.—This category provides for the lease, purchase and maintenance of general purpose data processing equipment which supports institutional operations at each installation. Excluded is equipment dedicated to specific research or operational systems which is funded from the Research and Development appropriations.

b. Operations.—Operations services include programming, computer operations and related services for institutional applications including payroll, financial management, security, maintenance, personnel, logistics, and procurement records and reports.

2. Scientific and technical information and educational programs

a Libraries.—The technical libraries are established to provide installation staffs with books, periodicals, technical reports and other scientific documentation.

b. Education and information programs.—The educational and informational programs provide for the documentation and dissemination of information about the Agency's programs to the general public, the educational community at the elementary and secondary levels, and the mass communications media. Assistance to the mass communications media includes the assembly and exposition of newsworthy material in support of requests in the form of press kits, news releases, television and radio information tapes and clips, and feature material.

c. Shop and support services.—Shop and support services include general fabrication shops, reliability and quality assurance activities, safety, photographic services, graphics, and audio-visual material.

Management and operations

1. Administration communications.—Included in this category are costs of leased lines not dedicated to a specific program or project, long distance tolls (including FTS charges), teletype services, and local telephone service.

2. Printing and reproduction.—Included in this category are the costs for duplicationg, blueprinting, microfilming, and other photographic reproductions. Also included in this category are Government Printing Ofice printing costs, contractual printing and the related composition and binding operations.

3. Transportation.—Transportation services include the operation and maintenance of all general purpose motor vehicles used by both civil service and support contrator personnel. The cost of movement of supplies and equpment by commercial carriers and payments to interagency motor pools are also in this category.

4. Installation common services.—Installation common services include support activities at each installation such as: occupational medicine and environmental health; mail service; supply management; patent services; administrative equipment; office supplies and materials; and postage.

SECTIONAL ANALYSIS

OF H.R. 5154, 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

TITLE I

Section 101

Subsections (a), (b), (c) and (d) would authorize to be appropriated to the National Aeronautics and Space Administration funds, in the total amount of $7,531,400,000, as follows: (a) for "Research and development," a total of 10 program line items aggregating the sum of $2,450,100,000; (b) for "Space flight, control and data communications," a total of 3 line items aggregating the sum of $3,600,300,000; for (c) "Construction of facilities," a total of 17 line items aggregating the sum of $150,000,000; and (d) for "Research and program management," $1,331,000,000 of which, $1,000,000 is authorized for the National Commission on Space established pursuant to Title II of this Act. Subsection (d) would also authorize to be appropriated such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

The category "Space flight, control and data communications" is a new section which separates the operational aspects of the Space Transportation System and tracking and data from the research and development aspects. This category was used for the first time in the fiscal year 1984 Appropriation Act, Public Law 98-45.

Subsection 101(e) would authorize the use of appropriations for "Research and development" and "Space flight, control and data communications" without regard to the provisions of subsection 101(h) 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 purpose 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 insure that the United States will receive benefit therefrom adequate to justify the making of that grant.

In either case, no funds appropriated for "Research and development" and "Space flight, control and data communications" may be used for the construction of a facility in accordance with this

subsection, the estimated cost of which, including collateral equipment, exceeds $500,000, unless the Administrator notifies the Speaker of the House, the President of the Senate and the specified committees of the Congress of the nature, location, and estimated cost of such facility.

Subsection 101(f) would provide that, when so specified and to the extent provided in an appropriation act, (1) 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, and (2) contracts for maintenance and operation of facilities, and support services may be entered into under the "Research and program management" appropriation for periods not in excess of twelve months beginning at any time during the fiscal year.

Subsection 101(g) 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 101(h) 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. This section also provides that not in excess of $500,000 per project of "Research and development" and "Space flight, control and data communications" funds may be used for any of the above for unforeseen programmatic needs.

Section 102

Section 102 would authorize upward variations of the sums authorized for the "Construction of facilities" line items (other than facilities planning and design) of 10 percent at the discretion or the Administrator or his designee, or 25 percent following a report by the administrator or his designee to the Committee on Science 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 purpose 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" and subsection 101(c), paragraphs (1) thorugh (12).

Section 103

Section 103 would provide that not 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, and, when so transferred, together with $10,000,000 of the funds appropriated for "Construction of facilities," (other than the funds appropriated for facilities planning and design pursuant to paragraph (13) of Section 101(c)), shall be available for the construction of facilities and land acquisition at any location if the Administrator determines (1) that such action is necessary because of changes in the aeronautical and space program or new scientific or engineering developments, and (2) 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. However, no such funds may be obligated until 30 days have passed after the Administrator or his designee has transmitted to the Speaker of the House, the President of the Senate and the specified committees of Congress a written report containing a description of the project, its cost, and the reason why such project is in the national interest.

Section 104

Section 104 would provide that, 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 House Committee on Science and Technology or the Senate Committee on Commerce, Science and Transportation,

(2) no amount appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for this particular program by subsections 1(a), 1(b) and 1(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 afer the receipt by the Speaker of the House, the President of the Senate and each such committee of notice given by the Administrator or his 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 105

Section 105 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 and that the National Aeronautics and Space Administration should explore ways and means of distributing its research and development funds whenever feasible.

Section 106

This section would provide for the procurement of structural spares and the critical skills for installation of electrical, mechanical, and fluid systems thereby maintaining production readiness for a fifth orbiter vehicle.

Section 107

This section directs the National Aeronautics and Space Administration to continue and to enhance research and development activities in the area of space remote-sensing. The Administrator is specifically authorized and encouraged to conduct basic and applied

research on space remote-sensing, to develop space remote-sensing technologies and techniques, including those needed for monitoring the Earth and its environment, and to conduct such research and development in cooperation with other private and public research entities, including those of the Department of Commerce which are conducting and should continue to perform applications research in the area of space remote-sensing.

Section 108

Section 108 would express the intent of Congress that Government expenditures in supporting the development of prop fan technology be repaid by firms in the aircraft manufacturing industry when successful products employing that technology are produced by such firms. To this end, this section directs the Administrator to submit to Congress within 60 days of enactment, a plan for the payment to the Administration of royalities by firms in the aircraft industry with respect to any such products that are developed by them.

Section 109

Section 109(a) would amend section 102 of the National Aeronautics and Space Act of 1958, as amended, by adding a new subsection (c) that would required NASA to seek and facilitate the fullest commercial use of space. This provision encourages NASA to pursue aggressively all areas of space commercialization and to establish a focal point within the agency for space commercialization activities.

Section 109(b) would amend section 102(d)(1) of the National Aeronautics and Space Act of 1958, as amended (and as redesignated by section 109(a) of this Act), to establish as an objective of the United States aeronautics and space activities the expansion of knowledge of the Earth and of phenomena in the atmosphere and space. This section directs NASA to expand its attention and activities in Earth sciences.

Section 110

This section would amend the National Aeronautics and Space Act of 1958, as amended, by adding a new section 311 which would allow the Administrator of NASA to transfer title to personal property that has been on loan to an academic institution or nonprofit organization for at least two years. The Administrator would have to first certify that (1) the property is being used for a purpose consistent with the use intended when it was first loaned, and (2) NASA will no longer need that article.

TITLE II

Sec. 201 sets forth the purposes of Title II, to establish a National Commission on Space to assist the United States in defining long range goals for the civilian space program.

Sec. 202 sets forth the Congressional findings.

Sec. 203 would provide for the establishment of, within 90 days of enactment of this Act, a bipartisan National Commission on Space, to be composed of 14 Members selected by the President, the Administrator of NASA, and ex officio and advisory Members appointed pursuant to Sec. 203(b)(1) and (2). Members appointed are to be individuals who by reason of their background, education, training, or experience, will contribute to the articulation of a long range agenda for U.S. civilian space activity. The President will designate a Chairman and the Administrator of NASA will serve as Vice Chairman who will perform the Chairman's functions in the Chairman's absence.

Sec. 203(a)(2) would provide for payment to the Commission Members appointed by the President at an annual rate of basic pay under Sec. 5332 of Title 5, U.S. Code, for grade GS-18 of the General Schedule for each day, including travel time, during which the members are engaged in the performance of the Commission's work. Travel expenses would be provided on a per diem basis, pursuant to Sec. 5703 of Title 5, U.S. Code. Receipt of payment by Members of the Commission under this section does not confer status as officers or employees of the United States.

Sec. 203(b)(1) would provide for the appointment by the President of representatives from various departments and agencies to serve on the Commission in an ex-officio capacity.

Sec. 203(b)(2) would provide for the appointment of Congressional advisors to the Commission.

Sec. 203(b)(3) would provide that ex officio and advisory members appointed under this section shall be entitled to reimbursement for travel expenses incurred while in the performance of the duties of the Commission but would otherwise not be entitled to compensation.

Sec. 203(c) would provide for the appointment and compensation of personnel by the Commission. The Chairman would be responsible for the assignment of duties and supervision of personnel, and the use and expenditures of funds available to the Commission.

Sec. 203(d) would authorize, to the extent permitted by law, the Commission to secure information from Federal executive departments, agencies, or independent instrumentalities, which shall cooperate with the Commission by furnishing such information to the extent permitted by law and upon request of the Chairman.

Sec. 203(e) would authorize the Commission to hold public hearings, initiate surveys and undertake other appropriate activities in discharging its responsibilities under this Act.

Sec. 203(f) would provide for the termination of the Commission's activities 60 days following the submission of its plan required by Sec. 204(c) of this Act.

Sec. 204(a) sets forth the functions of the Commission, to formulate an agenda for U.S. civilian space activity identifying long range goals, opportunities, and policy options for civil space activity for the next twenty years. The section would provide for certain considerations to be taken into account by the Commission. Based on an analysis of the Commission's findings, the Commission would develop options and recommendations for a long range civilian space policy plan.

Sec. 204(b) would provide for the inclusion in the Commission's plan, to the extent appropriate, estimates of costs and time schedules, institutional requirements, and statutory modifications necessary to implement the Commission's recommendations.

Sec. 204(c) would provide for the submission of the Commission's long range plan to the President, the Senate and the House of Representatives, within one year following the Commission's establishment.

Sec. 205 would define commission as the National Commission on Space as provided in Sec. 203 of the Act.

Cost and Budget Data

The bill will authorize appropriations for fiscal year 1985 in the amount of $7,531,400,000. In accordance with the requirements of Rule XIII, Clause 7, of the rules of the House of Representatives, the Committee's estimate for the next five years of NASA budget request is as follows:

Fiscal year:	
1985	$7,531,400,000
1986	7,914,000,000
1987	8,337,000,000
1988	8,757,000,000
1989	9,172,000,000

These estimates do not include provisions for any new program or program augmentation that may be recommended nor do they include any provisions for administrative adjustments that may be required.

Effects of Legislation on Inflation

In accordance with Rule XI, Clause 2(1)(4) of the Rules 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 85 percent of spending directly for jobs and the remainder for materials. NASA employs about 22,000 civil servants and supports about 109,000 contractor employees, plus about 4,300 support services contractors. Assuming a multiplier effect of 2.5, the total, short-run employment effect on the United States' economy is about 336,000 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, although there could be some specific cases of industry and regional employment and price changes influenced by NASA expenditures.

The most significant economic effects of NASA spending are long-run productivity advances from new technologies developed for the space and aeronautics programs. Many NASA sponsored advances in air and space and 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. These expanded business opportunities have and are expected to continue to stimulate more productive, non-inflationary private sector economic growth and job creation.

Although it is difficult to assess the results of the various macroeconomic studies of the effects of NASA spending GNP, it is apparent from analyses done by the Midwest Research Institute,

Mathematica, Inc., and others, that NASA high technology R&D expenditures have returned more to the economy in substantial and long-lasting productivity gains than has been spent. Since these gains are through spinoff commercial advances, they are "extra" returns above and beyond the primary goal of NASA programs: the successful completion of the various R&D mission assignments to meet public sector needs. Therefore, any gains which show positive economic returns in the long-run indicate a non-inflationary, significant return to the citizens of the United States.

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 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:

Oversight Findings and Recommendations

Pursuant to Rule XI, clause 2(1)(3)(A), and under the authority of Rule X, clause 2(b)(1) clause (3)(f), of the Rules of the House of Representatives no findings and recommendations are under consideration by the Committee on Science and Technology for inclusion in the legislative report to accompany H.R. 5154.

Congressional Budget Act Information

The bill provides for new authorization rather than new budget authority and consequently the provisions of section 308(a) of the Congressional Budget Act of 1974 are not applicable. No authorization for State or local financial assistance is included in the bill.

Congressional Budget Office—Cost Estimate

1. Bill number: H.R. 5154.
2. Bill title: The National Aeronautics and Space Administration Act of 1985.
3. Bill status: As ordered reported by the House Committee on Science and Technology, March 20, 1984.
4. Bill purpose: The bill authorizes the appropriation of $7,530 million for the National Aeronautics and Space Administration for fiscal year 1985 and establishes a National Commission on Space. The authorization includes $2,820 million for the production and operations of the space shuttle, $150 million for development of a space station, $2,300 million for other research and development activities, and $781 million for the space tracking system. The bill also includes $150 million for construction of facilities and $1,330 million for research and program management. Also authorized are such sums as may be necessary for increases in employee benefits as authorized by law. The amounts authorized are $39 million above the President's 1985 budget request for NASA and approximately $333 million above the 1984 appropriations for NASA.

As established in this bill, the National Commission on Space would formulate a long range plan for the civilian space program

and submit the plan to the President and the Congress within twelve months of being established. The commission would be composed of 15 members appointed by the President and representatives of various government agencies. The bill authorizes $1 million for the activities of the commission. The authorization for the commission ends 60 days after the report is submitted.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1985	1986	1987	1988	1989
Estimated Authorization Levels:					
Function 250—Civilian Space	6,844				
Function 400—Aeronautics	687				
Function 920—Pay Raises	33				
Total	7,564				
Estimated Outlays:					
Functions 250—Civilian Space	5,078	1,490	258	17	1
Functions 400—Aeronautics	448	185	47	4	3
Functions 920—Pay Raises	31	2			
Total	5,557	1,677	305	21	4

Basis of Estimate: The authorization levels are the amounts specified in the bill, plus an estimated $33 million for pay increases in fiscal year 1985 as authorized by the bill. The estimate of outlays assumes that all funds authorized will be appropriated prior to the beginning of fiscal year 1985 and that spending will reflect historical patterns.

6. Estimated cost of State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

Oversight Findings and Recommendations, Committee on Government Operations

No findings or recommendations on oversight activity pursuant to clause 2(b)(2), rule X, and clause 2(1)(3)(D), rule XI, of the Rules of the House of Representatives have been submitted by the Committee on Government Operations for inclusion in this report.

Committee Recommendations

A quorum being present, the Committee approved the bill by a roll call vote (31-7).

NASA Recommendations

This is a National Aeronautics and Space Administration legislation item approved with the exceptions noted in this report by the Office of Management and Budget, as indicated by the following letters:

Hon. Thomas P. O'Neill, Jr.,
Speaker of the House of Representatives,
Washington, D.C.

Dear Mr. Speaker: Submitted herewith is a draft of 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," 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 by the President in the Budget of the United States Government for fiscal year 1985. For that fiscal year, the bill would authorize appropriations totaling $7,491,400,000, to be made to the National Aeronautics and Space Administration as follows:

(1) for "Research and development," amounts totaling $2,400,100,000;

(2) for "Space flight, control and data communications," amounts totaling $3,600,300,000;

(3) for "Construction of facilities," amounts totaling $160,000,00; and

(4) for "Research and program management," $1,331,000,000.

In addition, the bill would authorize such sums as may be necessary for fiscal year 1986, i.e., to be available October 1, 1985.

The enclosed draft bill follows generally the format of the National Aeronautics and Space Administrative Authorization Act, 1984 (P.L. 98-52). However, the bill differs in substance from the prior Act in several respects.

First, subsections 1(a), 1(b), 1(c), and 1(d), the authorizations for the four NASA appropriation accounts, differ in the dollar amounts and in some of the line items for which authorization to appropriate is requested.

Section 1(b) "Space flight, control and data communications," is a new category for space transportation operations which at first used in the FY 1984 HUD-Independent Agencies Appropriation Act, (P.L. 98-45).

Second, in sections 1(c), (e), and (h), the limitations on minor facility project funding limits have been raised to account for inflation over the past ten years.

Third, in addition to providing authorization of appropriations in the amounts recommended by the President in his Budget for fiscal year 1985, the bill also would provide authorization for such sums as may be necessary for fiscal year 1986. It is specified that all of the limitations and other provisions of the bill applicable to amounts appropriated pursuant to section 1 shall apply in the same manner to amounts appropriated pursuant to section 6.

Fourth, section 7 is a new section which would amend the National Aeronautics and Space Act of 1958 to allow the Administrator of NASA to give title to personal property loaned by NASA to academic institutions or nonprofit organizations, once NASA is sure that it no longer needs that property.

Finally, the last section of the draft bill, section 8, has been changed to provide that the bill, upon enactment, may be cited as the "National Aeronautics and Space Administration Authorization Act, 1985," rather than "1984."

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 Committee on Science and Technology, as appropriate.

The National Aeronautics and Space Administration recommends that the enclosed draft bill be enacted. The Office of Management and Budget has advised that such enactment would be in accord with the program of the President.

Sincerely,

JAMES M. BEGGS, *Administrator.*

MINORITY VIEWS

NASA FY 1985 AUTHORIZATION BILL

The House Committee on Science and Technology has traditionally been a strong supporter of space programs. The committee has been pleased with the unparalleled success of the U.S. civilian space program. Recent achievements by NASA have continued this history. The space shuttle has captured the imagination of the American people. The NASA budget request for Fiscal Year 1985 will not only continue support of these programs, but allows for some spectacular new initiatives, such as the space station, the Mars Geoscience Climatology Orbiter, and the Upper Atmospheric Research Satellite. We hope to continue funding support of these programs.

However, the federal government is faced with a $200 billion deficit for fiscal year 1985. Everything added over the request level will increase this deficit even more. It should be noted that the Republican members of the subcommittees offered to accept any responsible suggestions on how to keep the budget at the President's request level while reordering priorities within this total. This approach was not accepted by the majority. Since the NASA authorization bill for FY 1985 is $40 million over the request level, we cannot support this proposed budget.

LARRY WINN, Jr.
BOB WALKER.
JOE SKEEN.
ALFRED MCCANDLESS
HERBERT H. BATEMAN.
JUDD GREGG.
CLAUDINE SCHNEIDER.
F. JAMES SENSENBRENNER, Jr.

Calendar No. 882

98TH CONGRESS, 2d Session | SENATE | REPORT 98-455

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT

MAY 17 (legislative day MAY 14), 1982.—Ordered to be printed

Mr. PACKWOOD, from the Committee on Commerce, Science, and Transportation, submitted the following

REPORT

[To accompany H.R. 5154]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (H.R. 5154) 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 this bill is to authorize appropriations to the National Aeronautics and Space Administration (NASA) totaling $7,582,400,000 for fiscal year 1985 as follows:

	Budget request	Committee authorization
Fiscal year 1985:		
Research and development	$2,400,100	$2,516,100
Space flight, control, and data communications	3,600,300	3,585,300
Construction of facilities	160,000	150,000
Research and program management	1,331,000	1,331,000

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COMMITTEE ADJUSTMENTS TO NASA REQUEST FOR FISCAL YEAR 1985—SUMMARY

Fiscal year 1985	Administration request	Committee authorization
Research and development:		
Space transportation systems	$361,400,000	$356,400,000
Space station	150,000,000	150,000,000
Physics and astronomy	677,200,000	705,200,000
Life sciences	63,300,000	63,300,000
Planetary exploration	286,900,000	296,900,000
Space applications	344,100,000	407,100,000
Technology utilization	9,500,000	9,500,000
Space commercialization		5,000,000
Aeronautical research and technology	342,400,000	357,400,000
Space research and technology	150,000,000	150,000,000
Space tracking and data systems	15,300,000	15,300,000
Total	2,400,100,000	2,516,100,000
Space Flight, Control and Data Communications:		
Space Shuttle production and operational capability	1,465,600,000	1,470,600,000
Space transportation operations	1,339,000,000	1,319,000,000
Space tracking and data acquisition	795,700,000	795,700,000
Total	3,600,300,000	3,585,300,000
Construction of facilities	160,000,000	150,000,000
Research and program management	1,331,000,000	1,331,000,000
Grand total	7,491,400,000	7,582,400,000

LEGISLATIVE HISTORY

On February 1, 1984, the fiscal year 1985 budget request for the National Aeronautics and Space Administration (NASA) was submitted to Congress. The Committee considered the budget request in hearings on February 28, March 1, 8, and 29. Testimony was received from the NASA Administrator and Deputy Administrator and from representatives of the Department of Defense, the aerospace industry, the space science and applications communities, and other outside witnesses. On May 1, 1984, Senator Gorton, along with Senators Packwood, Hollings, Heflin, and Lautenberg, introduced the National Aeronautics and Space Administration Authorization Act of 1985, S. 2612, which was referred to the Committee on Commerce, Science, and Transportation.

On May 8, 1984, the Committee considered S. 2612. Senator Gorton offered an amendment to S. 2612 that specified that the 1987 flight test of the advanced turboprop aeronautical propeller design should test either the single rotation or the counter rotation design. The amendment passed without objection. Since the House NASA authorization (H.R. 5154) had already been referred to the Committee, the Committee offered S. 2612, as amended, as an amendment in the nature of a substitute to H.R. 5154. The Committee then ordered H.R. 5154 to be reported.

SUMMARY OF MAJOR PROVISIONS

For fiscal year 1985, the Committee's NASA authorization bill authorizes $7,582,400,000, of which $2,516,100,000 is for research and development; $3,585,300,000 is for space flight, control, and

data communications; $150 million is for construction of facilities; and $1,331 million is for research and program management.

The space transportation systems (STS) budget of $356,400,000, compared to $431,700,000 in fiscal year 1984, provides for continued development of Spacelab hardware and for three Spacelab operational flights. Also included in fiscal year 1985 STS funding are development and operations activities for upper stages and for continued design and development of the hardware for the U.S./Italian tethered satellite system.

The Committee has provided the full $150 million requested by the administration for extended definition and design studies for a permanently manned space station to be operational within a decade.

The budget for the space sciences programs in fiscal year 1985 is $1,065,400,000, compared to $843 million in fiscal year 1984. This increase is comprised largely of additions to research and analysis programs in physics and astronomy and in planetary exploration and for Shuttle/Spacelab payload development activities in physics and astronomy. Planetary exploration funding provides for a new planetary mission, the Mars geoscience/climatology orbiter, and for continued planning and development of the planetary missions to Venus and Jupiter.

The space applications funding for fiscal year 1985 is $407,100,000, compared to a fiscal year 1984 operating level of $291 million. Within environmental observations, there are two new initiatives, the upper atmosphere research satellite and the Scatterometer sensor for the Navy remote ocean sensing system. Space applications funding also provides for an increase in microgravity research activities and for a flight test program to develop the advanced communications satellite technology (ACTS).

The Committee has authorized $5 million for a new initiative, space commercialization, as a means of encouraging government/industry partnerships in commercial space activities.

The Committee authorized $357,400,000 for aeronautical research and technology, compared to $302,300,000 in fiscal year 1984. The increase of $55,100,000 in Aeronautical Research and Technology is comprised of a $37,600,000 increase in systems technology and a $17,500,000 increase in research and technology base.

$150 million is authorized for space research and technology, a $13 million increase above the fiscal year 1984 level.

Tracking and data acquisition advanced systems for fiscal year 1985 is $15,300,000, up from the fiscal year 1984 level of $14,200,000.

The total research and development budget for the above-mentioned programs for fiscal year 1985 is $2,516,100,000 compared to the fiscal year 1984 funding level of $2,028,200,000.

Within the space flight, control, and data communications budget of $3,585,300,000, the Space Shuttle production and operational capability program is funded at a level of $1,470,600,000. This funding level enables NASA to complete the production of the fourth Space Shuttle orbiter, Atlantis, and to maintain the production readiness for a fifth orbiter, a position the Committee has supported in the past. Also included within Space Shuttle production and operational capability is funding for production of the main engines and critical orbiter spares.

Shuttle operations activities within space flight, control, and Data Communications are funded at a level of $1,319 million. This funding provides for the procurement of the external tanks, the solid rocket motors and boosters hardware, flight operations and launch and landing activities.

Finally, within space flight, control, and data communications, $795,700,000 is made available for space and ground networks, communications, and data systems activities at a level of $795,700,000, most of which finances the tracking and data relay satellite system (TDRSS).

The Committee recommendation for construction of facilities for fiscal year 1985 is $150 million, $5,500,000 less than the fiscal year 1984 level. The Committee recommendation for research and program management, is $1,331 million, compared to $1,258,500,000 in fiscal year 1984.

S. 2612 includes language prohibiting the use of the space station to carry or deploy nuclear weapons or any other weapons of mass destruction.

The bill also directs NASA to finalize and enter into, as expeditiously as possible, a contract to develop the advanced communications technology satellite (ACTS), which is authorized in this bill under research and development. Further, according to this provision, NASA is to enter into this contract only with the entity with which it had been negotiating prior to the passage of this bill.

Title II of the bill instructs the President to establish a National Commission on Space in order to make a comprehensive investigation of existing and proposed space activities in the United States and to make recommendations for a long-term space policy.

The Commission shall consist of 23 members appointed by the President, including 4 ex officio members and 4 advisory members. The four ex officio members will be Federal employees involved in space activities and the four advisory members will be from among the membership of the Congress—two each from the Senate and the House of Representatives.

The Commission would report its findings and recommendations to the President within 1 year following its establishment and would cease to exist within 60 days after the submission of its report.

One million dollars from within available funds would be authorized for the Commission's activities in fiscal year 1985.

RESEARCH AND DEVELOPMENT—$2,516,100,000

Space Transportation Capability Development—$356,400,000

The Committee has authorized $356,400,000 for fiscal year 1985 for space transportation capability development, $5 million less than the administration's request, as follows:

Summary of funding levels, fiscal year 1985

Spacelab	$69,300,000
Upper stages	92,400,000
Engineering and technical base	105,700,000

Payload operations and support equipment	56,300,000
Advanced programs	14,500,000
Tethered satellite system	18,200,000
Total	356,400,000

The principal areas of activity in space transportation capability development are efforts related to the Spacelab, the upper stages that place satellites in high altitude orbits, the engineering and technical base support at NASA centers, payload operations and support equipment, advanced programs study and evaluation efforts, and the development and first flight of the U.S./Italian tethered satellite system.

The Spacelab is a major element of the STS and provides a versatile, reusable laboratory which will be flown to and from Earth orbit in the Shuttle orbiter cargo bay. The program is being carried out jointly by NASA and the European Space Agency (ESA). NASA's support of the Spacelab development effort includes ancillary flight and ground hardware and system integration activation efforts which assure Spacelab compatibility with the experiments and orbiter, leading to an operational capability.

The upper stages project includes the effort necessary to provide upper stages for use with the Space Shuttle to place payloads in orbits and trajectories beyond the capability of the Shuttle alone, primarily for planetary and geosynchronous missions. Current developments include the two-stage inertial upper stage and the modification of the Centaur/STS for use with the Shuttle. In addition, a new upper stage, the transfer orbital stage, is being planned for use in launching the Mars geoscience/climatology orbiter (MGCO) in 1990.

The engineering and technical base provides the core capability for the engineering, scientific and technical support required at the Johnson Space Center (JSC), the Kennedy Space Center (KSC), the Marshall Space Flight Center (MSFC), the White Sands Test Facility (WSTF), and the National Space Technology Laboratories (NSTL) for space transportation systems research and development activities.

In fiscal year 1985 and subsequent years, computational capability is included to provide for complex flow dynamics modeling and other analyses in support of MSFC programs.

Payload operations and support equipment provides for developing and placing into operational status the ground and flight systems necessary to support the space transportation system payloads during prelaunch processing, on-orbit mission operations, and, when appropriate, post-landing processing.

The advanced programs effort identifies potential future space programs and provides technical as well as programmatic data for their definition and evaluation. In support of this effort, advanced development activities are conducted to provide a basis for obtaining significant performance and reliability improvements and reducing future program risks and development costs through the effective use of new technology.

The tethered satellite system (TSS) will provide a new capability for conducting space experiments in regions remote from the Shuttle orbiter. The objectives of the initial TSS mission scheduled for late 1987, are twofold: (1) to verify the controlled deployment, operation, and retrieval of the tethered satellite, and (2) to quantify the interaction between the satellite/tether and space plasma in the presence of a current drawn through the tether.

The initial Spacelab mission was launched on November 28, 1983, and was completely successful. During 1983 the prelaunch integration and checkout, launch and mission, and post launch deintegration were successfully accomplished. Evaluation of mission data has begun. Staging activities for Spacelab-2 (SL-2), Spacelab-3 (SL-3), OSTA-3, and SL-D1 were started this year.

In upper stages, a joint development program between NASA and DOD, was initiated in fiscal year 1983 for the use of the Centaur as an STS upper stage. The common vehicle, designated Centaur-G, accommodates a 40-foot long, approximately 10,000-pound payload in the orbiter vehicle bay and is capable of placing it into geosynchronous orbit. A longer version if the Centaur-G, known as G', is being developed by NASA for launch of the Galileo and International Solar Polar Mission (ISPM) spacecraft in mid-1986. Procurement will be initiated in fiscal year 1985 for two G vehicles to support the Venus radar mapper mission (VRM) in 1988 and the TDRS-E mission.

The inertial upper stage (IUS) is undergoing tests and evaluation following a failure of the IUS on STS-6 in April, 1983, during a maneuver to deploy the tracking and data relay satellite (TDRS)-A. After the TDRS had been successfully deployed from the Shuttle, a failure occurred while the IUS was attempting to propel TDRS into geosynchronous orbit. The TDRS/IUS combination began tumbling out of control. Engineers succeeded in separating the two and in stabilizing TDRS; however, the spacecraft remained in an elliptical orbit. Fifty-eight days later, the spacecraft was maneuvered into a proper orbit, where it is now operational.

Due to these tests and evaluations, the Air Force has had to postpone two of its Shuttle/IUS missions that were originally scheduled for November, 1983, and July, 1984. NASA has had to postpone its launch of TDRS-B and -C until at least 1985.

NASA is currently scheduled to use the IUS on its first four TDRS missions.

The payload assist module (PAM) program is to provide low-cost transportation, principally for commercial spacecraft, from the Shuttle's low Earth orbit. The Delta class PAM-D is capable of injecting up to 2,750-pound payloads into geosynchronous transfer orbit. PAM-DII is being developed commercially and will be capable of placing a 4,100-pound payload into geosynchronous transfer orbit and will be available for launch by mid-1985. The Atlas-Centaur class (PAM-A) well be capable of inserting 4,400-pound payloads into the same orbit and will be system qualified by mid-1984. Eleven PAM-D's have been successfully launched atop the Delta expendable launch vehicle and five more were successfully flown on STS-5, STS-7, and STS-8. However, on STS-10 in February, 1984, on two successive days, two communication satellites were boosted into incorrect orbits by a PAM-D. After each of the two communications satellites had been properly ejected from the cargo bay, the PAM-D perigee motor failed to burn for the requisite time, due to a presumed defect in the carbon/carbon engine nozzle.

Failure analysis of the two PAM-D mishaps is currently underway in NASA.

The transfer orbital stage (TOS) is a three-axis stabilized perigee stage that is being commercially developed by the Orbital Science Corp. (OCS) for use in the Shuttle. It will have the capability of placing 6,000 to 13,0.00 pounds into geosynchronous transfer orbit and thus bridge the gap between PAM-DII and Centaur. The scheduled lunch availability is late-1987. A TOS is planned to be used to launch the Mars geoscience/climatology orbiter. NASA is monitoring the development of the TOS prior to acquiring flight hardware for the MGCO mission.

In payload operations and support equipment, payload integration support and payload-related hardware are developed and furnished for NASA payloads. A key achievement this year was the retrieval/repair mission of the solar maximum mission spacecraft which was undertaken with funding supplied by both NASA and the Department of Defense (DOD). Multi-mission payload equipment being developed includes a payload bay bridge structure to carry small payloads, apparatus for providing cooling of the heat generated in the orbiter bay by the radioisotope thermal generators (RTG's) used for planetary missions, and a standard mission cable wire harness for mixed cargos.

The advanced programs effort, in addition to specific space station activities involving studies of station assembly and hardware commonality, will be focused on five major areas—satellite services, unmanned platforms, advanced transportation systems, crew systems, and generic space systems capabilities. Satellite servicing systems will continue definition and advanced development work in remote and proximity operations. Continued efforts will be made in the areas of platform systems and servicing and advanced tether applications. Advanced transportation concepts will be studied including orbital transfer vehicles (OTV's), propellant management, advanced launch vehicles, and advanced STS analytical tools. Systems supporting human presence in space as well as generic work in space structures, orbital debris management and retrieval, and advanced avionics will be investigated.

The tethered satellite system (TSS) hardware development will begin in fiscal year 1984. An announcement of opportunity was issued on April 15, 1984 and, if the schedule progresses as planned, selections of the first three flights will be made by October 1984. The Italians will also initiate hardware development in fiscal year 1984 leading to a cooperative first flight in December 1987.

Committee comment

Acknowledging that neither the inertial upper stage (IUS) nor the PAM-D upper stage were developed by NASA, the Committee regrets the impact that the anomalies associated with the IUS and the PAM-D upper stages failures in April, 1983 and February, 1984 respectively, have had and may continue to have on the Shuttle delivery schedule and on NASA's communications capabilities.

At this time, it is unclear to what extent these upper stage anomalies may represent a serious national problem for our space transportation system (STS). While the Committee is satisfied with the attempts to date to resolve the problems associated with the anomalies, the Committee would also urge NASA to assume the responsibility of reexamining our national upper stage technologies and capabilities to determine if the current mix of upper stages is adequate to support the needs of NASA's civilian and DOD customers. This reevaluation should also take into consideration the upper stages that are presently being designed and developed for future use. The Committee expects to be kept informed on a timely basis of the findings and conclusions of this reexamination.

Furthermore, the Committee expects that the funds provided within space transportation capability development for upper stages may be used for alternative upper stage technologies where deemed appropriate. Given the uncertainties that exist in our present upper stage technologies, the Committee does not want to preclude any potential design or configuration from consideration in fulfilling our STS upper stage requirements.

In the past, the Committee has supported the development of an orbital maneuvering vehicle (OMV) for the unique capabilities it will provide to our baseline STS orbital operations. The Committee awaits the award of the three contracts for definition studies for an OMV and emphasizes its interest in the OMV as an important adjunct to our Space Shuttle operations and to the development and operations of a space station.

Because certain STS missions, such as the Space Telescope launch, the tracking and data relay satellite (TDRSS) B and C launches, and other payload missions have been delayed from their originally scheduled launch dates, the Committee has recommended a funding decrease of $5 million from the administration's budget request for payload operations and support equipment. The Committee believes that the resulting authorization of $56,300,000 will adequately support the agency's STS payload operations during 1985.

Space Station—$150,000,000

The Committee has authorized $150 million for fiscal year 1985 as follows:

Summary of funding levels, fiscal year 1985

Utilization requirement	$14,100,000
Supporting studies from program support	12,200,000
Focused technology	34,200,000
Advanced development	20,200,000
Flight experiments	11,000,000
Systems definition/integration	58,300,000
Total	150,000,000

The U.S. space station will establish a permanent human presence in space to expand the exploration and use of space for activities which enhance the welfare and security of mankind. The program is built upon the operational capabilities of the Space Shuttle and represents the next logical step in U.S. space capability development. The program is responsive to the basic goals of the President's National Space Policy which calls for U.S. leadership in space and economic and scientific benefits through the exploration of space. The station, once operational, may also provide a staging base for succeeding major national steps in space such as manned

missions to the Moon or planets, or unmanned scientific probes and sample returns.

The U.S. space will be a multipurpose facility providing a permanent human presense in space to conduct essential scientific and technical research, to perform unique commercial activities, and to perform more efficiently operational tasks in space, such as satellite servicing construction and servicing of platforms, and placement of spacecraft into higher orbits. The space station will have both manned and unmanned elements and will involve extensive national and international user community participation in such areas as science, applications, manufacturing, communications, satellite servicing, and, potentially, in national security. From the outset of the program definition effort, the space station itself will incorporate a modular design philosophy which will permit the system to evolve through time, to provide greater user utility through simplified user interfaces and improved capability for on-orbit crew maintenance and operational autonomy in order to achieve effective long-term performance. Implicit in these objectives is the recognized need to optimize the synergistic effects of the man/machine combination in space via automation, robotics, and artificial intelligence technolgy. It will provide essential system elements and operation practices for an integrated national space capability. The space station facility (core and associated platforms) will be placed and maintained in low-Earth orbit by the space transportation system.

A basic premise of the space station program is to perform a thoroughly detailed front-end definition including: Engineering design by industrial contractors; subsystem advance development and tests in dedicated test beds; early flight experiments on the Space Shuttle to prove system feasibility; and continued trade studies for system optimization. Extensive engineering definition incorporated directly into hardware specifications provides the greatest single assurance of program success and the achievement of cost targets. Throughout the definition period, significant effort will be focused on growth potential and modular configurations to insure that the initial station will be capable of evolutionary growth in both size and technology. Following an extensive definition program, consisting of both in-house and contracted activities, development will begin in fiscal year 1987 with orbital activities beginning in the early 1990's.

BASIS OF FISCAL YEAR ESTIMATE

Utilization requirements.—This activity develops function and user operational requirements based on both national and international missions. These requirements specify customer needs in terms of power, volume, services, heat communications, et cetera. The objective of gathering this data now is to insure that the space station and supporting ground systems are "user friendly."

Supporting studies and program support.—Analysis of space station architecture and preliminary system and subsystem requirements are driven by and complement the ongoing and in-house trade study efforts in such operations as: Auxiliary propulsion, maintainability of the system, and thermal control systems definition. Studies will be performed to define the space station requirements of elements in assembling the space station as well as servicing satellites and the necessary operations associated with these tasks. Also, planned studies will determine the feasibility and the potential cost savings achievable from space station hardware commonality.

Focused technology.—This effort builds upon a generic technology base and focuses the technology development in those areas that will support space station development. The approach is to define requirements and timeliness for space station implementation, to develop options for space station application and to carry enhancing and enabling technologies into brassboard prototype programs, that is, advanced development.

Advanced development.—This program provides the "transfer" function between technology and system development. The approach is to select high leverage technologies from the focused technology program for brassboard/prototype demonstrations to evaluate technology alternatives, to quantity their respective performance and estimate their development risk from both cost and schedule standpoints. This test and demonstration activity will be conducted in test beds which will be developed along major subsystem disciplines. The initial technology test beds will be the following: environmental control/regenerative life support; electric power generations, storage, and distribution; thermal management; operating/data/management; attitude control; on-board propulsion; and space operations mechanisms.

Flight experiments.—The purpose of this activity is to use the unique space environment provided by the Space Shuttle to validate the performance of critical components and subsystems which cannot be validated in ground tests in order to verify and quantify calculated performance, to identify unforeseen anomalies, and to update engineering design criteria. It will also demonstrate techniques, sensors, tools, and procedures required for space station control, maintenance, and repair and servicing operations.

Systems definition/integration.—This effort provides for the analysis and engineering design to define the various elements that will make up the space station. Conceptually, these elements consist of various modules such as the habitability, logistics, resource and laboratory modules, and the various subsystems such as power, propulsion, data management, communications, and environmental control/life support systems. This effort will be divided into two to four work packages to be competed among industry with contracts to be awarded in fiscal year 1985.

Committee comment

Recognizing the unique capabilities and potential benefits that a permanently manned civilian space station could provide, the Committee welcomes the administration's proposal to develop a permanently manned space station within a decade. Furthermore, the Committee has had a forerunning involvement in the issue to develop a civilian space station. In November 1983, the Subcommittee on Science, Technology, and Space held a hearing on this issue, and in December, the Chairman of the Science Subcommittee, Senator Gorton, wrote a letter to the President advocating the development

of a permanently manned civilian space station, a position strongly endorsed by the subcommittee's ranking Democrat, Senator Heflin. In the eyes of the Committee, a space station would do much to:

1. Ensure U.S. civil leadership in space during the 1990's;
2. Stimulate the development of advanced aerospace technologies;
3. Develop fully the commercial potential of space;
4. Provide a versatile, efficient system for space science and applications;
5. Couple maturing international space programs to U.S. space systems, and provide a vehicle for international cooperation in space;
6. Enable man to function routinely and more efficiently in space, to build upon previous national investments, and to enable activities now not possible;
7. Increase prestige at home and abroad;
8. Stimulate interest in scientific and technical education;
9. Maintain continuity in and focus to the Nation's civilian space program; and
10. Provide options for future national endeavors.

As Mr. James Beggs, the administrator of NASA, testified at the Committee's hearing on February 28, 1984:

> The time for space is ripe. The agenda for tasks which can be undertaken and enhanced using the unique capabilities of the space station is full, and both the U.S. industry and the NASA institution are fully prepared to implement the President's initiative. The station is, I believe, the next logical step.

The Committee also believes that a space station is the next logical step and that such an initiative is well-timed, given the increasing operational capability and maturity of the Space Shuttle.

Furthermore, the Committee is convinced that a permanently manned space station is essential to maintaining the U.S. leadership in space exploration and exploitation. A space station, in the opinion of the Committee, would and could serve a varity of useful functions and purposes, including:

1. A permanent observatory to look down upon the Earth and out at the universe;
2. A transportation node where payloads and vehicles are stationed, processed, and propelled to their destinations;
3. A servicing facility were these payloads and vehicles are maintained and, if necessary, repaired;
4. An assembly facility where, due to ample time on orbit and the presence of appropriate equipment, large structures are put together and checked out;
5. A manufacturing facility where human intelligence and the servicing capability of the station combine to enhance commercial opportunities in space; and
6. A storage depot where payloads and parts are kept on orbit for subsequent deployment.

Perhaps even more important than any of these "perceived" uses of a space station are the "unperceived" uses and benefits that one cannot predict or even comprehend today. The space station is a bold step into the future, into the 21st century, and its represents a major evolutionary step in man's experimentation, use, and conquest of space.

In January of this year, the President in his State of the Union Address directed NASA to develop a permanently manned space station within a decade. This announcement by the President, as is the case with any bold new initiative, has stimulated much debate. However, from the onset, it should be clear that the concept of living and working in space is far from new. Authors wrote on the subject in the last century, and space station configurations have been studied in some depth. These concepts have ranged from elaborate configurations with artificial gravity and crews numbering several dozen to simple derivations of developed space hardware such as the Apollo command and service module. And, of course, let us not forget that just slightly more than 10 years ago, the United States orbited a precursor space station—Skylab—and that the Soviet space station that is currently in orbit—Salyut—is the seventh in a series of permanently manned Soviet space stations, the first of which was launched in 1971.

The latest space station proposal announced by President Reagan takes on added significance since it comes at a time when the Shuttle has gained increased operational capability and, therefore, NASA has enough flexibility in its budget to commerce another bold new initiative. If ever the time were ripe to develop a space station, now is the time. The required infrastructure is in place, the necessary transportation mode exists, and the degree of interest in commercial space activities by industry and foreign governments alike is at a peak.

Despite the great deal of interest in the space station proposal, the Committee is aware of the fact that there is not complete unanimity toward its development. In particular, the Committee is aware of the concerns of certain individuals within the science community. Mindful of their concerns, the Committee commends NASA for establishing the Task Force on Scientific Uses of the Space Station and urges NASA to support its space science and applications activities at a level that will permit accessible and affordable use of the space station. The Committee is aware of the concerns of the space science community during the development of the Space Shuttle and assures the community that the Committee will seek to maintain a steady level of growth in the space science and applications programs during the development of a space station. The Committee supports the assurance of "real growth" in the fiscal year 1986-89 NASA budget given by the administration and feels that this assurance makes it possible for the space science and applications programs to experience "real growth" during these years.

At the same time, the Committee feels that the recepitivity of the private sector and foreign governments to participate in the development of a manned space station should further reduce the budgetary pressures on the development of systems outside the "core" technology. The Committee, however, expects NASA to keep it well-informed as to any progress that is being made in this area and what the terms and conditions of any such financial agreements include.

The Committee is aware that it might be possible to carry out many of the early missions proposed for the space station on an unmanned basis. However, the Committee supports the contention that "it is man, not merely machines, in space that captures the imagination of the world." The Committee, therefore, supports the development of a permanently manned space station from the onset.

However, such a posture should not be interpreted to mean that the Committee supports the use of off-the-shelf technology or that the Committee does not support the development and inclusion of useful advanced automated systems in the space station. The Committee recalls that even prior to the creation of the Space Station Task Force in May 1982, a Space Station Technology Steering Committee (SSTSC) was established within NASA to assess the technologies relevant to a space station in the 1990 time frame. The SSTSC concluded that "the use of state-of-the-art technologies would result in a space station that would not have affordable growth potential and would not be cost effective for long-term life through on-orbit maintenance." The Committee, therefore, is most supportive of the automation study recently commenced by NASA and of the efforts of NASA to determine the appropriate mix of man and machine. The Committee supports the contention that while the space station will be permanently manned, it will not be able to operate in an optimally effective manner and it will not be able to fulfill the multiplicity of functions envisioned unless a plan is developed to optimally develop functions between man and automated elements.

From the beginning, the space station has been characterized as a facility that would be used only for peaceful purposes. In the "President's Plan for Space—A Partnership for Progress", the Administrator of NASA stated that the President's program "leaves no doubt that the United States means business in expanding our presence in space, not only for our own benefit, but for the benefit of peace-loving people around the world * * *" and that "the President's new international initiative will deepen our commitment to working with all nations to explore the peaceful uses of space." Furthermore, during the Committee's hearings, DOD stated that it had not yet identified any military requirements for military space station operations and that it had no desire to take any kind of preemptive rights on a civilian space station.

In light of this testimony and the administration's characterization of the space station as a facility to be used for peaceful purposes, the Committee feels it is appropriate to include language in the fiscal year 1985 NASA authorization that reaffirms the commitment of the United States to the peaceful use of space. Section 107 of S. 2612 and of H.R. 5154, as reported by the Senate Commerce Committee, therefore, restates Articles IV of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. While the language included in the Committee bill does not preclude DOD from conducting research and development activities on the space station, it would prohibit the installation of nuclear weapons of mass destruction on the space station.

In general, the Committee is most pleased with NASA's space station proposal. The Committee compliments NASA and especially the members of the Space Station Task Force for the focus and direction they have given to planning a space station. The Committee expects to be kept well-informed during the course of development of the space station as to any new developments in the program, the proposed schedule and budgetary requirements, the proposed timing and content of requests for proposals and contractual agreements, the result and consequences of NASA space station studies and evaluations, and the extent of foreign interest and involvement. To initiate the extended definition and design studies, the Committee authorizes $150 million in fiscal year 1985 for the space station, the full amount requested by the administration.

SPACE SCIENCES—$1,065,400,000

The Committee authorization for the space sciences—physics and astronomy, life sciences, planetary exploration—is $1,065,400,000, $38 million more than the fiscal year 1985 administration request.

PHYSICS AND ASTRONOMY—$705,200,000

The Committee recommends $705,200,000 for physics and astronomy, compared to the administration's request of $677,200,000. This $28 million increase is allocated between research and analysis ($14 million) and Shuttle/Spacelab payload development and mission management ($14 million).

Summary of funding levels, fiscal year 1985

Space Telescope development	$195,000,000
Gamma Ray Observatory development	120,200,000
Shuttle/Spacelab payload development and mission management	119,400,000
Explorer development	51,900,000
Mission operations and data analysis	109,100,000
Research and analysis	50,900,000
Suborbital programs	58,700,000
Total	705,200,000

The major objective of the physics and astronomy program is to increase our knowledge of the origin, evolution, structure and composition of the universe, including the Sun, the stars, and the other celestial bodies. Space-based research is being conducted to investigate the structure and dynamics of the Sun and its long- and short-term variations; cosmic ray, X-ray, ultraviolet, optical infrared, and radio emissions from stars, interstellar gas and dust, pulsars, neutron stars, quasars, black holes and other celestial sources; and the laws governing the interactions and processes occurring in the universe. Many of the pehnomena being investigated are not detectable from ground-based observatories because of the obscuring or distorting effects of the Earth's atmosphere.

To achieve the objectives of the physics and astronomy program, NASA employs theoretical and laboratory research; aircraft, balloon and sounding rocket flights; Shuttle/Spacelab flights; and free-flying spacecraft. Research teams involved in this program are located at universities, industrial laboratories, NASA field centers, and other Government laboratories. The scientific information ob-

tained and the technology developed in this program are made available to the scientific communities for the application to and the advancement of scientific knowledge, education and technology.

The physics and astronomy missions undertaken to date have been extraordinarily successful, and a number of missions continue to produce a rich harvest of scientific data—the International Ultraviolet Explorer (IUE) and the Solar Maximum Mission (SMM) are still operating and new scientific results are continually emerging from the analysis of the High Energy Astronomical Observatories (HEAO) and Infrared Astronomical Satellite (IRAS) data sets.

Space Telesope

The Space Telesope will make a major contribution to understanding the stars and galaxies, the nature and behavior of the gas and dust between them, and the broad question of the origin and scale of the universe. Operating in space above the atmospheric veil surrounding the Earth, the Space Telescope will increase by several hundredfold the volume of space accessible for observations. With its significant improvements in resolution and precision in light sensitivity and in wavelength coverage, the Space Telescope will permit scientists to conduct investigations that could never be carried out using ground-based observatories due to the obscuring and distorting effects of the Earth's atmosphere. The Space Telescope will enhance the ability of astronomers to study radiation in the visible and ultraviolet regions of the spectrum. It will be more sensitive than ground-based telescopes and will record greater detail about the objects under study. It will make possible observation of objects so remote than the light will have taken many billions of years to reach the Earth. As a result, we will be able to look far into the distant past or our universe. The Space Telescope will also contribute significantly to the study of the early state of stars and the formation of solar systems, as well as to the observation of such highly evolved objects as supernova remnants and white dwarfs stars. With the Space Telescope, we may be able to determine the nature of quasars and the processes by which they emit such enourmous amounts of energy, and it may also be possible to determine whether some nearby stars have planetary systems. The Space Telescope will be an automated observatory, delivered into orbit by the Space Shuttle. Data from its scientific instruments will be transmitted to Earth via the tracking and data relay satellite system. The Space Telescope design will permit in-orbit maintenance, repair, and retrieval by the Space Shuttle for return to Earth, refurbishment, and reuse.

During fiscal year 1983, the primary mirror assembly was completed and integration of the optical telescope assembly began. Most of the support system module has been fabricated. All of the scientific instruments have been delivered to the Goddard Space Flight Center for verification and acceptance testing, which is now in progress.

In fiscal year 1984, the Space Telescope system fabrication, integration and testing efforts will continue. In particular, the optical telescope assembly (OTA) integration and testing activities will be

continued leading to delivery of the OTA to Lockheed in early fiscal year 1985 for integration with the support system module.

The fiscal year 1985 funding is required to complete the integration and testing of the optical telescope system and its subsequent delivery to Lockheed where it will be integrated with the support systems module. In addition, the entire Space Telescope system integration and testing will be initiated leading to the launch of the ST in the second half of 1986 rather than the first half of 1985 due to technical problems encountered during fiscal year 1983, particulary with the optical telescope assembly.

Gamma Ray Observatory

The objective of the Gamma Ray Observatory (GRO) mission is to measure gamma ray radiation from the universe and, thus, to explore the fundamental physical processes powering it. Certain celestial phenomena are accessible only at gamma ray energies. The observational objectives of the Gamma Ray Observatory are to search for direct evidence of the synthesis of the chemical elements; to observe high energy astrophysical processes occuring in supernovae, neutron stars and black holes; to locate gamma ray burst sources; to measure the diffuse gamma ray radiation for cosmological evidence of its origin; and to search for unique gamma ray-emitting objects. Gamma rays represent one of the last fronties of the electromagnetic spectrum to be explored because the required technology has only recently been developed. The low flux levels of gamma ray quanta, and the high background they produce through their interaction with the Earth's atomosphere, coupled with the demand for better spectral, spatial, and temporal resolution of source features, combine to require that large gamma ray instruments be flown in space for a problonged period. Gamma rays provide unique information on the most intriguing astronomical objects yet discovered, including guasars, neutron stars, and black holes. The Gamma Ray Observatory will be launched by the Space Shuttle in 1988. The spacecraft is designed to accomodate four large gamma ray instruments. The instruments will have their principal axis pointing in the same direction, and the spacecraft will point these instruments in a fixed direction in space for long periods (hours to weeks).

In fiscal year 1984, instrument critical design reviews will be held for the GRO instruments, as will the preliminary design review for the spacecraft. In addition, fabrication of the spacecraft and instrment hardware will be initiated. The fical year 1985 funding is required for continuation of the major fabrication and assembly efforts on both the instruments and the spacecraft, and for completion of the total mission critical design review.

Shuttle/Spacelab payload development and mission management

The objectives of Shuttle/Spacelab payload development and mission management are to acquire new knowledge in the disciplines of physics and astronomy and to mange the mission planning and execution of the complete NASA Spacelab payload program. The funding provides for the development of all physics and astronomy Spacelab experiments, the system management and engineering development of the flight equipment and software, the payload spe-

cialist support, the physical integration of the payload with the Spacelab system, the operation of the payloads during flight, the dissemination of data to experimenters, and the analysis of physics and astronomy flight data. In addition, this funding supports mission managfement efforts for all NASA Spacelab payloads.

Instruments are currently under development for several Shuttle/Spacelab missions with primary emphasis on physics and astronomy. Spacelab-2, an all-pallet configuration, is scheduled to fly in 1985. The objectives of spacelabp-2 are to verify the Spacelab igloo and pallet systems and to obtain scienfific data, with emphasis on astrophysics and solar physics. The instrument pointing system, developed by the European Space Agency, will be used for the first time on the Spacelab-2 mission.

Three ultraviolet telescopes are also currently in development leading to a launch in 1986 (Astro-1). This mission is designed to conduct investigations in ultraviolet imaging, spectrophotometry, and polarimetry at very high resolution. The Astro-1 mission will also carry two widefield cameras, to conduct unique scientific observations of Halley's Comet in the near-Earth environment. Astro-1, as well as reflights of this instrumentation, are designed to allow scientific investigations of a broad range of objects, from nearby comets and planets to the most distant quasars.

Spacelab 3, primarily a materials processing and life sciences mission, will be flown in late 1984.

In fiscal year 1985, mission management of the ongoing Spacelab mission will be continued. Definition of the Solar Optical Telescope will be continued in fiscal year 1985, and development of the Space Plasma Lab will be continued. In addition, fiscal year 1985 funding is required for the continuation of development and testing activities on the Spacelab-2 hardware, hardware for the three ultraviolet telescopes which will be flown on ASTRO-1 in 1986, on OSS-2 which will be flown in 1987 and refurbishment of some hardware which was flown on Spacelabs 1 and 2. Fiscal year 1985 funding is also required for the development of low-cost sounding rocket class payloads which will be flown on the Space Shuttle to provide more flight opportunities to the science community at a relatively low cost.

Explorer

The Explorer program provides the principal means of conducting astronomical studies and long-term investigations of solar physics and of the near-Earth interplanetary environment having limited, specific objectives and not requiring major observatories. Included in the present program are missions to study atmospheric and magnetospheric physics; the several magnetospheric boundaries; interplanetary phenomena; and X-ray, ultraviolet, and infrared astronomy. Studies are conducted to define future high priority science explorer missions. NASA engages in cooperative missions with other Federal agencies and other nations whenever such cooperation will assist in achieving mission objectives. Solar terrestrial and atmospheric explorers provide the means for conducting studies of the earth's near-space environment. The program requires a wide variety of satellites in orbits extending from the very lowest reaches of the upper atmosphere, to the interplanetary medium

beyond the Earth's magnetosphere. Efforts in fiscal year 1984 include launch of the San Marco-D mission and launch of the Active Magnetospheric Particle Tracer Explorer. The San Marco-D mission, a cooperative project with Italy, will include a group of U.S. experiments to study the relationship between solar activity and the Earth's meterological phenomena. The Active Magnetospheric Particle Tracer Explorer, a cooperative project with the Republic of Germany, will involve the use of two spacecraft, one built by the United States, and one built by Germany. The mission will study the solar wind at the subsolar point and will identify particle entry windows, energization processes and transport processes into the magnetosphere.

Astrophysics explorers have been instrumental in conducting the first astronomical sky surveys in the gamma ray, X-ray, ultraviolet and low frequency radio regions of the electromagnetic spectrum. A prime example is the Infra-Red Astronomical Satellite, which has just completed a highly successful survey mission. In fiscal year 1984, development will continue on the Cosmic Background Explorer (COBE) and on the X-ray imaging instrument to be flown on the German Roentgen Satellite (Rosat). COBE will carry out a definitive all-sky exploration of the diffuse cosmic background radiation of the universe between the wavelengths of 1 micrometer and 9.6 millimeters. The detailed information that COBE will provide on the spectral and spatial distribution of low energy background radiation is expected to yield significant insights into basic cosmological questions of the origin and evolution of the universe.

Rosat, a cooperative project between the Federal Republic of Germany and the United States, will perform high resolution imaging studies of the X-ray sky. The United States will provide a high resolution imaging instrument and launch services, and Germany will provide the spacecraft and instrumentation.

Funding in fiscal year 1984 will support, among other things, initiation of the Extreme Ultraviolet Explorer (EUVE), which will carry out the first detailed all-sky survey of ultraviolet radiation between 100 and 900 angstroms—a hitherto unexplored portion of the electromagnetic spectrum.

Fiscal year 1984 funding is also supporting definition studies for future candidate explorer missions, including the X-ray Timing Explorer and the Far Ultraviolet Spectroscopy Explorer. Studies are also being conducted on potential alternate lower cost spacecraft concepts for future explorers.

Fiscal year 1985 funding is required for continued development activity on the Cosmic Background Explorer, the Extreme Ultraviolet Explorer, the Rosat instrument, the Cosmic Ray Isotope Experiment, and the instrumentation for the reflight of the Long Duration Exposure Facility to obtain cosmic ray data. Fiscal year 1985 funding will also provide for definition studies of future potential explorer missions.

Mission operations and data analysis

The purpose of the mission operations and data analysis effort is to conduct operations and to analyze data from the physics and astronomy satellites after launch. This program also supports the continued operation of a number of spacecraft, after their original-

ly planned objectives have been achieved, for purposes of conducting specific investigations that have continuing, high scientific significance. The funding supports the data analysis activities of the many investigators at universities and other research organizations associated with astrophysics and solar terrestrial operational satellite projects. Actual satellite operation, including operation control centers and related data reduction and engineering support activities, is typically carried out under a variety of mission support or center support contracts.

In addition to the normal support required for mission operations, the Space Telescope program encompasses several unique aspects which must be provided for well in advance of launch. The Space Telescope is designed for operation for more than a decade, based on in-orbit maintenance, recovery, refurbishment, and relaunch and in-orbit changeout of the scientific instruments. During the operational period, the Space Telescope will be used primarily by observers selected on the basis of proposals submitted in response to periodic solicitations. Science operations will be carried out through an independent Space Telescope Science Institute. The institute will operate under a long-term contract with NASA. While NASA will retain operational responsibilities or the observatory, the institute will implement NASA policies in the areas of planning, management, and scheduling of the scientific operations of the Space Telescope.

Fiscal year 1985 funds will provide support for the basic mission operations and data analyses activities for the Active Magnetospheric Particle Tracer Explorer, continued operation and data analysis activities for the International Ultraviolet Explorer, and continued analysis of the extensive data obtained by the Infrared Astronomical Satellite and the High Energy Astronomy observatories. Fiscal year 1985 funding will provide for the continued operation of the repaired Solar Maximum Mission, and preparation for the operation of the Space Telescope. In fiscal year 1985, the development of mission operations procedures as well as development of the science operations ground system for the Space Telescope will be continued. The Space Telescope Science Institute activities will be continued leading to operational capability through the continued development of the guide star selection system and science data analysis software. In fiscal year 1985, maintenance and refurbishment planning activities such as the purchase of orbital replacement units and space support equipment will be continued to allow for the capability to service the Space Telescope in orbit.

Research and analysis

The research and analysis program provides for the research and technology base necessary to define, plan, and support flight projects. Preliminary studies to define missions and-or payload requirements are carried out as are theoretical and ground-based supporting research and advanced technology deveopment (ATD). Activities included are supporting research and technology (SR&T), ATD and data analysis.

During fiscal year 1985, the supporting research and technology program will support those tasks which contribute to maintaining a firm base for a viable physics and astronomy program. Emphasis will be placed on infrared detector development and on expansion of technology activities related to large X-ray mirrors, advanced X-ray detectors, gamma ray spectrometers and instrumentation. Emphasis will also be placed on the development of a large array multichannel plate, and on intensified charge-coupled imagery devices. In the area of solar physics, activities will support the Solar Maximum Mission, especially through theoretical studies of high energy phenomena. Thrusts in the development of advanced generation instrument concepts will continue especially for the extreme ultraviolet and X-ray wavelengths, and for analyzing the structure and dynamics of the solar interior.

Fiscal year 1985 funding will also support continued reasibility and definition studies on future potential candidate missions such as the Advanced X-ray Astrophysics Facility and the Solar Dynamics Observatory as well as the definition of new Spacelab payload. In the data analysis activities to be carried out at universities and Government research centers in fiscal year 1985, emphasis will be placed on correlative studies involving data acquired from several sources (spacecraft, balloons, sounding rockets, research aircraft and ground observatories).

Suborbital programs

The suborbital program provides versatile, relatively low-cost research tools that complement the capabilities of balloons, aircraft, free-flying spacecraft and the Space Shuttle in all the space science disciplines, including the study of the Earth's ionosphere and magnetospere, space plasma physics, steller astronomy, solar astronomy, and high energy astrophysics. Activities are conducted on both a domestic and international cooperative basis.

Committee comments

The Committee has historically supported NASA's space science programs and continues to believe that capitalizing on space requires a firm commitment to these programs. Therefore, the Committee rejects the level of funding in the administration's budget request for two physics and astronomy programs—research and analysis, and Shuttle/Spacelab payload development and mission management.

In response to this budget request, the Committee has authorized an additional $14 million for research and analysis. Of this amount, $6 million is allocated for advanced technology development (ATD) funding for the Advanced X-ray Astrophysics Facility (AXAF), which was the top priority new program for the 1980's of the Astronomy Survey Committee of the National Research Council. AXAF is a follow-on the highly successful Einstein (HEAO)-2 Observatory and will fulfill the need for a long-lived satellite observatory with the capabilities for X-ray astronomy.

Within the augmentation for research and analysis, the Committee authorizes an additional $3 million for ATD funding for Gravity Probe-B for a total of $8 million. Gravity Probe-B has been indentified by the National Academy of Science Space Science Board as the leading free-flyer relativity mission for the 1980's. Gravity Probe-B will initially be tested as a Space Shuttle experiment and will subsequently provide two completely new tests of Einstein's

General Theory of Relativity, which is the basis of our current understanding of the universe.

Recognizing the importance of theoretical astrophysics to the design and performance of future space science missions, the Committee authorizes an additional $3 million for supporting research and technology in the field of theoretical astrophysics. These theoretical studies are vital to establishing the crucial scientific questions to be addressed by observation and to supporting NASA astrophysics research in universities.

Finally, within research and analysis, an additional $2 million is authorized by the Committee for university instrumentation and laboratory equipment. The 1983 report of the NASA/University Relations Study Group, entitled "The Universities and NASA Space Sciences," has identified aging university laboratory equipment and instrumentation as a national problem that could affect the quality of space science research conducted at our universities. While the Committee recognizes that a modest investment of $2 million to physics and astronomy research and analysis will not completely rectify this instrumentation problem, the Committee hopes that this augmentation will have a positive impact and that in the future NASA will assume a greater responsibility in resolving this problem.

Cognizant that funding for Shuttle/Spacelab payload development and mission management is critical to the development of instruments and experiments that will be launched as NASA payloads, the committee has authorized an additional $14 million in Fiscal Year 1985 for these activities. Of this amount, $6 million is allocated for ATD for the Solar Optical Telescope (SOT), which has been established as the major initiative in support of solar physics for the remainder of the century. During Fiscal Year 1984, funds were reprogramed from SOT to Space Telescope to accommodate the Space Telescope overruns identified in early 1983. This $6 million augmentation is to position SOT more closely to its original development schedule and to partially recover the impact of Fiscal Year 1984 reprograming.

The Committee understands NASA's concerns over the fact that both the Space Telescope and SOT had been contracted to the same development firm. However, now that the Space Telescope management and budgetary problems have been mitigated, the Committee would urge NASA to proceed with the development of SOT is a manner consistent with its original schedule.

Four million dollars of the Committee's $14 million augmentation to Shuttle/Spacelab payload development is for Shuttle Infared Telescope Facility (SIRTF) ATD. The spectacular success of the Infrared Astronomical Satellite (IRAS) underscored the importance and timeliness of a follow-on cryogenically cooled infrared facility in space. SIRTF will become the first facility class space infrared observatory and will be able to study celestial phenomena ranging from the most energetic bodies in the universe to newly formed stars and planets.

Finally, within Shuttle/Spacelab payload development, the Committee authorizes ana additional $4 million for Space Plasma Lab ATD. Unlike most plasma studies which are passive observations, the Space Plasma Lab will afford the possibility of using active

probing and perturbation techniques. The augmentation is to minimize the impact on the program from any slippage in the mission.

After having recently received a briefing on the Space Telescope development by the NASA Marshall Space Flight Center project manager, the Committee is pleased to learn that NASA is presently on schedule for a November 1984 delivery of the Space Telescope's optical telescope assembly to Lockheed. Further, the Committee is pleased to learn that all management and budgetary problems identified in early 1983 are currently under control and that the June 1986 Space Telescope launch is still achievable.

LIFE SCIENCES—$63,300,000

The Committee has authorized $63,300,000 for fiscal year 1985, the same amount as the administration requested, as follows:

Summary of funding levels, fiscal year 1985

Life sciences flight experiments	$27,100,000
Research and analysis	36,200,000
Total	63,300,000

The goals of the life sciences program are to provide a sound scientific, medical, and technical basis for safe and effective manned space flight, and to advance the understanding of the basic mechanisms of biological processes by using the unique capabilities of the space program. Results from the research program are applied to: the immediate needs in the maintenance and health of the astronauts; understanding the response of biological systems to weightlessness; the design of the advanced life support systems for use on future missions; and understanding the biosphere of the planet Earth, its origin, evolution, and present state.

The life sciences program is the key to developing a capability to sustain a permanent manned presence in space and to utilize the space environment to study living systems. These activities include both ground-based and space research efforts which are mutually supportive and integrated, and use a composite of disciplines and techniques in both biology and medicine to address space-related medical problems and fundamental biological processes.

Life sciences flight experiments

The objective of the life sciences flight experiments program is to assimilate information and scientific questions from the various life sciences disciplines and translate them into payloads designed to expand our understanding of the basic physiological mechanisms involved in adaptation to weightlessness. The program includes selection, definition, inflight execution, data analysis, and reporting of medical and biological investigations.

Current activities involve the development of life sciences flight experiments to be flown on Spacelabs 2, 3 and 4 and the German-D1 mission (Spacelab D1). Most of the experiments onboard the early Shuttle flights will serve as pathfinding activities for Spacelab-4, the first Spacelab mission dedicated entirely to life sciences investigations. Hardware and experimental protocols for flights through Spacelab-3 are well developed. Activities on Spacelab-3 will involve evaluation of functional performance and compatibility of hardware that is essential to human and animal investigations

which will be conducted on Spacelab-4. Hardware development and mission planning activities are proceeding on schedule for the U.S. vestibular experiment which will be flown on the German-D1 mission; these are follow-up investigations to those conducted on Spacelab-1.

Fiscal year 1985 funding is required for the continuing definition and development of hardware which will be flown on future Spacelab missions, that is, Spacelab-3, D1,-4 and the second dedicated life sciences mission, yet to be designated. Flight hardware integration and experiment development associated with Spacelab-2,-3 and D-1 will be completed in preparation for launches in 1984 and 1985. Final experiment selection of investigations for Spacelab-4 is now in process. In addition, the selection process for experiments for the follow-on dedicated Spacelab life sciences missions has been initiated through the recent release of a new flight announcement of opportunity (AO).

Research and analysis

The research and analysis activity of the life sciences program is concerned, in part, with ground-base research in basic biology and in those medical problem areas that affect manned spaceflight. The program is comprised of six elements: (1) operational medicine; (2) biomedical research; (3) advanced life support systems research; (4) gravitational biology; (5) exobiology; and (6) biospheric research. The life sciences operational medicine program is responsible for bringing the science, technology, and practice of medicine to bear on solving the problems of sustaining, supporting, and protecting individuals working in the space environment. The biomedical research program seeks to develop the basic medical knowledge needed to enable men and women to operate more effectively in space. The advanced life support systems research program concentrates on enhancing our ability to support long-duration manned presence in space and on optimizing the productivity of the STS crews.

The gravitational biology program explores the role of gravity in life processes and uses gravity as an environmental tool to investigate fundamental biological questions. The exobiology program is directed toward furthering our understanding of the origin and evolution of life, and life-related molecules, on Earth and elsewhere in the universe. The biospheric research program explores the interaction between the biota and the contemporary environment to develop an understanding of global biogeochemical cycles.

In fiscal year 1985, life sciences research and analysis activities will support the continued efforts in the six programs described above and will emphasize the formulation of improved approaches to the operational management of space adaptation syndrome.

PLANETARY EXPLORATION—$296,900,000

The Committee authorization of $296,900,000 for fiscal year 1985 is $10 million above the administration's request. The additional funding is entirely for research and analysis.

Summary of funding levels, fiscal year 1985

Galileo development	$56,100,000
Venus radar mapping mission	92,500,000
International Solar Polar Mission	9,000,000
Mars Geoscience/climatology orbiter (MGCO)	16,000,000
Mission operations and data analysis	58,800,000
Research and analysis	64,500,000
Total	296,900,000

The planetary exploration program encompasses the scientific exploration of the planets and their satellites, comets and asteroids, and the interplanetary medium. The program objectives are: to understand the origin and evloution of the solar system; to understand better the Earth through compara ive studies with other planets; and to understand how the appearance of life in the solar system is related to the chemical histroy of the system. The projects undertaken in the past have been highly successful. The strategy that has been adopted calls for a balanced emphasis on the terrestrial-like inner planets, the giant gaseous outer planets, and the small bodies (comets and asteroids). Missions to these planetary bodies start at the level of reconaissance and exploration to achieve the most fundamental characterization of the bodies, and proceed to a level of detailed study. The reconnaissance phase of inner planet exploration began in the 1960's and has now been completed, though we still know little about the nature of 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 new level of scientific and technological achievement, thereby setting the stage for next step of detailed study. Analyses of the Moon rock samples returned by Apollo continue to be highly productive as new insights into the early history of the inner solar system are achieved and as our theoretical concepts are revised accordingly. The continuing Pioneer Venus mission is carrying the study of our nearest neighbor and closest planetary analogue beyond the reconnaissance stage to the point where a basic characterization of the massive cloud-covered atmosphere of Venus has been made, including fundamental data about the formation of the planet.

The exploration of the giant outer planets began relatively recently. The Pioneer-10 and 11 flybys of Jupiter in 1973 and 1974 were followed by the Voyager-1 and -2 spacecraft. Voyager-1 encountered Jupiter in March 1979 and Saturn in November 1980. Voyager-2 flew by Jupiter in July 1979, and then Saturn in August 1981. New data on these planets, satellites, and rings have revolutionized our concepts of the formation and evolution of the solar system. Now, the Pioneer-10 and -11 and Voyager-1 spacecraft are on escape trajectories from the solar system. The Voyager-2 spacecraft is headed for an encounter with Uranus in 1986 that will provide our first look at this giant outer planet. Its trajectory will carry the spacecraft on to Neptune in 1989.

The Galileo misson, a cooperative effort between the United States and the Federal Republic of Germany, will be launched to Jupiter in 1986 by the Space Shuttle/Centaur upper stage. The payload is expected to extend our knowledge of Jupiter and its system of satellites beyond the profound discoveries of the Voyager and Pioneer missions. During 20 months of operation in the Jovian system, Galileo will have the capability to provide as many as 11

targeted encounters with the Galilean satellites, and an instrumented probe will be injected into Jupiter's atmosphere to a depth where the pressure is equivalent to 10 times the pressure exerted by the Earth's atmosphere.

During fiscal year 1984, major activities of the Galileo program will involve completion of the orbiter subsystems integration and testing, and the flight probe will be integrated with the orbiter leading to environmental testing in 1985.

The fiscal year 1985 funding will provide for completion of the environmental testing of the entire Galileo systems; final subsystem and instrument calibration verification will be initiated; and development of the ground systems and the associated software required to support operation of the spacecraft will be continued. The fiscal year 1985 funding also is required for hardware changes necessitated by recent informatioin regarding the Jovian radiation and its potential effect on the Galileo spacecraft as currently designed; based on analysis of Voyager and Pioneer spacecraft data, heavy ion flux in the vicinity of the satellite Io may be more severe than previously assumed. In addition, fiscal year 1985 funds are required to reimburse the Department of Energy for the continued development of the radioisotope thermoelectric power generators for the Galileo mission.

Venus radar mapper

The Venus radar mapper (VRM) mission, initiated in fiscal year 1984, will provide a global map of the cloud-shrouded surface of Venus. The VRM, using a synthetic aperture radar, will obtain global radar imagery of Venus with resolution sufficient to address fundamental questions regarding the origin and evolution of the planet, and will obtain altimetric and gravity data to determine accurately the gravity field, internal stresses, and density variations of the planet's interior. This data will be analyzed so that the evolutionary history of Venus can be compared with the Earth's. The VRM, scheduled for launch in 1988, will map essentially the entire planet in 243 days.

During fiscal year 1984, major effort on the Venus radar mapper program includes the initiation of the design and development activities on both the spacecraft and radar including an initiation of long-lead procurement items.

Fiscal year 1985 funds are required to complete the preliminary design for the spacecraft and radar systems, to initiate fabrication of the subsystems, to initiate development of the mission software, and to complete the radar development model.

International Solar Polar Mission

The International Solar Polar Mission (ISPM) is a joint NASA and European Space Agency (ESA) endeavor that will fly a package of experiments outside the solar ecliptic plane. The ISPM, which will provide data on the effects of solar activity on the Earth, will be launched in 1986 on the Shuttle/Centaur upper stage. ESA will provide the spacecraft and some instrumentation and NASA will provide the remainder of the instrumentation, the launch, tracking support, and the radioactive thermal power generators. The mission is designed to obtain the first view of the solar

system from outside the plane in which the planets orbit the Sun. The mission will aid in the study of the relationship between the Sun and its magnetic field and particle emissions (solar wind and cosmic rays) as a function of solar latitude, thereby providing an insight into the effects of solar activity on the Earth's weather and climate. The ISPM will be launched in 1986 on the Shuttle/Centaur.

The ISPM was restructured in fiscal year 1981, from a two-spacecraft mission—one provided by the United States and one provided as ESA—to a single ESA spacecraft mission. However, the U.S. participation in the program remains substantial. NASA is developing five of the nine principal investigator instruments and three of the four European investigations have U.S. co-investigators.

During fiscal year 1983, the U.S. flight instruments were delivered to the ESA spacecraft developer for integration and system testing. All spacecraft testing has been completed, and the spacecraft is being partially disassembled for storage until launch.

Mars geoscience/climatology orbiter

The Mars geoscience/climatology orbiter (MGCO) mission is a relatively low-cost inner solar system mission which will utilize a high-inheritance, modified production line Earth-orbital spacecraft, and will have a well defined and focused science objective. The objective of the MGCO mission is to extend and complement the data acquired by the Mariner and Viking missions by mapping the global surface composition, topography, figure, gravity and magnetic fields of Mars to determine the location of volatile reservoirs and characterize their interaction with the Martian environment.

The MGCO mission, which is a fiscal year 1985 new initiative, will be launched in 1990 with the Space Shuttle and will be inserted into Martian orbit in 1991 to perform geochemical, geophysical and climatological mapping of the planet over a period of 2 years. The planning estimate for total cost of the development and mission operations is in the $300 to 375 million range.

The fiscal year 1985 funds are required to initiate the Mars geoscience/climatology orbiter spacecraft design and development activities. An existing Earth-orbital spacecraft derivative will be selected for the MGCO mission based on the recommendation of the Solar System Exploration Committee to identify lower-cost planetary exploration missions. The scientific instruments will be selected based on a very focused scientific objective. The MGCO mission is the highest priority planetary exploration mission recommended by the Solar System Exploration Committee.

Mission operations and data analysis

Since their launches in 1977, the two Voyager spacecraft have encountered both the Jupiter and Saturn systems and have achieved all of their original objectives. Voyager-1 is now on a cruise trajectory which will take it out of the solar system at a steep angle to the plane of the eclipse. The spacecraft will continue to collect data on the outer solar system environment while it also serves as a test bed for sequences and maneuvers to be used by Voyager-2 at Uranus and possibly Neptune. Voyager-2 is proceeding toward an encounter with the planet Uranus in January 1986.

Operation of the Pioneer Venus and the Pioneer 6-11 spacecraft is continuing. The Pioneer Venus orbiter is measuring the dynamic character of the upper Venus ionosphere and its solar wind interaction which resembles that of a comet. The Pioneer 6-9 spacecraft are operating in interplanetary space in solar orbit, and data is being acquired from the spacecraft when unusual solar phenomena occur or as unique scientific opportunities arise. The Pioneer 10 and 11 spacecraft are on a course that will take them out of the solar system in opposite directions while collecting data on the behavior of the diminishing solar wind. The search for gravitational evidence of a 10th planet also will be continued with these spacecraft.

Research and analysis

The research and analysis program contains five elements required to: Assure that data and samples returned from flight missions are fully exploited; undertake complementary laboratory and theoretical efforts; define science rationale and development of required technology to undertake future planetary missions; coordinate an International Halley's Comet Watch; and provide coinvestigator support to the European Space Agency's Giotto Mission to Halley's Comet. The planetary astronomy funding also provides for the continued operation of the Infrared Telescope Facility on Mauna Kea, Hawaii.

Committee comments

The Committee commends the Mars/geoscience/climatology orbiter (MGCO) new start as a welcome response by NASA to the Solar System Exploration Committee (SSEC) recommendations of 1983. This mission is an important milestone in the SSEC plan for low-to-moderate cost planetary missions which are, nonetheless, productive. However, the Committee finds it disturbing that the administration's budget request for planetary exploration research and analysis is $5 million less than the appropriated level for fiscal year 1984. While it may be difficult in this year of budgetary constraints to completely restore research analysis funding to a level that reflects an appropriate measure of growth, the Committee authorizes an augmentation of $10 million to planetary exploration research and analysis for fiscal year 1985.

Of this total augmentation, $8 million is authorized by the Committee for supporting research and technology to support the planning of future missions and data analysis from former and continuing missions. The Committee also has authorized within the total augmentation $2 million for the purchase of new equipment and instrumentation at universities for reasons similar to those expressed in the Committee comment for physics and astronomy.

The Committee also supports the SSEC recommendation for NASA to establish a level-of-effort series called the planetary observers, a program of low-cost, modestly scaled inner solar system missions using already developed, high capability Earth orbital spacecraft. Even though the budget request includes the new start for MGCO, the first mission recommended as a planetary observer, the administration failed to include the planetary observer program itself. The Committee urges NASA to implement in fiscal year 1986 the planetary observer level-of-effort as a means of providing stability, flexibility and affordability to its base program of planetary studies.

SPACE APPLICATIONS—$407,100,000

The objective of the space applications program is to conduct research and development activities that demonstrate space-related technology, systems, and other capabilities which provide down-to-Earth practical benefits. These activities are grouped in the following general areas: Resource observations, environmental observations, applications systems, materials processing in space, communications and information systems. In each of these areas, programs are being planned and conducted to contribute to the solution of pressing national, as well as international, problems and needs. The funding levels for these activities are shown in the following tables:

Summary of funding levels, fiscal year 1985

Solid Earth observations	$63,600,000
Environmental observations	228,700,000
Materials processing in space	33,000,000
Communications	65,600,000
Information systems	16,200,000
Total	407,100,000

The Committee has authorized augmentations in the following space applications activities: Environmental observations ($8 million); Materials processing in space ($10 million); and Communications ($45 million).

SOLID EARTH OBSERVATIONS—$63,600,000

The Committee authorization of $63,600,000 is identical to the administration request.

Summary of funding levels, fiscal year 1985

Shuttle/Spacelab payloads	$18,100,000
Geodynamics	29,900,000
Research and analysis	15,600,000
Total	63,600,000

The objectives of the solid Earth observations program are to develop space observations and experimentation to further the understanding of the global, physical, chemical, and biological processes involving the land areas of the Earth and interactions of the land areas with the Earth's oceans and atmosphere; to improve our ability to systematically evaluate the composition and geometry of the Earth's crust in order to increase the effectiveness of global assessment, exploration, and development of mineral and energy resources; and to increase our understanding of the Earth, its interior structure and composition, its rotational dynamics, the processes related to the movement and deformation of its crust, and the mechanisms associated with the occurrence of earthquakes. Principal elements of the program include the development of space and supporting ground systems and improved data processing and analysis techniques; sensor and technique development; as well as basic

and applied research for identifying, monitoring, analyzing, and modeling the vegetated and geological features of the Earth.

The objective of the Shuttle/Spacelab payload development project is to develop, test, and evaluate Earth-viewing remote sensing instruments and systems to obtain data for solid Earth observations research. Both the Shuttle imaging radar, which was flown on the Shuttle orbital test flight in November 1981 to evaluate the utility of spaceborne imaging radar for geologic exploration, and the Shuttle multispectral infrared radiometer, which was used to determine the optimum spectral bands for surface materials classification, operated successfully. The large format camera, required for high resolution mapping applications, is being prepared for launch on the Shuttle in June 1984. The next generation Shuttle imaging radar is under development leading to a 1984 Shuttle launch.

Studies of the movement and deformation of the Earth's crust, the rotational dynamics of the Earth, and the Earth's gravity and magnetic fields provide information which is needed to: Understand the processes leading to the release of crustal strain in the form of earthquakes; improve our understanding of the formation of mineral deposit; and contribute to better understanding of the Earth as a planet. Space techniques such as laser ranging to satellites and the Moon, and vary long baseline interferometry using radio stars or satellites, are the only methods which can provide the precise measurements needed for these studies.

The multispectral linear array (MLA) advanced technology development activities are being focused on the development of a future high performance MLA instrument which can be used as a diagnostic tool for fundamental research in remote sensing. The MLA solid-state sensor has a number of significant features such as electronic scan, inherent geometric and spectral registration, and programmable high spatial and spectral resolution. The critical technology development and supporting research on the linear array instrument and the Shuttle imaging spectromenter is being continued in fiscal year 1985.

Landsat-4 was launched on July 16, 1982 to provide multispectral scanner and thematic mapper images for many applications in civil remote sensing. NOAA assumed operational responsibility for the Landsat-4 spacecraft and the multispectral scanner in January 1983. However, NASA still retains responsibility for the thematic mapper operations and data processing.

Landsat-D' (Landsat 5) was launched March 1, 1984 due to the premature failure of Landsat-4. NOAA has already assumed operational responsiblity for Landsat-5. NASA will retain responsibility for the thematic mapper operations until January 1985, at which time NOAA will assume operational responsibility.

Committee comments

The Committee believes that land remote sensing research and development activities have been underemphasized in the administraton's fiscal year 1985 budget request. With the tansfer of Landsat's operational responsibilities to NOAA and the pending privatization of the existing land remote sensing satellite system, NASA appears to have lost its incentive to continue long-term land

remote sensing research and development. Regardless of the outcome of the land remote sensing privatization effort, the Committee is concerned that uncertainties associated with this initiative could result in undue curtailment of NASA research and development activities necessary to maintain long-term U.S. leadership in land remote sensing.

With Landsat-4 operating in a degraded mode and with the early launch of Landsat-5 in March 1984 to compensate for Landsat-4's condition, our country's remote sensing capabilities after 1987 are in question. With the recent on-orbit Shuttle repair of the malfunctioning Solar Maximum Mission observatory, the Committee continues its interest in the possibility of such a repair of Landsat-4 when a polar orbital launch from the Vandenberg launch site is possible. The Committee also is awaiting the results of a study it requested of NASA a year ago to determine the technical and cost implications of a Landsat-4 retrieval and repair mission.

Regardless of who ultimately assumes operational responsibilities of U.S. land remote sensing capabilities, the Committee believes that NASA still retains a role for related research and development. There will likely remain a necessary and desirable governmental role for research and development, particularly where the lead time to commercial application is too long and too costly and the associated risk is too great for private sector entities.

Therefore, the Committee urges NASA to increase its land remote sensing research and development activities with such sums as may be available in the fiscal year 1985 authorization. The Committee is awaiting the release of a National Academy of Sciences Space Applications Board study on our Nation's future strategy for remote sensing and would urge NASA to take into consideration the results of this study in developing its own remote sensing research and development strategy.

ENVIRONMENTAL OBSERVATIONS—$228,700,000

This Committee's authorization of $228,700,000 includes an increase of $8 million above the administration's request, to be allocated to space physics/and research and anaylsis.

Summary of funding levels, fiscal year 1985

Upper atmosphere research and analysis	$31,000,000
Atmospheric dynamics and radiation research and analysis	28,500,000
Oceanic processes research and analysis	19,400,000
Space physics/ATD research and analysis	24,700,000
Shuttle/Spacelab payload development	7,800,000
Earth radiation budget experiment	8,100,000
Extended mission operations	29,500,000
Interdisciplinary research and analysis	1,000,000
Tethered satellite payloads	3,000,000
Scatterometer	15,000,000
Upper atmosphere research satellite mission	60,700,000
Total	228,700,000

NASA's Envoronmental observations program has the goals of improving the understanding of processes in the atmosphere and the oceans, providing space observations of parameters involved in these processes and extending the national capabilities to predict environmental phenomena and their interaction with human ac-

tivities. Because many of these phenomera are global or regional, the can be most effectively, and sometimes solely, studied from space. NASA's program includes scientific research effort splus the development of new technology for global and synoptic measurements. NASA's research statellites provide a unique view of the radiative, chemical, plasma acceleration, and dynamic processes occurring in the magnetosphere, atmosphere, and oceans.

To achieve these goals, a number of significant objectives have been established for the next decade. These include advancing the understanding of the upper atmosphere through the determination of 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; optimization of the use of space derived measurements in understanding large scale weather patterns; advances in our knowledge of severe storms and forecasting capabilities; ocean productivity, circulation, and air-sea interactions; an improved knowledge of seasonal climate variability leading to a long-term strategy for climate observation and prediction; and a comprehensive understanding of the solar terrestrial connection and detailed determination of the physics and coupling between the solar wind, magnetosphere, and ionosphere.

The Upper Atmospheric Research Satellite (UARS) will place a set of instruments in Earth orbit which will make a comprehensive measurement of the state of the stratosphere, providing data about the Earth's upper atmosphere in spatial and temporal dimensions which are presently unattainable. Detailed defintion studies of the instruments have been completed, and the design and development activities have begun. In fiscal year 1985, design and development activities will be initiated on the UARS observatory.

The development of the Earth radiation budget experiment (ERBE) and the solar backscatter ultraviolet instrument development are proceeding on schedule toward a 1984 launch. NASA also is continuing to support the National Oceanic and Atmospheric Administration (NOAA) by managing the development of the NOAA and the Geostationary Operational Environmental Satellites (GOES) series on a reimbursable basis. Preparations are proceeding to launch NOAA-F in 1984.

Design and development activities will be initiated on a scatterometer, which will be flown on the Navy remote ocean sensing system (N-ROSS), in late 1988 to acquire global data.

Studies of the upper atmosphere have led to a new assessment of the impact of chlorofluorocarbons on stratospheric ozone, and a report has recently been forwarded to the Congress. The revised assessment of the predicted impact is somewhat less severe; this assessment is the result of improved measurements in our continuing program of laboratory chemical kinetics measurements.

Three-dimensional models of the stratosphere are being developed to quantify our understanding of the interrelation of chemistry with dynamics and radiation. The record of satellite ozone measurements now extends for over a decade and is being used in studies to determine if there have been long term trends in the average amount of global ozone which shields the Earth's surface from harmful ultraviolet radiation.

The ability to perform temperature and moisture soundings of the atmosphere from geostationary orbit has been demonstrated by the flight of the NASA-developed visible/infrared spin-scan radiometer and atmospheric sounder instrument on the GOES spacecraft. The opportunity afforded by geostationary orbits to observe a localized region continously will permit intensive study of the evolving temperature and moisture environment of severe local storms. Low Earth-orbit sounding capabilities are now enabling the extension of forecast reliability from 3 to 5 days. In certain situations, reliable forecasts of 8 to 10 days duration have been achieved.

Virtually all of the data from the Seasat mission has been archived and much of the Nimbus-7 ocean data has been analyzed. This information is being used to define potential low-cost approaches to the use of demonstrated ocean observing techniques to address a variety of ocean research challenges.

The Nimbus spacecraft continue to collect unique data sets to aid in the study of long-term trends of the Earth's atmosphere, oceans and polar ice. The Solar Mesosphere Explorer (SME) data collection over the last year has made a major contribution to the study of the El Chichon volcano. The Dynamic Explorer-1 spacecraft, renamed International Cometary Explorer, has completed an exploration of the Earth's geomagnetic tail and is being redirected toward the planned encounter in 1985 with the comet Giacobini-Zinner.

Committee Comments

An additional $8 million for space physics research and analysis has been authorized by the Committee to be allocated as follows: five million dollars for advanced technology development for the International Solar Terrestrial Physics (ISTP) program (formerly called the Origin of Plasmas in the Earth's Neighborhood, or OPEN) and $3 million for replacement of obsolete university laboratory equipment.

ISTP is a joint NASA/European Space Agency/Japan program designed to study the phenomena that occur in the interaction between the solar and terrestrial environments. A tentative time schedule calls for a new start of ISTP in fiscal year 1986. However, the funding requested in the administration's budget leaves in doubt the ability to proceed on this internationally agreed time schedule. The $5 million augmentation is to ensure that NASA's role in this joint effort contributes to a successful and timely initiation.

As mentioned in the Committee comment on physics and astronomy, the Committee believes that NASA should assume a greater role in replacing aging university laboratory equipment and instruments. The purpose of this $3 million augmentation is to assist in this modernization effort and to encourage greater NASA participation.

MATERIALS PROCESSING IN SPACE—$33,000,000

The Committee has authorized $33 million for Materials processing in space for fiscal year 1985, compared to the administration's request of $23 million.

The materials processing in space program emphasizes the science and technology of processing materials to understand constraints imposed by gravitational forces and the unique capabilities made possible by controlling these processes in the space environment. Ground-based research, technology development, and payload definition activities in fiscal year 1984 are being concentrated on six major processing areas: Metals and alloys, electronic material, glass and ceramics, biotechnology, combustion, and fluid dynamics and transport phenomena. These activities will provide the scientific basis for future space applications of materials processing technology as well as providing a better understanding of how these processes occur on the ground. Definition studies will be performed for Shuttle experiment combustion science, solidification and crystal growth, and blood storage. Also included are maintenance of capabilities for experimentation in drop tubes and towers, and aircraft. An outreach program, consisting of technical publications, workshops, experiment accommodation studies and support for joint endeavor and technical exchange agreements, are included in this program.

Materials experiment operations is a consolidation of ongoing activities which provide a range of experimental capabilities for all scientific and commercial participants in the material processing program. These include Shuttle mid-deck experiments, the material experiment assembly and the materials science laboratory, which is carried in the orbiter bay. These capabilities will enable users to develop different experiments in a cost-effective manner and allow a better understanding of the technical risks associated with experiment concepts before attempting to develop more complex hardware. In addition, reflight of investigations on Shuttle/Spacelab missions and the mid-deck is provided for in material experiment operations.

Committee Comment

The Committee believes that the potential for the commercial application of microgravity science and applications research is very high although commercial profitability may not occur in the near term. Furthermore, the Committee agrees with the administration and NASA that the permanently manned space station should provide an environment conducive to advancing microgravity research and, in turn, to developing more completely the commercial applications of space. Therefore, the Committee is concerned that NASA and the administration are not committed to supporting the development of the strong research base necessary to bring about the commerical application of the results of microgravity scientific investigation.

The NASA request to support microgravity science and applications is evidence of the failure. The ongoing program has been dramatically reduced before the potential can be demonstrated. Accordingly, the Committee recommends an increase of $10 million for materials processing. These funds are to be used to continue the ongoing activities in the following areas: Biotechnology research and analysis, electronic materials, biotechnology flight equipment, fluid dynamics, combustion, glasses and ceramics, metals and alloys, multidisciplinary flight apparatus, and the development of

levitation furnaces and furnaces with highly controlled thermal profiles. The Committee feels that development of this equipment will greatly enhance the commercial potential of the materials processing program. Furthermore, it is the intent of the Committee that this increase should be included in the base microgravity science and applications program from which NASA will develop future budget requests.

The Committee is pleased about the recent agreement between NASA and 3M to jointly undertake a long-range basic research program in space, with the aim of eventually producing commercial products in orbit. NASA is encouraged to seek and enter into additional agreements such as this to help bridge the Government/industry gap and to further our understanding of microgravity research and applications.

The Committee also is pleased with the program office's recent solicitation of proposals from interested universities to establish centers for organic separations and pharmaceutical research. The Committee feels these awards will do much to increase the degree of interest and research in the use of the microgravity (space) environment and act as an important educational tool.

COMMUNICATIONS—$65,600,000

The Committee authorizes $65,600,000 for fiscal year 1985 in lieu of the administration's request of $20,600,000.

Summary of funding levels, fiscal year 1985

Research and analysis	$9,100,000
Search and rescue	2,400,000
Technical consultation and support studies	2,900,000
Experiment coordination and operations support	1,200,000
Advanced Communications Technology Satellite	50,000,000
Total	65,600,000

Research and analysis

The communications research and analysis program provides the high-risk technology required to ensure continued U.S. preeminence in the field of satellite communication. In fiscal year 1984, the research and analysis program continues to support the development of component and device technology required by NASA, other Government agencies, and U.S. industry for advanced communications satellite systems. Research and analysis efforts are also directed toward defining the ground segment (that is, mobile and base station equipment) and networking technology for a first generation mobile communications satellite service. This is a joint study with industry and Canada to define a two-way radio, radio telephone and low-speed message and data service to mobile terminals operating in rural and nonmetropolitan areas. In November 1983, NASA signed an agreement with the Canadian Department of Communications to cooperate in the definition phase of the program. In fiscal year 1984, a notice of opportunity will be released to solicit U.S. industry participation.

Search and rescue

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, and Sweden also participate. Two COSPAS satellites and one search and rescue-equipped satellite (NOAA-E) are currently in operation. Over 120 lives have been saved in numerous incidents in Canada, the United States and Western Europe, and the list continues to grow on a weekly basis.

Technical consultation and support program

The technical consultation and support program will continue to provide for studies of radio interference, propagation, and special systems required for the growth of existing satellite services and the extension of new satellite applications. Support to the Department of State, the Federal Communications Commission, the National Telecommunications and Information Administration, and the Federal Emergency Management Agency in the development of frequency and orbit sharing techniques and strategies for upcoming World Administrative Radio Conferences (WAR's) will continue.

Experimental coordination and operations support program

The experimental coordination and operations support program assists other Federal agencies and public sector organizations in the development of experimental satellite communications for emergency, disaster and public service applications. The Application Technology Satellites (ATS) 1, 3, and 5 will continue operating until fiscal year 1985, at which time operations will be transferred to universities.

Advanced Communications Technology Satellite

The objective of NASA's Advanced Communications Technology Satellite (ACTS) flight-test program is to develop the high-risk advanced communications technologies which will apply to multiple frequency bands and will support a wide range of future communications systems for NASA, other Government agencies and industry.

The technologies to be tested in the ACTS 30/20 GHz (Ka) band frequency are (a) multiple fixed and scanning spot beams; (b) time division multiple access (TDMA) ground system architecture; (c) high speed digital baseband processing and intermediate frequency switching facilities; and (d) rain fade compensation methods.

The ACTS experimental satellite is designed to serve for 2 years and to advance the technologies critical to compete in the world market in the 1990's. ACTS is a joint Government-industry endeavor in which industry participants in the flight test program will include commercial communications carriers, who will submit proposals for experiments to be performed. When the proposals are approved, the experimenters will construct earth terminals at their expense and conduct the proposed experiments. The results of the experiments will be reported to NASA, where they will be compiled and published.

Fiscal year 1985 funding is required to continue ACTS technology development and activities leading to a flight-test program.

Committee Comments

For the past 2 years, the Committee has supported the Advanced Communications Technology Satellite (ACTS) program and its innovative Government/industry approach to experimenting with and testing advanced communications technologies. The Committee has felt all along that the goals established by NASA in concert with industry were in the national interest and were essential to maintaining U.S. preeminence in the world communications satellite industry.

Therefore, when the Committee learned that OMB had decided to significantly reduce the funding for ACTS and to descope ACTS from a flight test program to a ground test program based on a filing at the Federal Communications Commission (FCC) by Hughes Communications Galaxys Inc. In December 1983, the Committee was placed in the position of reexamining its previous position on the ACTS flight test program. The reexamination focused on (1) the urgency of advancing the technology, (2) the foreign competition in this area, and (3) the role of NASA in communications satellite research and development.

First, it is the Committee's belief that the market for communications satellites and their related systems and services are expanding and will continue to expand. A study performed by Western Union for NASA forecast a worldwide communications market worth $35 billion to $50 billion between 1981 and 2000. Quite clearly, if the U.S. communications satellite technology does not develop to meet this expanding market, Japanese and European competition will likely do so.

At present the United States is the dominant force in the world communications satellite industry. However, our foreign competitors are beginning to make noticeable inroads as a result of the lack of NASA research and development during the 1970's. The Japanese already have launched a communications satellite in the Ka band, the same frequency bandwidth the ACTS program and the recent Hughes Aircraft Co. proposal have targeted, and the Europeans and Japanese are making significant advances in the development and marketing of ground stations. Although the formal space budgets of the Japanese and the European Space Agency are less than that of NASA, the combined value of government and industry research and development spending in these countries reflects their commitment to penetrate the communications markets and to challenge the U.S. technological leadership.

As noted in a recent NASA publication entitled "ACTS—Advanced Communications Technology Satellite,": "The efforts by the Japanese and similar activities in Europe, particularly in the areas of spot-beam technology and Ka band advances, are serious threats to the U.S. lead in satellite technology, systems and market share. It has become clear that without appropriate Government support, the U.S. satellite lead will be lost, following the unfortunate precedent established in the consumer electronic industry".

It is the Committee opinion that the growing challenge of foreign competition warrants an aggressive governmental role in communi-

cations satellite research and development. The Committee does not want the errors of the 1970's repeated and continues to support NASA's research and development activities in the communications area.

Second, faced with the possibility that the NASA might simply ground test, rather than flight test, the ACTS technologies, the Committee has attempted to determine to what extent an ACTS ground test program would contribute to an appropriate level of technology development. The Committee believes that to give the planners and operators of future communications satellite systems the confidence needed to implement these technologies, a flight test program is required, not later than 1989. Once the private sector is aware of the risks associated with the technologies, it can make a more judicious, intelligent decision concerning the implementation of the technologies. This, in turn, should positively impact the U.S. position in the world communications satellite industry.

The Committee believes that the Hughes Aircraft Co. proposal is a responsive proposal for a perceived market in the 1980's; the ACTS technologies, however, are quite different and are designed to meet the needs of the 1990's, a time frame that is presently outside the scope of most private sectors firm's research and development activities.

The Committee feels that the fundamental question of NASA's role in communications satellite research and development once again has been reexamined in the course of this debate and the Committee comes to the same conclusions as did the Space Applications Board in 1977—NASA has a fundamental role in communications satellite technology development. Therefore, the Committee feels that an ACTS flight test program is an appropriate activity for NASA and the U.S. Government to support. As noted above, the once unchallenge U.S. leadership in the communications satellite industry is now being seriously and, quite often, successfully, challenged and the technology gap is narrowing. Recognizing that almost half a year has been lost in this debate, the Committee authorizes an additional $45 million for the Advanced Communications Technology Satellite program for fiscal year 1985. The Committee realizes that this commitment carries with it an implied budgetary obligation for the next several years. However, under the circumstances, the Committee believes that this is an obligation that the Nation cannot afford to ignore. To preclude any further disruptions in the ACTS program, the Committee's bill requires NASA to enter into and finalize, as expeditiously as possible, a contract with the contractor team with which NASA had been negotiating prior to the interruption of these negotiations. This provision in the bill is designed to reduce the possibility of additional delays in the activities leading to a flight test in 1989.

INFORMATION SYSTEMS—$16,200,000

The Committee authorization for fiscal year 1985 is $16,200,000, which is identical to the administration request.

The objectives of the information systems programs are to: Develop and demonstrate advanced capabilities for managing, distributing, and processing data and information; implement information

systems standards and provide transportable common software in order to lower data systems costs; and develop the basis for data services to provide improved access to, and rapid delivery of, space data and advanced data systems in support of the Nation's satellite programs and the space science and applications projects.

This program provides for timely development of data systems capabilities to meet the needs of flight missions and major space science and applications programs. The early demonstration of capabilities has a high potential for reducing ground data systems development risks and the chance of late data delivery.

TECHNOLOGY UTILIZATION—$9,500,000

The Committee authorizes $9,500,000 for fiscal year 1985 for technology utilization, which is identical to the administration's request.

The NASA technology utilization program is designed to enhance national economic growth and productivity through the transfer of new technology resulting from NASA research and development programs to the nonaerospace sectors of the economy. In addition to generating use of aerospace technology in U.S. industry, such technological advances have found use in important public sector areas such as medicine, transportation, environment and public safety. The specific objectives of the program are to accelerate and facilitate the application and use of new technology thus shortening the time between development of advanced aeronautics and space technologies and their full 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 exists; to understand more fully the technology transfer process and its impact on the economy, and to manage and optimize the process in a systematic way; and to develop applications of NASA's aerospace expertise—its technology, technologists and unique facilities—to nonaerospace needs of the Nation.

Committee comment

Consistent with the position that the Committee has taken on NASA's materials processing in space program and with the Committee's initiative in space commercialization, the Committee endorses the activities of NASA's technology utilization program as another resource with which NASA can help develop closer cooperation between Government and industry. The Committee encourages NASA to emphasize its industrial application centers and its other dissemination centers as conduits through which the flow of technology will benefit not only our existing industrial base but also the embryonic space commercialization industry.

SPACE COMMERCIALIZATION—$5,000,000

Committee comment

Over the past two decades, significant payoffs (both private and public) have been demonstrated in several space venture areas including communication satellites, meteorology satellites, Earth resources satellites, and, more recently, space manufacturing. With

the Space Shuttle offering routine and reliable access to space and with other facilities for ground-based testing and on-orbit research, the Committee believes that the circumstances are appropriate for encouraging new private sector participation and investment in commercial space activities.

In his State of the Union Address on January 25, 1984, President Reagan outlined a comprehensive plan for space which included an appeal for a Government-industry partnership to ensure expanded private sector investment and involvement in the commercial development of space. The Committee supports the President's space initiative, including his plans for a permanently manned space station and feels that a Government-industry partnership will maximize the benefits from the development of space.

Many other recent developments have reflected a growing interest in the potential of commercial space activities. During the last half of 1983, NASA sponsored, within the agency, a Space Commercialization Task Force to define potential commercialization initiatives and to develop management plans for implementing an agencywide commercialization policy. Outside the agency, a broad group of industry representatives have been working with the White House to determine how the Government can best encourage and facilitate the use of space and space technology by both aerospace and nonaerospace firms. The desirability of commercial space activities has also been studied by a number of prestigious non-Government groups. In its recent report entitled, "Encouraging Business Ventures in Space Technologies", the National Academy of Public Administration emphasized the importance of private sector involvement:

> The extent to which past investment in space technology contributes to our future economic well-being and national growth will depend in large measure on policies and actions taken in a spirit of collaboration by the Federal Government and industry. Unless the public and private sector join to develop the opportunities presented by new space technologies and unless entrepreneurial forces are engaged more fully, the United States will fall behind in the contest for leadership in space and the economic rewards associated with that position.

The Committee recognizes that, over the years, the aerospace industry has developed the scientific and technological capabilities necessary to pursue space commercialization. However, for many nonaerospace firms, there is an intrinsic reluctance to enter this exotic arena. As intrigued as they may be by potential payoffs, private investors are still wary because of a general lack of understanding of what types of commercial space opportunities actually exist. Also, investors are cautious of becoming involved in projects that depend on a rate of return over a long period of time when little tangible evidence exists of a stable and durable Government commitment to support such risk-prone ventures.

Private sector investment is based upon the estimation of profitability and predictability. These factors can become more concrete with a strong, visible Government commitment to help lead the way through these "unchartered waters". NASA's Space Commercialization Task Force has worked to determine the most appropriate role for NASA and the Federal Government in encouraging and facilitating space commercialization. As a follow-up to the work of the Task Force, NASA is developing plans to establish within the agency a high-level Office of Space Commercialization to serve as the focal point for private sector firms that are interested in commercial space activities. The Committee has reviewed these plans and supports the expeditious creation of an Office of Space Commercialization.

A major concern of potential private sector investors has been the absence within NASA of a focal point which could facilitate access to the NASA organization and those resources that are essential to stimulating commercial space investment. In anticipation of the establishment of such an office, the Committee authorizes $5 million for space commercialization activities in fiscal year 1985.

The Committee also invites NASA to target new high tech commercial space ventures and new commercial space applications of existing technologies. Many of the potential participants in these areas lack the longstanding involvement that is necessary to confidently pursue these activities and Government support is critical to the initial entry of these participants into these areas.

Furthermore, the Committee urges NASA to consider, as elements within the overall space commercialization initiative, the following activities:

1. The initiation of several National Centers of Excellence to encourage partnerships among industry, academia and Government to perform research in areas with a high potential payoff;
2. Prioritized research by NASA in selected areas where early research and development results can be expected to foster commercial space endeavors;
3. The use of independent intermediaries with strong business community ties and credentials to identify and stimulate a much broader cross-section of potentially interested American businesses;
4. Identification of NASA facilities and equipment available for increased private sector use in ground tests and flight experimentation; and
5. Provision of exploratory commercialization seed funding to help entrepreneurial technologists.

The Committee is encouraged by the agreements that NASA has established with private sector firms such as John Deere, McDonnell Douglas, Ortho Pharmaceuticals, Microgravity Research Associates, Fairchild Industries, and 3M, and is hopeful that this fiscal year 1985 authorization will play a key role in fostering new agreements with other aerospace and nonaerospace firms.

The Committee recognizes that long-term, high-risk research and development does not always produce near-term profits, and, therefore, realizes that the commercial payoffs of a government initiative in space commercialization may not be immediate. But, as distant as the long-term payoffs may be, they may never exist unless a foundation is established. By authorizing a modest investment of $5 million, the Committee hopes to lay the groundwork that is necessary for the success of this initiative. Furthermore, the Commit-

tee hopes this authorization sends a signal to industry that the government is indeed committed to space commercialization. The Committee believes that space commercialization is in the national interest and deserves a vigorous, aggressive advocacy within the Federal Government. Our Nation must be equipped to exploit space for the benefit of the United States and the world.

Aeronautical Research and Technology—$357,400,000

The Committee authorizes $357,000,000 for fiscal year 1985, $10 million above the administration request, to be allocated as follows:

Research and technology base	$233,300,000
Systems technology base	124,100,000
Rotorcraft systems technology	(26,500)
High-performance aircraft systems technology	(21,000)
Subsonic aircraft systems technology	(19,000)
Advanced propulsion systems technology	(31,100)
Numerical aerodynamic simulation	(26,500)
Total	357,400,000

The objectives of the aeronautics program are to advance aeronautical technology to insure safer, more economical, efficient, and environmentally acceptable air transportation systems which are responsive to current and projected national needs; to support the Department of Defense in maintaining the superiority of the Nation's military aircraft; and to maintain the strong competitive position of the United States in the international aviation marketplace.

The research and technology base program will build on the substantial results of the ongoing program, utilizing the unique NASA experimental facilities, research aircraft, computer capabilities, and expertise now in existence. Fundamental discipline efforts will continue to lead to significant test techniques and the development of computational methods to better understand and predict aerodynamic and thermodynamic characteristics associated with complex flows over aircraft and in propulsion systems to improve performance and reduce development costs; metallic, ceramic, polymer, and composite materials for high temperature engine applications and lighweight airframe structures; the development of analytical methods to improve life prediction and better understand and control the dynamic response of complex aircraft and engine structures; electronics and highly reliable, fault-tolerant aircraft control system software and architectural concepts; crew station technology and the capability of modeling pilot behavior in a multivariable environment; and a better fundamental understanding of alternative fuels and their potential impact on engine performance. The discipline and vehicle oriented research and technology base efforts in the various speed regimes will continue with wind-tunnel investigations on advanced aircraft and rotorcraft configurations, and examinations of the effects of promising technology advances individually and in combination.

The systems technology programs are designed to accomplish the following objectives: To extend the scientific discoveries and findings flowing from the research and technology base through applied research to demonstration and validation for selective technologies which thereafter provide the design base for advanced military and commercial products undertaken by private industry.

Rotorcraft systems technology

The rotorcraft systems technology program conducts research on two fronts. The first thrust consists of efforts in broad systems technology areas that advance the state of the art in flight dynamics and controls, aerodynamic analyses, and the prediction and reduction of loads, vibration and noise. The second thrust involves advanced military and civil concepts which are investigated in conjunction with DOD and the Federal Aviation Administration. These currently include the X-Wing demonstration test on the Rotor Systems Research Aircraft (RSRA), and XV-15 tilt flight testing. In both of these thrusts, integrated system testing is required and involves large-scale wind tunnel testing, flight testing and moving-base simulation.

With the delay of 40x80x120-foot wind tunnel operation until fiscal year 1986, a large backlog of tests will accumulate. The interactional aerodynamics test which seeks to examine main rotor fuselage/tail rotor/wing interference and noise and loads measurements will continue in the preparation stage. Also undergoing preparation will be the test of multicyclic control for vibration suppression to investigate various control algorithms in order to document the promise of adaptive control theories for the first time. Arrangements for the French rotor test and a reconstructed bearingless main rotor to be tested in 1986 will continue. A UH-60 rotor will be instrumented for comprehensive noise testing in 1986.

The advanced technology tilt rotor blades will be tested on the XV-15. This will conclude the NASA flight test program of this very successful research aircraft. One vehicle may go to the Navy in support of the JVX full-scale development. A JVX rotor/wing combination will be tested in the 40x80-foot wind tunnel as a critical milestone in that program. It will be the first test in that facility when it becomes operational in fiscal year 1986. Simulation support will also continue.

The X-Wing rotor program will be generating wind tunnel, simulation, and analytical data. This fast-paced program culminates in several crucial tests in 1985 and will require special NASA capabilities to support the contractor's efforts. In particular, a model rotor test will be supported for detailed aeroelastic behavior in helicopter transition, conversion, and stopped rotor flight modes. The first demonstration flight of the X-Wing rotor concept is expected in 1985.

High performance aircraft systems technology

The objective of the high-performance aircraft systems technology program is to generate validated engineering methods and design data applicable to the development of advanced high-performance, high-speed aircraft for military and civil applications. The program objective is accomplished by analysis, ground-based simulations, and wind tunnel experimental research and flight research tests of aircraft, as well as development of specific analytical methods for turbine engine durability improvements.

The fiscal year 1985 funding level reflects an increased emphasis on high-performance flight research to provide the technology foundation applicable to the development of future high-performance aircraft. The high-performance flight research activity in fiscal year 1985 will involve a variety of high-performance aircraft to investigate advanced concepts. Several projects will continue their flight test phases during this period. Under the joint NASA/Air Force advanced fighter technology integration (AFTI) projects, the F-16 aircraft will continue flight evaluation of integrated technologies comprising the automatic maneuvering and attack system (AMAS), and the F-111 mission adaptive wing will continue flight envelope expansion starting with the preliminary assessment of the automatic flight control system (AFCS). The joint NASA Defense Advanced Research Projects Agency (DARPA) X-29A forward swept wing flight demonstration program will continue its envelope expansion and begin its flight research phase of the program. The F-15 highly integrated digital electronic controls (HIDEC) program will begin flight research to evaluate the potential of improving the performance and mission effectiveness due to engine-airframe control integration. The high angle-of-attack flight research activity will be continued using other aircraft opportunities and will focus on developing the design methodology applicable to handling qualities improvement and control system design for aircraft operation at high angles of attack. In fiscal year 1985, the YAV-8B Harrier program will concentrate on evaluation of the performance of the NASA-modified flight control system for comparison with simulations.

In fiscal year 1985, the hot section technology (HOST) program will concentrate on continued improvements in instrumentation to validate newly developed models; studies on multiple jet dilution mixing and flame radiation/heat flux modeling; and 3-D flow and heat transfer models for nonrotating and rotating components, including cooling passage effect. Advanced 3-D inelastic structural/stress analysis methods and solution strategies will be developed, along with anisotropic life/constitutive models for creepfatigue interaction. Also, the role of oxide scale and coating composition in hot corrosion will be evaluated. The research program on the use of ceramic materials for long-life components will continue.

Subsonic aircraft systems technology

The objective of the subsonic aircraft systems technology program is to provide a substantiated base of key technologies, design data and validated design procedures. Individual concepts are examined in the systems context with other interacting components and technologies to define techniques and procedures for obtaining maximum benefit from these applications. To this end, the advanced composite structures technology program is designed to develop a composite primary airframe structures technology base that achieves the full potential of weight, fuel, and cost savings possible for the design of civil and military transport aircraft in the 1990's. The program's purpose is to establish a composite engineering data base which will permit Government and industry management decisions to commit composities to advanced, large aircraft with acceptable cost and risk. Full airframe use of lighter weight composities in primary airframe structure can reduce overall aircraft weight and acquisition costs by up to 15 percent, significantly lowering operational costs and extending service usage.

Advanced propulsion systems technology

The objective of the advanced propulsion systems technology program is to explore advanced concepts for future aircraft engines in high-payoff technology areas through the focusing of fundamental research and technology efforts and integration of advanced propulsion components.

The energy efficient engine program is nearly complete. The integrated core/low spool test has been completed successfully and the remaining component tests, which are compressor rig tests at both contractors, will be completed during 1984. All data support the goal of 15 percent fuel savings when these technologies are applied to advanced turbofan engines. Studies conducted during fiscal year 1983 have shown that advanced component technologies beyond those developed in the energy efficient engine program have the potential to reduce fuel consumption an additional 15 percent.

Activities in the advanced turboprop systems program are focused on development of a broad research and technology data base and on support for potential future systems integration/flight research phase necessary to establish large-scale advanced turboprop feasibility. The preliminary design review for the large-scale advanced propeller (LAP), 9-foot-diameter SR-7, was conducted. The design recommended by Hamilton Standard was approved, and fabrication of the first large-scale single-rotation blade will be performed in 1984. An independent assessment of the SR-7 aerodynamic, acoustic, structural and aeroelastic characteristics is in progress at Lewis Research Center (LeRC). Detailed design of the 2-foot-diameter aeroelastic model of the SR-7 is underway and will be used to verify the aeroelastic scalability of the 9-foot LAP. The proposals for the propeller test assessment (PTA) are being evaluated, with contract award scheduled for 1984. A contract was awarded on November 22, 1983 (to the General Electric Co. to provide a counter-rotating propeller drive rig and several 2-foot-diameter propfan models to the Lewis Research Center for testing in the 8 x 6 foot wind tunnel. A proposal for an unducted fan engine ground test program for a gearless counter-rotation propfan concept is also in the evaluation process of LeRC with a contract award scheduled for 1984. High-speed wind tunnel aerodynamic performance investigations of the contoured over-the-wing nacelle installation on a semispan wing and low-speed wind tunnel stability and control investigation of aft-mounted configurations will continue in 1984. Subscale propeller model tests in high-speed wind tunnels and on the Jet Star aircraft have given encouraging indications of achieving cabin comfort and community noise goals with only minimal weight and configuration penalties.

In fiscal year 1985, advanced turboprop systems program activities will continue to develop the broad-based supporting technology required for advanced high-speed turboprop propulsion and will include advanced concepts and configurations such as counter-rotation propeller systems. In fiscal year 1985, the aeroelastic model of

the large-scale propeller (SR-7A) will be fabricated, and wind tunnel aerodynamic performance investigations of improved under-the-wing and over-the-wing nacelle installations on improved semi-span wings will be completed. High-speed wind tunnel stability and control investigations of wind and aft-fuselage mounted propeller configurations will be completed. High-speed investigations of wing- and aft-mounted counter rotation propeller configurations will also be carried out. Additionally, validation tests of counter-rotation propeller model performance and acoutics will be completed.

Numerical aerodynamic simulation

The numerical aerodynamic simulation (NAS) program objective is to significantly augment the Nation's capabilities in computational fluid dynamics and other areas of computational physics by developing a preeminent capability for numerical simulation of aerodynamic flows. This program will provide the computational capabilities required to obtain solutions to problems which are currently intractable.

The first high-speed processor for the NAS system will be acquired in 1984 and will continue under lease through fiscal year 1985 and beyond. This high-speed processor is the heart of the NAS system and the key component around which the extensive, user friendly subsystems are assembled. The development of the system control and operation software will be continued during fiscal year 1985 leading toward an fiscal year 1986 initial operational status for the NAS system. The NAS system network development will continue with the acquisition of critical system components required to attain system operational status. The critical system components include additional work stations to provide access to the NAS system through the support processing subsystem and acquisition of components for the long-haul communications subsystem which will allow remote access to the NAS. Additionally, initial acquisition and assembly of the graphics subsystem will occur, which is required to support the output and analysis of large data-producing solution/simulations. The combination of the work station, support processing, and graphics subsystems is critical to the successful initial operation of the NAS system. System tests and integration activities leading up to the initial NAS operations will begin in fiscal year 1985. These tests and integration activities are necessary to assure that the NAS system meets the system requirements developed during the initial planning activities. Fiscal year 1985 will be a year of intense activities leading toward the initial operations of the NAS system in fiscal year 1985.

Committee Comment

The Committee commends the administration for the significant increase in funding above that for fiscal year 1984 for aeronautical research and technology, particularly in light of the funding requested by the administration in previous years. However, as in prior years, the administration has failed to recognize the importance of the advanced turboprop technology program to the future of the U.S. aviation industry. In years past, this technology program has been one of the Committee's highest priorities, and the Committee has annually been forced to augment the funding for the advanced turboprop to accommodate the annual shortfall in the administration's budget request.

The Committee continues to believe that NASA, in cooperation with industry, should proceed with the development of the advanced turboprop propulsion system, with the ultimate goal of a flight test by 1987 to prove this critical technology. To this end, the Committee authorizes an additional $15 million to advanced propulsion systems technology for activities leading to a 1987 flight test of either a single-rotational or counter-rotational turboprop concept and supporting research and technology. The Committee feels that in proceeding with its research and development work in this area, NASA should explore both single and counter-rotational concepts thoroughly. The ultimate goal is the continued U.S. preeminence in civil aviation, and the Committee believes that no individual concept should be precluded from consideration for the 1987 flight test until a broader base of knowledge has been developed.

The Committee recognizes the potential benefits that could accrue to the United States from a major initiative in ceramics for advanced heat engines; however, the cost, risk and reliability are still the major constraints that have prevented U.S. private industry from making the necessary effort to advance this technology. Meanwhile, foreign competition may be overtaking U.S. technology in this area. The Committee feels the high-risk, long-term nature of this technology development represents an appropriate role for governmental research and development. Therefore, within the aeronautical research and technology base programs, the Committee recommend that NASA reprogram not less than $2 million toward ceramics for gas turbine engines.

Space Research and Technology—$150,000,000

The Committee authorizes $150 million for space research and technology, as requested by the administration.

Summary of funding levels for fiscal year 1985

Research and Technology base	$136,000,000
Systems Technology programs	9,100,000
Standards and Practices	4,900,000
Total	150,000,000

The overall goal of the space research and technology program is to advance the technology base in support of NASA's role as an effective, productive, and long-term contributor to the continued preeminence of the United States in space. The specific objectives of this program are to support a broad-based advance technology program designed to provide new concepts, materials, components, devices, software and subsystems for use in U.S. civil and military space activities; assure preeminent national capability through extensive and interrelated participation in the program by the NASA centers, other Government agencies, universities, and industrial research and technology organizations; and maintain NASA centers in positions of recognized excellence in critical space technologies. The fiscal year 1985 program supports these objectives by placing emphasis on disciplinary technologies that provide the necessary

data base and understanding to create new opportunities for future national civil, military, and commercial space mission objectives, and on systems technology program directed at obtaining fundamental data from in-space experimentation, and transferring advanced technology into space programs through more focused efforts that provide proof of concept to support technology readiness for anticipated applications.

TRACKING AND DATA ADVANCED SYSTEMS—$15,300,000

The Committee authorizes $15,300,000 for the tracking and data advanced systems budget, as requested by the administration.

Summary of funding levels, fiscal year 1985

Advanced systems	$15,300,000

The overall objective of the advance systems program is to perform studies and provide for the development of tracking and data systems and techniques required to: (1) obtain new and improved tracking and data capabilities that will meet the needs of approved new missions and near term new starts; and (2) improve the cost effectiveness and reliability needed for overal support of the total mix of spaceflight missions.

This program remains a vital element in the space tracking and data systems program. Activity continues under this program to assess the dramatic changes taking place in the state-of-the-art in telecommunications and computer technology. Such effort is critical for proper planning and for the application of new technology to future support capabilities that are cost effective and reliable. Efforts include the investigation of upcoming missions and studies of ground systems and telecommunications links to determine design approaches and overall trade-offs for the lowest life-cycle costs to support future space missions.

SPACE FLIGHT, CONTROL, AND DATA COMMUNICATION—$3,585,300,000

SHUTTLE PRODUCTION AND OPERATIONAL CAPABILITY—$1,470,600,000

The Committee authorizes $1,470,600,000 for fiscal year 1985, $5 million more than the administration's request.

Summary of funding levels, fiscal year 1985

Orbiter	$651,800,000
Launch and mission support	219,800,000
Propulsion systems	599,000,000
Changes and system upgrading	
Total	1,470,600,000

The Space Shuttle is the key element of a versatile space transportation system (STS) that is available to a wide variety of national and international users. The Space Shuttle is the first reusable space vehicle and is configured to carry many different types of space applications, scientific, and national security payloads. The Space Shuttle offers unique capabilities that cannot be achieved with today's expendable launch vehicles—to retrieve payloads from orbit for reuse; to service and repair satellites in space; to transport

to orbit, operate, and return space laboratories; to transport materials and equipment to orbit; and to perform rescue missions.

Shuttle production and operational capability development provides for the national fleet of Space Shuttle orbiters, including main engines, and provides for the launch site and mission operations control requirements, spares, production, tooling, and related supporting activities to meet appropriate national needs. More specifically, this line item contains the orbiter production for three flight orbiters; and initial modification of Columbia (OV-102) for Spacelab with a subsequent major modification to effect its changeover into its operational configuration; the procurement of major structural orbiter components to be used as spares for the fleet; the residual development tasks for the orbiter, main engine, external tank (ET) and solid rocket booster (SRB); Johnson Space Center (JSC) mission support capability development; the provision of the second line of processing stations and equipment for launch and landing at the Kennedy Space Center (KSC); the development of the filament would case (FWC) solid rocket booster; the lay-in of spares and the ground support equipment; and the production rate tooling for the ET and SRB. Modifications to two orbitors, mobile launch platforms (MLP), and launch pads for the 1986 launches of the Centaur as a space transportation system upper stage are also funded under this budget item.

The continuation of the orbiter production has been a major activity during the past year. Discovery (OV-103) was delivered in November 1983 and brings to three the number of orbiters now available for flight. Columbia (OV-102) and Challenger (OV-099) were previously delivered and have flown several flights each. Atlantis (OV-104) also continues its production progress and is now into the mate and final assembly phase at the Palmdale contractor facility. However, the date of delivery of Atlantis has slipped from December 1984 to April 1985. Support of the flight program also has been a major activity of the orbiter program. OV-102 was modified at KSC in order for the vehicle to support the recently completed Spacelab mission. A final period of OV-102 modifications will take place in the January 1985 to August 1985 time frame to place the vehicle in its fully operational configuration.

At KSC, the second line of vehicle processing stations is being phased in to support the parallel launch processing of orbiters. Parallel processing can be done in the orbiter processing facility (OPF) and vehicle assembly building (VAB) since activation in fiscal year 1982 of the second OPF high bay and second MLP and in fiscal year 1983 of the software production facility, the second launch control room, and the second set of VAB high bays. Parallel processing at the launch pad will be possible after Pad B completion January 1, 1986, consitent with the requirements to support the Centaur launches of Galileo and International Solar Polar Mission (ISPM) in May 1986. The third MLP is planned for a September 1986 operational readiness date.

Initial certification of the Space Shuttle main engine (SSME) in a full power level (FPL) configuration was completed. The FPL capability is necessary to allow NASA's payload commitments to be met. The successful completion of the FPL certification then allows flight operations at the 109 percent thrust level. However, during

the course of FPL certification testing, it became apparent that the current SSME configuration requires an unacceptably high level of maintenance. In addition, a detailed review and assessment of the SSME program (prompted by the pre-flight delays of STA-6) revealed that there is an inadequate logistics base of engines and spare parts to ensure an uninterrupted operational program. As a result of the FPL certification test experience and the SSME review, the SSME program has been replanned so as to focus on solutions to the excessive maintenance problem and the inadequate logistics base. A two-phase effort is directed at significantly improving the life of the high pressure turbopumps; four additional engines have been added to the production schedule; and the production and engine overhaul schedules have been accelerated. During this year, five flights of the Space Shuttle were completed (STS-9) with no SSME anomalies which impacted launch performance. Thus the concept of a high thrust, reusable rocket engine continues to be viable.

NASA has just initiated a significantly expanded development program to improve the operational reliability and cost-effectiveness of the SSME. The near-term objectives are to fine-tune the current turbopump designs to improve durability. The long-term objectives are based on a recompetition of the SSME contract and are grounded in four separate procurement actions. The first of these actions was the release on March 2, 1984 of a request for proposal for engine system and component level improvements, primarily in the powerhead and turbopumps. The second action will solicit proposals for improvement in piece parts that feed the component and engine building process. The third action will involve solicitation of bids for build-to-print manufacturing operations to develop alternate supply resources for critical components. The fourth is for a conceptual feasibility study of a national rocket engine development complex.

The experience with the SRB's during earlier flights indicated the need for design improvements to reduce the amount of water impact damage to the SRB aft skirt, and to the hydraulic power units mounted internally to the aft skirt. Design improvements have been incorporated subsequent to the loss of the STS-4 boosters and have proven to be successful in reducing structural damage. Problems still exist with water intrusion and damage to the thrust vector control (TVC) hydraulic power units. Development activity has been initiated for design changes to the TVC system to eliminate this problem. In order to reduce the water impact velocity, which is the major contributor to the damage at water impact, the use of larger main parachutes is also being explored.

The first high performance motor was successfully flown on STS-8. The performance characteristics of the motor were normal and well within specifications. Post-flight inspection of the motor indicated some minor changes are required in the manufacturing process for the carbon phenolic nozzle material. Efforts are underway to correct this problem.

Performance of the ET on all nine Shuttle flights has been excellent. All flight hardware has been delivered on or ahead of schedule. Weight savings on the lightweight tanks have been greater

than baselined and should continue to be realized as additional planned improvements are implemented. Cost reduction/producibility/production readiness efforts continue to be a high priority, as additional tooling and equipment is introduced to meet production requirements of 24 tanks per year. Significant improvements have been realized in the reduction of ablation on the tank and associated labor and tooling.

The development of the FWC for the SRB's to improve the payload capability of the Space Shuttle for high performance missions has been progressing toward achieving major program milestones. During the past year, design allowables were established; manufacturing processes and tooling were verified and six full diameter segments were manufactured (3 12-foot length and 3 full-length). Hydro-burst tests were performed on a full-diameter segment as well as combined segment/joint hydrotest. Major emphasis has been placed on technical areas related to the composite FWC development by the formation of an expert working group from within NASA and contractors organizations to address materials/processes, nondestructive evaluation, and fracture machanics.

Committee comment

Although it is not completely clear if a five-orbiter fleet is necessary to meet the future space transportation system requirements that can be forecast now, the Committee continues to believe, as it has in past years, that a Shuttle fleet or five orbiters is economically prudent and in the national interest. The cost reductions associated with Shuttle flights can only be realized through a higher flight rate which, in turn, can only occur with a sufficient fleet or orbiters.

The Shuttle is just beginning to demonstrate some of its multifaceted capabilities, and requirements for the Shuttle are likely to increase as we begin to increase and diversify our space activities. Only by increasing the launch rate and fully utilizing the unique on-orbit and return capabilities of the Shuttle can the Nation fully realize the intended benefits of the STS and recover the substantial public investment which has been made.

Even if one disregards an optimistic expectation of the future Shuttle manifest, one cannot overlook the distinct possibility that an attrition vehicle may be needed to maintain even the most conservative expectations of Shuttle requirements. Our experience to date indicates that, even after moving into an operational mode, anomalies may continue to occur. Once a flight rate of 24 launches per year is reached, an anomaly that may remove an orbiter from service for even 2 to 3 months could noticeably disrupt the flight schedule. With the Shuttle pricing policy moving to a full cost recovery by fiscal year 1988, the STS must demonstrate, above all else, reliability and dependability.

For these reasons, the Committee has authorized an additional $45 million for orbiter production within Space Shuttle production and operational capability to augment structural spares and to maintain the critical skills necessary for production readiness for a fifth orbiter.

During its fiscal year 1985 authorization hearings, the Committee received testimony from the agency concerning the amount by

which the cost of a fifth orbiter would increase each year the fifth orbiter decision is delayed. Based on this testimony, the Committee believes that, for economic reasons, a decision to procure a fifth orbiter should be made within the next 2 years; otherwise, exorbitantly unnecessary costs could be added to the ultimate cost. Therefore, the Committee requests NASA to submit no later than October 1, 1984, a study which assesses the agency's consideration in making this decision, along with the perceived ramifications of making a decision not to purchase a fifth orbiter.

The Committee realizes that the recent Air Force decision to purchase and launch a minimum of two commercial expendable launch vehicles per year for 5 years, beginning in fiscal year 1988, could negatively impact the STS. However, the Air Force requirement for assured access to space is a responsible requirement. The Committee requests NASA to factor this decision into the study requested above and to comment on the implications of this decision on the future of the STS.

The Committee continues to maintain an interest in the concept of an extended duration orbiter (EDO) as another means of achieving a longer manned presence in space and as a possible test-bed toward achieving a permanent manned presence in space. It appears that modifying an orbiter to achieve a 21-day on-orbit capability can be accomplished for a relatively modest cost. However, there are questions that still deserve answers. Do the benefits of a 21-day on-orbit capability justify the costs, modest as they may be? To what extent might the orbiter fleet be compromised by these modifications and to what extent would extending the on-orbit capability of an orbiter affect the Shuttle manifest? What would be the utility of an EDO once a permanently manned presence is achieved?

The Committee endorses the study that the House Science and Technology Committee has requested on the EDO concept and hopes that this study resolves these and other related issues.

With regard to Shuttle safety, the Committee notes that in 1983 NASA experienced several problems with the auxiliary power unit system and the landing gear system. For the past 2 years, NASA's Aerospace Safety Advisory Panel (ASAP) has expressed concern about the safety of both of these systems. The Committee requests a report from NASA by September 1, 1984 on (1) what action, if any, the agency took concerning these two systems subsequent to the release of the January 1983 ASAP report, and (2) the agency's planned response to the recent problems that have beset these two systems.

The Committee has recommended a $15 million reduction in funding for launch and mission support, which can be accommodated by the deferral of less critical activities. The Committee believes that the resulting authorization of $219,800,000 is adequate for the agency to continue its activities of mission preparation, mission operations, launch and recovery operations, and astronaut crew training.

A reduction of $25 million in changes and systems upgrading is also recommended by the Committee. With the delivery of the orbiter Atlantis in April 1985, activities related to the development of

the Shuttle may be deemphasized without any degradation of the capabilities of the STS.

Space Transportation Operations—$1,319,000,000

The Committee authorizes $1,319.0 million for fiscal year 1985, $20.0 million less than the Administration request.

Summary of funding levels, fiscal year 1985

Shuttle operations (flight operations, flight hardware, and launch and landing operations)	$1,319,000,000

Space transportation operations provides the standard operations support services for both of the primary U.S. space launch systems: The Space Shuttle and the expendable launch vehicles. Within Shuttle operations, external tank and solid rocket booster flight hardware is produced; operational spare hardware is provisioned, overhauled and repaired; and the manpower, propellants, and other materials are furnished to conduct and support both flight and ground (launch and landing) operations. The Space Shuttle operations program provides for the launch of NASA, DOD, other U.S. Government, domestic commercial and international missions. The 1984-87 launch schedule calls for 6 flights in fiscal year 1984 and 10 flights in fiscal year 1985. The flight-rate in later years is planned to accommodate 24 launches per year by 1988-89. The first Vandenberg launch is scheduled for early fiscal year 1986.

The Space Shuttle provides for launch services to non-NASA users on a reimbursable basis; the amount paid by users is tied to the size of the user's payload and the services required to support the user's launch requirements. For flights through fiscal year 1985, the computation is based on a full mission cost for standard launch of $18 million per flight in 1975 dollars; for fiscal year 1986-88 flights, the charge will increase to $38 million in 1975 dollars. The budget is based on charging DOD $16 million in 1975 dollars for dedicated flights in fiscal year 1984 and fiscal year 1985, and $29.8 million in 1975 dollars for flights during fiscal year 1986-88. The Bureau of Labor Statistics computation of compensation per hour is used as the index for escalating 1975 dollars to current dollars for billing purposes. The projected receipts from reimbursable users are applied against total program funding requirements to derive the amount of appropriated funds requested.

The Shuttle operations budget request funds three principal areas: Flight operations, flight hardware, and launch and landing operations. Under flight operations is mission support, integration, and support; the flight hardware program provides for the procurement of the external tanks (ET), solid rocket motors, booster hardware, and propellants; spare components for the SSME's; orbiter spares; sustaining engineering and logistics support for external tank/solid rocket booster/main engine flight hardware elements; and maintenance and operation of flight crew equipment; and launch and landing operations provides for the launch and landing operations of the Space Shuttle and its cargo.

At KSC, four operational missions were processed and launched successfully during fiscal year 1983, including the first Spacelab processing and launch. KSC plans to launch an additional seven

missions in fiscal year 1984. Initially, five of these launches were scheduled to land at the KSC Shuttle landing facility. However, this policy appears less certain now, due to technological difficulties in predicting weather patterns at KSC. The landing of the orbiter Discovery from its maiden voyage in June 1984 has been changed from KSC to Edwards Air Force Base, Calif. KSC has completed the first full year with the base operations contractor and recently awarded the Shuttle processing contract which established one consolidated contractor for Shuttle launch and landing activities both at KSC and Vandenberg. Preliminary plans are also underway to propose consolidation of the cargo processing effort in the fiscal year 1986 timeframe.

The contracting philosophy for the operations component of space transportation has been directed toward the consolidation of contracts to strengthen the STS launch function. To this end, a base operations contract (BOC) was awarded in early fiscal year 1983 to establish a single on-site, consolidated support contractor to provide institutional support to the KSC organizations. The Shuttle processing contract (SPC) was awarded in late fiscal year 1983 establishing one consolidated contractor for launch and landing activities and operation of related ground systems at both KSC and Vandenberg. There are plans to incorporate a consolidated cargo processing contract (CPC).

Committee comment

As the Shuttle flight rate continues to increase and as the turnaround time continues to improve, the Committee expects Shuttle operations to become more efficient than has been estimated. For this reason, the Committee recommends a reduction of $20 million in Shuttle operations. The resulting authorization of $1,319,000,000 million should adequately support the Shuttle flight schedule for fiscal year 1985 without any degradation in STS safety or reliability.

Space and Ground Network, Communications and Data Systems—$795,700,000

The Committee authorizes the budget request of $795,700,000 for space and ground network, communications and data systems.

Summary of funding levels, fiscal year 1985

Space Network	$386,500,000
Ground Network	223,600,000
Communications and Data Systems	185,600,000
Total	795,700,000

The purpose of this program is to provide vital tracking, command, telemetry, and data acquisition support to meet the requirements of all NASA flight projects. In addition to NASA flight projects, support is provided for projects of DOD, and on a reimbursable basis to other Government agencies, commercial firms, and other countries and international organizations engaged in space research endeavors.

Support is provided for sounding rockets, research aircraft, Earth orbital and planetary missions, and deep space probes. The program also includes the support of the Space Shuttle and Spacelab flight program. The various types of support provided include: (a) tracking to determine the position and trajectory of vehicles in space; (b) acquisition of scientific 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) transmission of commands from ground stations to spacecraft; (e) communication with astronauts; (f) transfer of information between the various ground facilities and control centers; (g) processing of data acquired from the launch vehicles and spacecraft; and (h) reception of television transmission from space vehicles. Such support is essential for achieving the scientific objectives of all flight missions, for executing the critical decisions which must be made to assure the success of these flight missions, and, in the case of Shuttle missions, to insure the safety of the crew.

Tracking and acquisition of data for the spaceflight projects is accomplished through the use of a worldwide network of NASA ground stations, and by the first of a system of three tracking and data relay satellites in geosynchronous orbit working with a single highly specialized ground station. Ground facilities are interconnected by ground communications lines, undersea cables, and communications satellite circuits which are leased from communications carriers, both domestic and foreign. This interconnection provides the communications capability needed between spacecraft and the control centers from which the flights are directed.

To meet the support requirements levied by the wide variety and large number of flight projects, NASA has established 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 supports Earth orbital missions; the deep space network (DSN), which supports planetary and interplanetary flight missions; and the tracking and data relay satellite system (TDRSS), which will provide all low Earth orbital mission support when it becomes fully operational. The STDN will remain the primary Earth orbital support network until three TDRSS spacecraft are launched, properly positioned, and have completed preoperational testing to ensure reliable mission operations support.

When the TDRSS is fully operational, a phaseout of selected STDN ground stations will be initiated. This is presently planned for 1985. Certain facilities of the STDN will be retained to provide support to geosynchronous and highly elliptical missions which cannot be supported via the TDRSS or to provide launch and Shuttle landing support. These remaining facilities, except for the launch and Shuttle landing support facilities, are to be consolidated with the DSN stations under the management of the Jet Propulsion Laboratory (JPL). The consolidation, when completed, will provide a single network to support geosynchronous, highly elliptical, and planetary missions. The consolidated network will also support those spacecraft, now in low-Earth orbit, which are not compatible with TDRSS.

The Space Network consists of TDRSS and a number of NASA ground elements to provide the necessary tracking, telemetry, command, and communication services to low-Earth orbital spacecraft. The TDRSS itself will consist of a three-satellite ground terminal

located at White Sands, N. Mex. The satellites communicate with the user spacecraft in space and relay information to and from the ground terminal. From the ground terminal, satellite and ground communication links interconnect the NASA elements of the network and any remotely located user facilities.

The fiscal year 1985 request includes funding for: Repayment of the loans extended by the Federal Financing Bank (FFB) for TDRSS development; operations payments to the TDRSS contractor; manpower and services necessary to operate and maintain the NASA elements of the network; and system engineering, engineering analyses and other support services to the network elements such as mission planning, logistics, and documentation.

The TDRS-1 was launched in April 1983, and the inertial upper stage (IUS) booster failed to deliver the TDRS spacecraft into the correct orbit. In late June, the mission was recovered through a complex sequence of maneuvers, and the spacecraft was placed into its nominal orbit. Since that time, the spacecraft has supported subsequent Shuttle missions, including Spacelab-1, while continuing the test and checkout of the TDRSS spacecraft and ground terminal. Recently, the spacecraft has experienced failures of the Ku band forward link that provides communication from TDRSS to the user spacecraft. The cause of these failures is currently under review.

The launches of TDRS-B and -C have been delayed while modifications are being made to the IUS to rectify the causes of the anomaly experienced during the first launch. Current plans anticipate launch of the second TDRS in early 1985 with the third launch following in mid-1985. These launches will complete the operational constellation of three TDRS's. Production of TDRSS spacecraft continues with TDRS-B having completed testing and been placed in storage. TDRS-C has completed environmental tests and is being prepared for storage (some modifications to these spacecraft may be necessary as a result of the TDRS-1 problem). TDRS-D, first of the ground spares, begins environmental testing this spring. The TDRS B-F will have the C-band modification for Government communication use. Principal agencies that plan to use C-band are DOD, NASA and the U.S. Information Agency (USIA).

The ground network includes STDN, consisting of 15 geographically dispersed ground stations which support Earth orbital mission; DSN, consisting of three stations approximately 120 degrees apart in longitude for continuous mission viewing, which support planetary and interplanetary flight missions; and support for aeronautics balloon and sounding rocket (AB&SR) programs at the Wallops Flight Facility (WFF), the Dryden Flight Research Facility (DFRF), the Moffett Field Flight Complex (MFFC), and White Sands Missile Range, as well as instrumentation support at the National Balloon Facility at Palestine, Tex.

Funds requested for the communications and data systems program provide for the implementation and operation of facilities and systems which are required for data transmission, mission control and data processing support.

Communication circuits and services are necessary to transmit data between the remote tracking and data acquisition facilities,

launch areas, and the mission control centers. Real-time information is crucial to determining the condition of the spacecraft and payload control. Data received from the various spacecraft must be processed into a usable form before transfer to control centers and experimenters. Such support is mandatory for achieving mission objectives. Missions supported include Shuttle, NASA scientific and applications missions and international cooperative efforts.

Committee comments

The Committee regrets that the launches of TDRS-B and -C have again been delayed due to the difficulties encountered with the IUS. However, even with the single TDRS operating in orbit, NASA has been able to provide essential and critical support to its end users, although with some compromise. The Committee recognizes that NASA will have to extend its ground station activities an additional 6 months as a result of these delays, as well as continue funding the White Sands Test Facility, pending the launches of TDRS-B and -C in 1985. The Committee expects to be kept well informed as to developments concerning the IUS and the eventual launch of TDRS-B and -C. TDRSs is an essential component of our space communications network and should be made operational at the earliest possible date.

The Committee awaits final resolution of the two separate K-band problems affecting TDRS-A and expects to be informed as soon as these problems have been resolved.

The Committee supports the fiscal year 1985 request of $795,700,000 for space and ground networks, communications, and data systems.

CONSTRUCTION OF FACILITIES—$150,000,000

The Committee authorizes $150 million for construction of facilities, $10 million below the administration request. This authorization is for the following purposes:

(1) Repairs to test stand 500, George C. Marshall Space Flight Center, $1,600,000;

(2) Space Shuttle facilities at various locations as follows:

(A) Modifications of Site electrical substation Lyndon B. Johnson Space Center, $3,200,000;

(B) Modification for single engine testing, National Space Technology Laboratories, $3 million;

(C) Construction of launch complex 39 logistics facility, John F. Kennedy Space Center, $10 million;

(D) Construction of solid rocket booster assembly and refurbishment facility, John F. Kennedy Space Center, $15 million;

(3) Space Shuttle payload facilities at various locations as follows:

(A) Construction of additions to cargo hazardous servicing facility, John F. Kennedy Space Center, $4,600,000;

(B) Construction of biomedical research facility, Ames Research Center, $2,100,000;

(4) Construction of addition to network control center, Goddard Space Flight Center, $2,200,000;

(5) Construction of Earth and space science laboratory, Jet Propulsion Laboratory, $12,200,000;

(6) Construction of numerical aerodynamic simulation facility, Ames Research Center, $11,500,000;
(7) Modifications of the 8-foot high temperature tunnel, Langley Research Center, $13,800,000;
(8) Construction of 34-meter antenna, Madrid, Spain, $6 million;
(9) Modifications of 64-meter antenna, DSS-63, Madrid, Spain, $7,800,000;
(10) Repair of facilities at various locations, not in excess of $750,000 per project, $20 million;
(11) Rehabilitation and modification of facilities at various locations, not in excess of $750,000 per project, $25 milllion;
(12) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of $500,000 per project, $5 million; and
(13) Facility planning and design not otherwise provided for $12 million.

The construction of facilities (CoF) appropriation provides for contractual services for repair, rehabilitation and modification of existing facilities; the construction of new facilities; the acquisition of related facility equipment; and the design of facilities projects and advance planning related to future facilities needs.

The funds requested for 1985 provide for: the continuation of prior year's endeavors in meeting the facilities requirements for the Space Shuttle; Space Shuttle payload support operations; modification of aeronautical research and development facilities; repair, rehabilitation, and modification of other facilities to maintain, upgrade and improve the usefullness of the NASA physical plant; minor construction of new facilities; and facility planning and design activities.

The projects and amounts in the budget estimate reflect Space Shuttle and Space Shuttle payload requirements that are time sensitive to meet specific milestones. Other program requirements for 1985 include the repairs to test stand 500 at Marshall Space Flight Center; construction of a numerical aerodynamic simulation facility at the Ames Research Center; modifications to the 8-foot high temperature tunnel at Langley Research Center; construction of an addition to the network control center at Goddard Space Flight Center, construction of an Earth and space science laboratory at the Jet Propulsion Laboratory; and construction of a 34-meter antenna, and modifications of a 64-meter antenna, DSS-63, in Spain.

The fiscal year 1985 program continues to meet the objectives of preserving and enhancing the capabilities and usefulness of existing facilities and to ensure safe, economical and efficient use of the NASA physical plant. This request continues the necessary rehabilitation and modification program as in prior years and continues a repair program. The purpose of the repair program is to restore 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 accomodate changes in technical and institutional requirements.

Committee comments

The Committee recommends an authorization of $150 million for construction of facilities, $10 million less than the administration's

request. To partially achieve this reduction, NASA is requested to defer $5 million from the administration's request for construction of the numerical aerodynamic simulation (NAS) facility at Ames Research Center. Because there have been delays in the procurement of some of the computer equipment associated with the NAS, the Committee feels that the resulting fiscal year 1985 authorization of $11,500,000 will not seriously impat the implementation of the NAS system. Also, the Committee recommends a $5 million general reduction of less critical construction of facilities activities, at the discretion of the agency.

RESEARCH AND PROGRAM MANAGEMENT—$1,331,000,000

The Committee authorizes $1,331,000,000 for research and program management, as requested.

Summary of budget plan by function

Personnel and related costs	$935,928,000
Travel	28,000,000
Operation of Installation	367,072,000
Facilities services	(198,679,000)
Technical services	(57,765,000)
Management and operations	(110,628,000)
Total	1,331,000,000

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 objectives in aeronautical and space research. Objectives of the efforts funded by the research and program management appropriation are to (1) provide the technical and management capability of the civil service staff needed to conduct the full range of programs for which NASA is responsible, (2) maintain facilities and laboratories in a state of operational capability and manage their 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 22,000 permanent and temporary civil service personnel at 8 instllations and Headquarters are funded by the research and program management appropriation. This civil service workforce is NASA's most important resource and is vital to future space and aeronautics research activities. Seventy percent of the research and program management appropriation is needed to provide for salaries and related costs of the civil service workforce. About 2 percent is for travel, which is vital to successfully manage the agency's in-house and contracted programs. The remaining amount of the research and program management appropriation provides for the research, test and operational facility support, and for related goods and services necessary to successfully operate the NASA installations and to efficiently and effectively accomplish NASA's approved missions.

Committee Comment

The Committee authorized the administration's request of $1,331,000,000 for research and program management for fiscal

year 1985. However, within these funds authorized, the Committee recommends that no more than $1 million be made available to fund the activities of the National Commission on Space, as authorized under title II of this bill.

NATIONAL COMMISSION ON SPACE

Committee comments

Due to the changing nature of the space environment, it is necessary for the United States to publicly reassess its space programs and space policies in order to insure the U.S. leadership position, to maximize the national benefits, to promote the peaceful exploration and utilization of space, and to guarantee that the U.S. space program continues in a coherent manner.

Much has happened since the United States first mobilized efforts in space in 1958 in response to the Soviet challenge. No longer is the only competition in space the Soviet Union, and no longer is NASA the only U.S. Government agency involved in civil space programs and space policies. Today, we face increased competition in space, particularly for commercial purposes, from the Europeans and Japanese, and we rely increasingly on space for vital private and public functions (communications and military reconnaissance) and for useful purposes (land remote sensing, navigation, and weather forecasting). The dawn of the era of space commercialization has arrived; the time has come for the United States to reaffirm its commitment to the space program and to reassess the role of the private sector and the implications of international competition if it is to safeguard its leadership position in space.

In order to maximize the economic, scientific and natural security benefits that can accrue from a space program, the Committee instructs the President to establish a National Commission of Space. The Commission shall consist of 15 members appointed by the President. The members shall be selected from among individuals from State and local governments, industry, business, labor, academia and the general population, who by reason of their background, education, training or experience, possess experience in scientific and technological pursuits, as well as the use and implications of the use of such pursuits. The Commission shall have 12 months to make a comprehensive investigation of existing and proposed space activities in the United States in order to assess their adequacy in meeting the present and future needs of the Nation. At the end of this period, the Commission shall submit the results of this study, together with recommendations for such legislation as the Commission deems appropriate. To carry out the activities of the Commission, the Committee provides $1 million from within available funds in the research and program management account.

The Committee believes that both NASA and the U.S. space program are at the threshold of a new era. The time has come to reassess the basic institutions and policy principles for civilian space activities that were established in the National Aeronautics and Space (NAS) Act of 1958 and to reaffirm the Nation's commitment to preeminence in space; the time has come to investigate existing and proposed space activities and to review the known and possible

economic, social, environmental, foreign policy and national security needs.

To insure this process, the Committee instructs the National Commission on Space to consider a broad array of issues, including:

The adequacy of the National Aeronautics and Space Act of 1958 to serve as a basis for future national space policy;

Alternative roles and relationships of the civil and national security space programs;

Alternative roles and relationships of the private and public sectors in national space efforts;

The suitability of existing Federal organizational arrangements to carry out future governmental responsibilities in space research, technology development, and applications;

The opportunities for, and barriers to, private sector utilization of the space environment and participation in national space programs; and

Considerations involving international cooperation and competition in the utilization of the space environment.

NASA, since its establishment in 1958, has had phenomenal success in its programs of research, technology development, and space utilization for the benefit of all mankind. The world has shared in the success of the Moon landings, the spectacular images of Jupiter and Saturn, and of course, the Space Shuttle. Our country's newest space initiative, which this Committee fully endorses, is the administration's proposal to develop within a decade a permanently manned space station. Less spectacular but extremely beneficial to mankind are many other NASA research projects.

However, in spite of these advances, there is still no *overall* agreement about the direction or scope the civilian space program should assume in the future. As noted in a 1982 Office of Technology Assessment Report, "Civilian Space Policy and Applications:"

> The lack of consensus is of concern because many desirable space activities require continued Federal support. The Government continues to play a crucial role in at least four areas that are essential to the Nation's future in space but have little potential for immediate commercial return: contribution to advanced R&D, continuation of space science, provision of public goods and services, and regulation/coordination of national efforts, particularly with respect to international agreements.
>
> The failure to agree about the aims of the U.S. space program has occurred as other nations have been expanding their own programs. When the U.S. space program began, the Soviet Union was our only competitor in space. The Soviets have never challenged our leadership in space applications. Now, however, international competition in space applications is a reality. The Europeans and the Japanese have targeted specific space technologies for development, and they will soon be providing stiff competition for services theretofore offered only by the United States. Their increased activities threaten the loss of significant revenue opportunities for the United States as well as a potential loss of prestige and influence. Japanese and Eu-

ropean technologies now capture a small but growing portion of the world market in satellite communications technology. Their position is likely to strengthen in time. In the near future they are also likely to be in a similar position with respect to launch services and remote sensing systems.

Unless the United States is prepared to commit more of its public and private resources to space than it now does, it will lose its preeminence in space applications during the 1980s. Both technological and commercial leadership are at stake. The U.S. leadership position will depend not only or even primarily on spending more money, but on effectively allocating our technical, financial, and institutional resources to meet international competition. Given the likely constraints on the Federal budget, it will be important to decide in what areas the United States wishes to compete, because attempts to maintain a comprehensive program without additional capital and manpower may lead to second-best technology and systems and/or inadequate institutional support.

To assist in the creation of the consensus so vital for long-term space programs and policies, the Committee feels that it is most appropriate for a National Commission on Space to be created. The Committee notes that in 1966 a similar situation occurred in the area of ocean development. The oceans had been viewed largely as a scientific curiosity and a means for transportation. The potential for marine resource development was really just getting under way. There also were a number of policy issues related to the utilization of the oceans. In response to this situation, the Committee recommended that Congress establish a Marine Resources Commission to be headed by Julius Stratton. The Stratton Commission had an excellent and diverse membership that was supported by a strong professional staff. They reviewed the diverse Federal oceans programs and the Government's ability to respond to various opportunities, and the Commission's report provided an extremely valuable guide in the oceans area.

The Committee feels that the National Commission on Space will provide a long-term guide of comparable value to the civilian space policy area.

The Committee realizes that a Senior Interagency Group (SIG) on Space has been created within the administration to decide space policy issues. However, the SIG, which is an arm of the National Security Council, is a questionable mechanism for handling civilian space policy issues. Space policy needs more public discourse and public consensus. Under the SIG arrangement, it is not possible to formulate such a public civilian space policy and to generate the necessary broad-based public support.

The Committee recalls that in 1969 an interagency Space Task Group, comparable to today's SIG, was established to assess the post-Apollo era space program. That Space Task Group's final report, "The Post-Apollo Space Program: Directions for the Future," went nowhere, despite its laudable goals and objectives, because it failed to provide a forum for public discourse or to establish a public consensus. Today's SIG faces a similar fate. Both of these interagency task forces lack the potential to increase the public's understanding of the values derived from space activity or the public's understanding and acceptance of long-term goals and objectives which establish the framework for the space program.

The Committee feels that this understanding and the public support required for a long-term commitment to space can best be fostered through the establishment of a National Commission on Space. To quote from the above-mentioned OTA report on civilian space policy:

> A pervasive element is the lack of consistent long-term goals and clear policy initiatives, from either the executive or the legislative branches of the Government. This situation derives in part from the fact that since the Apollo decision was made in 1961, the number of major actors in civilian space activities has increased from one agency (NASA) to include six Federal agencies and numerous private firms. Not surprisingly, the many groups with direct and indirect interests in space agree neither about the overall importance of the civilian space program nor about specific applications projects. In the absence of broad consensus and a means for deciding between opposing views, the scope of individual projects is determined by the annual budget deliberations among the executive agencies, the Office of Management and Budget (OMB), and Congress. Over time, the sum of these decisions determines the overall course of the space program. However, the annual budget cycle bears little relationship to the long-term evolutionary cycle of space systems. In addition, OMB has not chosen to view investment in space activities from a long-range perspective. Until such time as a broad consensus is formed, it is left to the President or Congress to set forth a coherent, strategic framework for civilian space policy. In the absence of such direction, the current drift will continue and worsen. . .
>
> In order to plan for the future of the space program in the context of other national needs, the United States needs a multi-representative forum to discuss and recommend comprehensive, long-term goals. Such a forum could coordinate the interests of all the major actors in order to allow equitable and stable decisions to be made about the overall direction of the civilian space program. Though such a body would not itself direct the course of the space program, because this responsibility lies with the President and Congress, it could focus the debate and provide timely advice. . .
>
> A device that is occasionally employed to investigate a broad area of national interest is a Presidential or National (implying congressional and private involvement) commission, board, committee, or council. . .
>
> One possibility for space is to charter for a specified term, a "National Space Commission" with membership from the general public, State and local governments, in-

dustry (particularly aerospace and electronics firms), academia, Congress, and the executive branch—NASA, State, DOD, Interior, Commerce, and Agriculture. The Commission would be charged with reviewing and assessing the civilian space program and its benefits, and recommending long- and short-term objectives, and a time frame for their achievement. The product of the Commission would be a major report, recommending short- and long-term goals for the U.S. space program. The Commission would be publicly supported; following its report, congressional hearings could be held on its recommendations, and legislation prepared for consideration by Congress.

Such a forum enables participation from a broad set of interests in developing program goals, it operates in a manner that is outside normal channels and hence would be less threatening to the annual budget preparation process; it would be public and could solicit public input as appropriate; and it would serve as an expression of broad national and bipartisan support for the civilian space program. In order to provide a specific objective for such a group, a major report should probably be specified, with annual updates for the life of the Commission.

A National Space Commission, because of its public, short-term nature, could not substitute for a means within the administratioin to resolve issues, develop policy proposals, review goals, and set strategy for the space program. The Commission therefore is complementary to the previous two options, although it would deal with many of the issues. The Commission would have the advantage of being able to evaluate public response and support, and to focus that support on specific goals. It also provides a device for full discussion of congressional, executive branch, and private sector views in a constructive setting.

The Committee agrees with OTA's analysis and supports the establishment of a National Commission on Space. The Committee believes that such a Commission will reinforce our resolve to utilize the space environment for the maximum national benefit, will make recommendations on a number of issues and programs that will shape the future of the space program, will provide the public support and commitment required to maintain U.S. preeminence in space, and will help mobilize our national spirit and resolve and give direction to our space program.

The Committee instructs the President to create a National Commission on Space within 90 days of the date of enactment of this legislation. The Committee looks forward to working with the President and the Commission in formulating long-term space policy options and goals and in responding to the challenges and opportunities of space.

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, D.C., May 10, 1984.

Hon. Bob Packwood,
Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate, Dirksen Senate Office Building, Washington, D.C.

Dear Mr. Chairman: The Congressional Budget Office has prepared the attached cost estimate for H.R. 5154, the National Aeronautics and Space Administration Act of 1985.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

Rudolph G. Penner.

Congressional Budget Office Cost Estimate

1. Bill number: H.R. 5154.
2. Bill title: The National Aeronautics and Space Administration Act of 1985.
3. Bill status: As ordered reported by the Senate Committee on Commerce, Science and Transportation, May 8, 1984.
4. Bill purpose: The bill authorizes the appropriation of $7,582 million for the National Aeronautics and Space Administration (NASA) for fiscal year 1985 and establishes a National Commission on Space. The authorization includes $2,790 million for the production and operation of the space shuttle, $150 million for development of a space station, $2,366 million for other research and development activities, and $796 million for the space tracking system. The bill also includes $150 million for construction of facilities and $1,331 million for research and program management. Also authorized are such sums as may be necessary for increases in employee benefits as authorized by law. The amounts authorized are $91 million above the President's 1985 budget request for NASA and approximately $385 million above the 1984 appropriations for NASA.

As established in this bill, the National Commission on Space would formulate a long-range plan for the civilian space program and submit the paln to the President and the Congress within twelve months. The commission would be composed of 15 members appointed by the President and representatives of various government agencies. Of the amounts authorized in this bill for NASA research and program management, $1 million is to be used for the activities of the commission. The authorization for the commission ends 60 days after the report is submitted.

5. Estimated cost to the Federal Government:

[by fiscal years, in millions of dollars]

	1985	1986	1987	1988	1989
Estimated authorization levels:					
Function 250—Civilian space	6,885				

	1985	1986	1987	1988	1989
Function 400—Aeronautics	697				
Function 920—Pay raises	33				
Total	7,615				
Estimated outlays:					
Function 250—Civilian space	5,101	1,505	261	17	1
Function 400—Aeronautics	453	189	48	4	3
Function 920—Pay raises	31	2			
Total	5,585	1,696	309	21	4

Basis of estimate: The authorization levels are the amounts specified in the bill, plus an estimated $33 million for pay increses in fiscal year 1985 as authorized by the bill. The estimate of outlays assumes that all funds authorized will be appropiated prior to the beginning of fiscal year 1985 and that spending will reflect historical patterns.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On March 21, 1984, the Congressional Budget Office prepared a cost estimate on H.R. 5154, the National Aeronautics and Space Administration Act of 1985, as ordered reported by the House Committee on Science and Technology. The House bill authorized the appropriation of $7,531 million in 1985 for NASA and a National Commission on Space, $51 million less than the amount authorized in the Senate Commerce Committee version.

9. Estimate prepared by: Jeff Nitta.

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:

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 the nature of these activities is such that there is no regulatory impact on individuals and businesses and no effect on individual privacy.

In accordance with the establishment of the National Commission on Space, as called for in title II of this bill, the Committee expects that there will be an additional paperwork impact as the Commission performs its study and analysis. However, the Committee believes that this impact will not be burdensome. When the Commission delivers its report to the President and Congress, approximately 1 year after the establishment of the Commission, the

Commission will expire. At this time, the Committee will be able to reassess the paperwork impact of the Commission.

Section-by-Section Analysis

Section 1.—The first section states the short title of the legislation, the "National Aeronautics and Space Administration Act, 1985".

TITLE I

Sec. 101.—An authorization of $7,582.4 million is provided as follows:

(a) $2,516.1 million for "Research and Development";

(b) $3,585.3 million for "Space Flight, Control, and Data Communications";

(c) $150.0 million for "Construction of Facilities"; and

(d) $1,331.0 million for "Research and Program Management".

Sec. 102.—Authorization is provided for an increase in the "Construction of Facilities" funds of up to 10 percent, at the discretion of the NASA Administrator, or 25 percent, following a report to the Senate and House authorization Committees justifying the increase.

Sec. 103.—Up to ½ of 1 percent of the funds appropriated for "Research and Development" and "Space Flight, Control, and Data Communications" may be transferred to "Construction of Facilities". This amount then may be added to $10 million of the "Construction of Facilities" appropriations for additional construction of facilities and land acquisition, if the NASA Administrator justifies the expenditure.

Sec. 104.—No appropriations may be used for any program deleted by Congress and no appropriations may exceed the amount authorized for that particular program. For NASA to obtain funding for programs not presented to the Senate and House in the routine manner, NASA must first prepare a report justifying the proposal. Then, 30 days must elapse after receipt by the Senate and the House of this report.

Sec. 105.—Consideration shall be given to geographical distribution of Federal research funds whenever feasible.

Sec. 106.—Funding is provided to augment the structural spares for the current four-orbiter Space Shuttle fleet and to maintain production readiness for the development of a fifth orbiter.

Sec. 107.—The civil space station may not be used to carry or to deploy in space nuclear weapons or any other weapons of mass destruction and may be used only for peaceful purposes.

Sec. 108.—NASA should, as expeditiously as possible, finalize and enter into a contract to develop the Advanced Communications Technology Satellite, which is funded under research and development in section 101 of this title. Furthermore, NASA should enter into this contract only with the firm with which it was previously negotiating.

Sec. 109.—This section amends the National Aeronautics and Space Act of 1958 to require NASA to fully support space commer-

cialization and to encourage NASA's expanded activity in the Earth Sciences.

Sec. 110.—This section approves NASA's request to allow the NASA Administrator to transfer title to personal property loaned by NASA to academic institutions or nonprofit organizations, once NASA ascertains that it no longer needs the property.

TITLE II

Sec. 201.—This title may be cited as the "National Commission on Space Act".

Sec. 202.—The purpose of the National Commission on Space (Commission) is to assist the United States in maintaining its preeminence in space and to develop policy and program options for our Nation's civil space program.

Sec. 203.—Congress has found and declared that the U.S. space program has provided social, economic, and national security benefits to our Nation. Furthermore, as we enter a new era of international competition and cooperation in space, and as the private sector evolves as a major participant in the space environment, our Nation's interest would be best served by a public forum to identify policy and program options for our civilian space program.

Sec. 204. This section outlines the framework and membership for the Commission, the most significant aspects of which are:

1. The President shall appoint 15 qualified representatives from business, academia, and State and local governments to serve on the Commission. One of these members shall serve as Chairman of the Commission and one shall serve as Vice Chairman;
2. The President shall appoint four individuals who are employees of the Federal Government to serve as ex officio members of the Commission;
3. The President shall appoint two U.S. Senators and two U.S. Representatives to serve as advisory members of the Commission; and
4. The Commission shall cease to exist 60 days after it has submitted the report required in section 205.

Sec. 205.—The Commission shall review our Nation's public and private capabilities in space science, technology, and applications and assess how our Nation's interests can be best served by these and additional capabilities. Furthermore, the Commission will identify, among other things, alternative roles and relationships of the civilian and national security space programs; the opportunities for and barriers to private sector utilization of space; and international competition and cooperation in space.

Within 12 months after the establishment of the Commission, the Commission shall submit to the President and to the Senate Committee on Commerce, Science, and Transportation and the House Committee on Science and Technology the results of this study along with appropriate recommendations.

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):

THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Section 102 of that Act

SEC. 102. (a)-(b) * * *

(c) The Congress declares that the general welfare of the United States requires that the National Aeronautics and Space Administration seek and encourage, to the maximum extent possible, the fullest commercial use of space.

[(c)] *(d)* The aeronautical and space acitivities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:

(1) The expansion of human knowledge *of the Earth and* of phenomena in the atmosphere and space;

(2) The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;

(3) The development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space;

(4) The establishment of long-range studies of the potential benefits to be gained from, the opportunities for, and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes;

(5) The preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere;

(6) The making available to agencies directly concerned with national defense of discoveries that have military value or significance, and the furnishing by such agencies, to the civilian agency established to direct and control nonmilitary aeronautical and space activities, of information as to discoveries which have value or significance to that agency;

(7) Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof; and

(8) The most effective utilization of the scientific and engineering resources of the United States, with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

[(d)] *(e)* The Congress declares that the general welfare of the United States requires that the unique competence in scientific and engineering systems of the National Aeronautics and Space Administration also be directed toward ground propulsion systems research and development. Such development shall be conducted so as to contribute to the objectives of developing energy- and petroleum-conserving ground propulsion systems, and of minimizing the environmental degradation caused by such systems.

[(e)] *(f)* The Congress declares that the general welfare of the United States requires that the unique competence in scientific and engineering systems of the National Aeronautics and Space Administration also be directed toward the development of advanced automobile propulsion systems. Such development shall be conducted so as to contribute to the achievement of the purposes set forth in section 302(b) of the Automotive Propulsion Research and Development Act of 1978.

[(f)] *(g)* The Congress declares that the general welfare of the United States requires that the unique competence of the National Aeronautics and Space Administration in science and engineering systems be directed to assisting in bioengineering research, development, and demonstration programs designed to alleviate and minimize the effects of disability.

[(g)] *(h)* It is the purpose of this Act to carry out and effectuate the policies declared in subsections (a), (b), (c), (d), [(e), and (f)] *(e), (f), and (g).*

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98TH CONGRESS
2d Session
HOUSE OF REPRESENTATIVES
REPORT
98-873

AUTHORIZING APPROPRIATIONS FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JUNE 27, 1984.—Ordered to be printed

Mr. FUQUA, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 5154]

The committee of conference on the disagreeing votes of the two Houses on the amendment of the Senate to the bill (H.R. 5154) to authorize appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and research and program management, 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 House recede from its disagreement to the amendment of the Senate and agree to the same with an amendment as follows:

In lieu of the matter proposed to be inserted by the Senate amendment insert the following:

That this Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1985".

TITLE I—AUTHORIZATIONS OF APPROPRIATIONS

SEC. 101. There is hereby authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1984:

(a) For "Research and development", for the following programs:

(1) Space transportation capability development, $351,400,000;

(2) Space station, $150,000,000;

(3) Physics and astronomy, $696,200,000;

(4) Life sciences, $63,300,000;

(5) Planetary exploration, $296,900,000;

(6) Space applications, $390,100,000 of which $45,000,000 is authorized only for the Advanced Communications Technology Satellite flight program which is designed to lead to a launch of such satellite no later than 1989;

(7) Technology utilization, $9,500,000;

(8) Aeronautical research and technology, $352,400,000, of which $24,000,000 is authorized only for activities which are designed to lead to a flight test of a single rotation or counter rotation turboprop concept no later than 1987 (and for supporting research and technology);

(9) Space research and technology, $150,000,000; and

(10) Tracking and data advanced systems, $15,300,000.

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

(1) Space shuttle production and operational capability, $1,470,600,000;

(2) Space transportation operations, $1,319,000,000; and

(3) Space and ground network, communications and data systems, $795,700,000.

(c) Except as provided in section 102(a), for "Construction of facilities", including land acquisition, as follows:

(1) Repairs to test stand 500, George C. Marshall Space Flight Center, $1,600,000;

(2) Space shuttle facilities at various locations as follows:

(A) Modifications of site electrical substation, Lyndon B. Johnson Space Center, $3,200,000;

(B) Modification for single engine testing, National Space Technology Laboratories, $3,000,000;

(C) Construction of launch complex 39 logistics facility, John F. Kennedy Space Center, $10,000,000;

(D) Construction of solid rocket booster assembly and refurbishment facility, John F. Kennedy Space Center, $15,000,000;

(3) Space shuttle payload facilities at various locations as follows:

(A) Construction of additions to cargo hazardous servicing facility, John F. Kennedy Space Center, $4,600,000;

(B) Construction of biomedical research facility, Ames Research Center, $2,100,000;

(4) Construction of addition to network control center, Goddard Space Flight Center, $2,200,000;

(5) Construction of Earth and space science laboratory, Jet Propulsion Laboratory, $12,200,000;

(6) Construction of numerical aerodynamic simulation facility, Ames Research Center, $11,500,000;

(7) Modifications of the 8-foot high temperature tunnel, Langley Research Center, $13,800,000;

(8) Construction of 34-meter antenna, Madrid, Spain, $6,000,000;

(9) Modifications of 64-meter antenna, DSS-63, Madrid, Spain, $7,800,000;

(10) Repair of facilities at various locations, not in excess of $750,000 per project, $20,000,000;

(11) Rehabilitation and modification of facilities at various locations, not in excess of $750,000 per project, $25,000,000;

(12) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of $500,000 per project, $5,000,000; and

(13) Facility planning and design not otherwise provided for, $12,000,000.

(d)(1) For "Research and program management", $1,316,000,000, and such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

(2) Of the funds authorized under paragraph (1), $1,000,000 shall be available for the activities of the National Commission on Space, established pursuant to title II of this Act.

(e) Notwithstanding the provisions of subsection (h), 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 insure 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 Speaker of the House of Representatives and the President of the Senate and the Committee on Science 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.

(f) 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) maintenance and operation of facilities, and support services contracts may be entered into under the "Research and program management" appropriation for periods not in excess of twelve months beginning at any time during the fiscal year.

(g) 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.

(h) Of the funds appropriated pursuant to subsections (a), (b), and (d), not in excess of $100,000 for each 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: Provided, That, of the funds appropriated pursuant to subsection (a) or (b), not in excess of $500,000 for each project, including collateral equipment, may be used for any of the foregoing for unforeseen programmatic needs.

SEC. 102. (a) Notwithstanding the provisions of section 101(c) of the title, the total amount authorized to be appropriated by such section shall be $5,000,000 less than the sum of the amounts contained in paragraphs (1) through (13) of such section for individual projects.

(b) After the reduction specified in subsection (a) of this section is made, authorization is granted whereby any of the amounts prescribed in paragraphs (1) through (12) inclusive, of section 101(c)—

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

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science 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 per centum, to meet unusual cost variations, but the total cost of all work authorized under such paragraphs shall not exceed the total of the amounts specified in such paragraphs.

SEC. 103. Not to exceed one-half of 1 per centum of the funds appropriated pursuant to section 101(a) or 101(b) hereof may be transferred to and merged with the "Construction of facilities" appropriation, and, when so transferred, together with $10,000,000 of funds appropriated pursuant to section 101(c) hereof (other than funds appropriated pursuant to paragraph (13) of such section) shall be available for expenditure to construct, expand, and modify laboratories and other installation at any location (including locations specified in section 101(c)), if (1) the Administrator determines such action to be necessary because of changes in the national program of aeronautical and space activities or new scientific or engineering developments, and (2) the Administrator determines 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 funds so made available 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 portion of such sums may be obligated for expenditure or expended to construct, expand, or modify laboratories and other installations unless a period of thirty days has passed after the Administrator or the Administrator's designee has transmitted to the Speaker of the House of Representatives and to the President of the Senate and to the Committee on Science and Technology of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a written report containing a full and complete statement concerning (A) the nature of such construction, expansion, or modification, (B) the cost thereof including the cost of any real estate action pertaining thereto, and (C) the reason why such construction, expansion, or modification is necessary in the national interest.

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 House Committee on Science and Technology or the Senate Committee on Commerce, Science, and Transportation,

(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 sections 101(a), 101(b), and 101(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 thirty days has passed after the receipt by the Speaker of the House of Representatives and the President of the Senate and 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.

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.

SEC. 106. The authorization for shuttle production and operational capability includes provisions for the production of structural spares and the critical skills necessary for installation of electrical, mechanical, and fluid systems thereby maintaining production readiness for a fifth orbiter vehicle.

SEC. 107. No civil space station authorized under section 101(a)(2) of this title 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.

SEC. 108. (a) The Administrator of the National Aeronautics and Space Administration is directed to continue and to enhance such Administration's programs of remote-sensing research and development.

(b) The Administrator is authorized and encouraged to—

(1) conduct experimental space remote-sensing programs (including applications demonstration programs and basic research at universities);

(2) develop remote-sensing technologies and techniques, including those needed for monitoring the Earth and its environment; and

(3) conduct such research and development in cooperation with other public and private research entities, including private industry, universities, Federal, State, and local government agencies, foreign governments, and international organizations, and to enter into arrangements (including joint ventures) which will foster such cooperation.

SEC. 109. It is the intent of the Congress that expenditures made from sums appropriated pursuant to the authorization contained in subsection (a)(8) of section 101 of this Act for activities in the advanced turboprop program should be recouped by the National Aeronautics and Space Administration if and when commercially successful products are developed by the aircraft industry as a direct result of such activities. For this purpose the Administrator shall submit to Congress within sixty days of enactment of this Act a plan for the payment to the Administrator of royalties by firms in the aircraft industry with respect to any such products which may be so developed by them.

SEC. 110. (a) Section 102 of the National Aeronautics and Space Act of 1958, as amended, is amended—

(1) by striking out "(e), and (f)" in subsection (g) and inserting in lieu thereof "(e), (f), and (g)";

(2) by redesignating subsections (c) through (g) as subsections (d) through (h); and

(3) by inserting after subsection (b) the following new subsection:

"(c) The Congress declares that the general welfare of the United States requires that the National Aeronautics and Space Administration (as established by title II of this Act) seek and encourage, to the maximum extent possible, the fullest commercial use of space.".

(b) Section 102(d)(1) of the National Aeronautics and Space Act of 1958, as amended (and as redesignated by subsection (a) of this section), is amended by inserting "of the Earth and" after "knowledge".

SEC. 111. (a) Any Federal personal property may be disposed of in accordance with subsection (b) if such property—

(1) is scientific research or development equipment and is not personal property that may be used for general administrative purposes;

(2) has been loaned by the National Aeronautics and Space Administration to any academic institution or nonprofit organization; and

(3) as of March 31, 1984, has been on loan to any such institution or organization for at least two years.

(b) The Administrator may transfer title to property described in subsection (a) to an academic institution or nonprofit organization if the Administrator certifies that—

(1) such property is being used by the institution or organization holding such property for a purpose consistent with the use intended when the property was loaned; and

(2) the Administration will no longer need such property.

TITLE II—NATIONAL COMMISSION ON SPACE

PURPOSE

SEC. 201. It is the purpose of this title to establish a National Commission on Space that will assist the United States—

(1) to define the long-range needs of the Nation that may be fulfilled through the peaceful uses of outer space;

(2) to maintain the Nation's preeminence in space science, technology, and applications;

(3) to promote the peaceful exploration and utilization of the space environment; and

(4) to articulate goals and develop options for the future direction of the Nation's civilian space program.

FINDINGS

SEC. 202. The Congress finds and declares that—

(1) the National Aeronautics and Space Administration, the lead civilian space agency, as established in the National Aeronautics and Space Act of 1958, as amended, has conducted a space program that has been an unparalleled success, providing significant economic, social, scientific, and national security benefits, and helping to maintain international stability and good will;

(2) the National Aeronautics and Space Act of 1958, as amended (42 U.S.C. 2451 et seq.), has provided the policy framework for achieving this success, and continues to be a sound statutory basis for national efforts in space;

(3) the United States is entering a new era of international competition and cooperation in space, and therefore this Nation must strengthen the commitment of its public and private technical, financial, and institutional resources, so that the United States will not lose its leadership position during this decade;

(4) while there continues to be a crucial Government role in space science, advanced research and development, provision of public goods and services and coordination of national and international efforts, advances in applications of space technology have raised many issues regarding public and private sector roles and relationships in technology development, applications, and marketing;

(5) the private sector will continue to evolve as a major participant in the utilization of the space environment;

(6) the Nation is committed to a permanently manned space station in low Earth orbit, and future national efforts in space will benefit from the presence of such a station;

(7) the separation of the civilian and military space programs is essential to ensure the continued health and vitality of both; and

(8) the identification of long range goals and policy options for the United States civilian space program through a high level, representational public forum will assist the President and Congress in formulating future policies for the United States civilian space program.

NATIONAL COMMISSION ON SPACE

SEC. 203. (a)(1) The President shall within ninety days of the enactment of this Act establish a National Commission on Space (hereinafter in this title referred to as the "Commission"), which shall be composed of 15 members appointed by the President. The members appointed under this subsection shall be selected from among individuals from Federal, State, and local governments, industry, business, labor, academia, and the general population who, by reason of their background, education, training, or experience, possess expertise in scientific and technological pursuits, as well as the use and implications of the use of such pursuits. Of the fifteen members appointed, not more than three members may be employees of the Federal Government. The President shall designate one of the members of the Commission appointed under this subsection to serve as Chairman, and one of the members to serve as Vice Chairman. The Vice Chairman shall perform the functions of the Chairman in the Chairman's absence.

(2) Members appointed by the President under paragraph (1) of this subsection may be paid at a rate not to exceed the daily equivalent of the annual rate of basic pay in effect under section 5332 of title 5, United States Code, for grade GS-18 of the General Schedule for each day, including traveltime, during which such members are engaged in the actual performance of the duties of the Commission. While away from their homes or regular places of business, such members may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed under section 5703 of title 5, United States Code. Individuals who are not officers or employees of the United States and who are members of the Commission shall not be considered officers or employees of the United States by reason of receiving payments under this paragraph.

(b)(1) The President shall appoint one individual from each of the following Federal departments and agencies to serve as ex officio, advisory, non-voting members of the Commission (if such department or agency does not already have a member appointed to the Commission pursuant to subsection (a)(1)):

(A) National Aeronautics and Space Administration.

(B) Department of State.

(C) Department of Defense.

(D) Department of Transportation.

(E) Department of Commerce.

(F) Department of Agriculture.

(G) Department of the Interior.

(H) National Science Foundation.

(I) Office of Science and Technology Policy.

(2) The President of the Senate shall appoint two advisory members of the Commission from among the Members of the Senate and the Speaker of the House of Representatives shall appoint two advisory members of the Commission from among the Members of the House of Representatives. Such members shall not participate, except in an advisory capacity, in the formulation of the findings and recommendations of the Commission.

(3) Members of the Commission appointed under this subsection shall not be entitled to receive compensation for service relating to the performance of the duties of the Commission, but shall be entitled to reimbursement for travel expenses incurred while in the actual performance of the duties of the Commission.

(c) The Commission shall appoint and fix the compensation of such personnel as it deems advisable. The Chairman of the Commission shall be responsible for—

(1) the assignment of duties and responsibilities among such personnel and their continuing supervision; and

(2) the use and expenditures of funds available to the Commission.

In carrying out the provisions of this subsection, the Chairman shall act in accordance with the general policies of the Commission.

(d) To the extent permitted by law, the Commission may secure directly from any executive department, agency, or independent instrumentality of the Federal Government any information it deems necessary to carry out its functions under this Act. Each such department, agency, and instrumentality shall cooperate with the Commission and, to the extent permitted by law and upon request of the Chairman of the Commission, furnish such information to the Commission.

(e) The Commission may hold hearings, receive public comment and testimony, initiate surveys, and undertake other appropriate activities to gather the information necessary to carry out its activities under section 204 of this title.

(f) The Commission shall cease to exist sixty days after it has submitted the plan required by section 204(c) of this title.

FUNCTIONS OF THE COMMISSION

SEC. 204. (a) The Commission shall study existing and proposed space activities and formulate an agenda for the United States civilian space program. The Commission shall identify long range goals, opportunities, and policy options for United States civilian space activity for the next twenty years. In carrying out this responsibility, the Commission shall take into consideration—

(1) the commitment by the Nation to a permanently manned space station in low Earth orbit;

(2) present and future scientific, economic, social, environmental, and foreign policy needs of the United States, and methods by which space science, technology, and applications initiatives might address those needs;

(3) the adequacy of the Nation's public and private capability in fulfilling the needs identified in paragraph (2);

(4) how a cooperative interchange between Federal agencies on research and technology development programs can benefit the civilian space program;

(5) opportunities for, and constraints on, the use of outer space toward the achievement of Federal program objectives or national needs;

(6) current and emerging issues and concerns that may arise through the utilization of space research, technology development, and applications;

(7) the Commission shall analyze the findings of the reviews specified in paragraphs (1) through (6) of this subsection, and develop options and recommendations for a long range national civilian space policy plan.

(b) Options and recommendations submitted in accordance with subsection (a)(7) of this section shall include, to the extent appropriate, an estimate of costs and time schedules, institutional requirements, and statutory modifications necessary for implementation of such options and recommendations.

(c) Within twelve months after the date of the establishment of the Commission, the Commission shall submit to the President and to the Committee on Commerce, Science and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives, a long range plan for United States civilian space activity incorporating the results of the studies conducted under this section, together with recommendations for such legislation as the Commission determines to be appropriate.

And the Senate agree to the same.

DON FUQUA,
DAN GLICKMAN,
HAROLD L. VOLKMER,
BILL NELSON,
MICHAEL A. ANDREWS,
MANUEL LUJAN, Jr.,
WILLIAM CARNEY
for section III only,
GEORGE E. BROWN, Jr.,
Managers on the Part of the House.

BOB PACKWOOD,
BARRY GOLDWATER,
SLADE GORTON,
HOWELL HEFLIN,
FRANK R. LAUTENBERG,
Managers on the Part of the Senate.

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 amendment of the Senate to the bill H.R. 5154 to authorize appropriations to the National Aeronautics and Space Administration for fiscal year 1983 for Research and Development, Construction of Facilities, and Research and Program Management, and for other purposes, submit the following joint statement to the House and the Senate in explanation of the disposition of the differences agreed upon by managers and recommended in the accompanying conference report.

The NASA request for fiscal year 1985 totaled $7,491,400,000. The House authorized $7,490,000,000 and the Senate amendment authorized $7,582,400,000. The committee of conference agrees to a total authorization for fiscal year 1985 of $7,526,400,000 as follows:

SUMMARY OF ADJUSTMENTS TO H.R. 5154—NASA FISCAL YEAR 1985 AUTHORIZATION

Program	Budget request	House action	Senate action	Committee of conference
Research and development:				
1(a)(1) space transportation cap. dev	$361,400,000	$346,400,000	$356,400,000	$351,400,000
1(a)(2) space station	150,000,000	150,000,000	150,000,000	150,000,000
1(a)(3) Physics and astronomy	677,200,000	687,200,000	705,200,000	696,200,000
1(a)(4) life sciences	63,300,000	63,300,000	63,300,000	63,300,000
1(a)(5) planetary exploration	286,900,000	296,900,000	296,900,000	296,900,000
1(a)(6) space applications	344,100,000	384,100,000	407,100,000	390,100,000
1(a)(7) technology utilization	9,500,000	9,500,000	9,500,000	9,500,000
1(a)(?) space commercialization	0	0	5,000,000	0
1(a)(8) aeronautical research and technology	342,400,000	347,400,000	357,400,000	352,400,000
1(a)(9) space research and technology	150,000,000	150,000,000	150,000,000	150,000,000
1(a)(10) tracking and data acquisition	15,300,000	15,300,000	15,300,000	15,300,000
Total: Research and development	2,400,100,000	2,450,100,000	2,516,100,000	2,475,100,000
Space flight, control and data communication				
1(b)(1) space shuttle prod./oper. cap	1,465,600,000	1,490,600,000	1,470,600,000	1,470,600,000
1(b)(2) space transportation oper	1,339,000,000	1,329,000,000	1,319,000,000	1,319,000,000
1(b)(3) space tracking and data acq	795,700,000	780,700,000	795,700,000	795,700,000
Total: Space flight, control and data communications	3,600,300,000	3,600,300,000	3,585,300,000	3,585,300,000
1(c) construction of facilities	160,000,000	150,000,000	150,000,000	150,000,000
1(d) research and program management	1,331,000,000	1,331,000,000	1,331,000,000	1,316,000,000
Subtotal	7,491,400,000	7,531,400,000	7,582,400,000	7,526,400,000
General reduction	0	41,400,000	0	0
Grand total	7,491,400,000	7,490,000,000	7,582,400,000	7,526,400,000

The points in disagreement and the resolution of them are as follows:

1. NASA requested $361,400,000 for Space Transportation Capability Development activities in fiscal year 1985.

The House authorized $346,400,000, a decrease of $15 million as follows: a decrease of $10 million for Engineering and Technical Base activities due to a reduced level of effort; and a decrease of $5 million for Payload Operations and Support Equipment associated with payload schedule delays.

The Senate authorized $356,400,000, a decrease of $5 million, all of which was for Payload Operations and Support Equipment associated with payload and schedule delays.

The Conference agreement authorizes $351,400,000 for Space Transportation Capability Development activities reflecting a $5 million reduction in Engineering and Technical Base activities and a $5 million reduction in Payload Operations and Support Equipment.

2. NASA requested $677,200,000 for Physics and Astronomy activities in fiscal year 1985.

The House authorized $687,200,000, an increase of $10 million which included: an increase of $4 million for Shuttle/Spacelab Payload Development activities to fund advanced technology development of the Solar Optical Telescope (SOT) and the Shuttle Infrared Telescope Facility (SIRTF); and an increase of $6 million for Research and Analysis activities—of which $3 million is for university laboratory equipment, and $3 million is to support advanced technology development on the advanced X-ray Astronomy Facility (AXAF).

The Senate authorized $705,200,000, an increase of $28 million which included: an increase of $14 million for Shuttle/Spacelab Payload Development activities—$6 million of which is to fund advanced technology development of the Solar Optical Telescope (SOT), $4 million is to fund advanced technology development of the Shuttle Infrared Telescope Facility (SIRTF), and $4 million is to fund the development of the Space Plasma Lab; and an increase of $14 million for Research and Analysis activities—$6 million of which is to support advanced technology development on the Advanced X-ray Astronomy Facility (AXAF), $3 million is to support Gravity Probe-B, $3 million is for theoretical astrophysics SR&T, and $2 million is for university instrumentation.

The Conference agreement authorizes $696,200,000 for Physics and Astronomy activities, an increase of $19 million as follows: an increase of $8 million for Shuttle/Spacelab 1 Payload development including $4 million for advanced technology development activities for the Solar Optical Telescope and the Shuttle Infrared Telescope Facility and $4 million for advanced technology development activities for the Space Plasma Laboratory and an increase of $11 million for Research and Analysis including $3 million for university instrumentation and laboratory equipment, $3 million for advanced technology development and the Advanced X-Ray Astronomy Facility, $2 million for theoretical astrophysics supporting research and technology, and $3 million for Gravity Probe-B.

3. NASA requested $286,900,000 for Planetary Exploration activities in fiscal year 1985.

The House authorized $296,900,000, an increase of $10 million. The increase is in Research and Analysis activities—with $2 million for university laboratory equipment, and $8 million for basic planetary research at universities.

The Senate authorized $296,900,000, an increase of $10 million. The increase is in Research and Analysis activities—with $2 million for university instrumentation, and $8 million for SR&T.

The Conference agreement authorizes $296,900,000 for Planetary Exploration activities, including the following: a $2 million increase for university instrumentation and laboratory equipment and an $8 million increase for basic planetary research at universities.

4. NASA requested $344,100,000 for Space Applications activities in fiscal year 1985.

The House authorized $384,100,000, a net increase of $40 million. This included: a $2 million redistribution of Solid Earth Observation funding—with a $2 million increase to measure Caribbean crustal movements, and an offsetting $2 million decrease achieved through a general reduction in Geodynamics funding; a $5 million redistribution of Environmental Observations funding—with a $5 million increase for advanced technology development for the International Solar Terrestrial Physics Program, and an offsetting $5 million reduction without prejudice for the Upper Atmosphere Research Satellite; and a $40 million increase to continue funding of an ACTS flight demonstration.

The Senate authorized $407,100,000 an increase of $63 million. This included: an $8 million increase in Environmental Observations—with a $5 million increase for advanced technology development for the International Solar Terrestrial Physics program, and a $3 million increase for university instrumentation; a $10 million increase to augment materials processing in space activities; and a $45 million increase to continue funding for an ACTS flight demonstration.

The conference agreement authorizes $390,100,000 for Space Applications activities, an increase of $46 million as follows: An increase of $2 million to measure Caribbean crustal movements within available funding for Geodynamics activities; an increase of $4 million for advanced technology development on the International Solar Terrestrial Program and $2 million for university instrumentation in Space Physics Research and Analysis; a reduction of $5 million in the Upper Atmospheric Research Satellite program without prejudice; an increase of $5 million to augment Materials Processing in Space activities; and an increase of $40 million to continue the flight demonstration program envisioned for the Advanced Communications Technology Satellite program. The intent of the additional funding for the Advanced Communications Technology Satellite program is for NASA to finalize and enter into a contract for the development of the Advanced Communications Technology Satellite as expeditiously as possible pursuant to Request for Proposal numbered 85-11907.

5. The Senate added a new line item (Space Commercialization) to their authorization bill. This line item did not appear in the NASA request for fiscal year 1985 or the House authorization bill.

The Senate authorized $5,000,000 for Space Commercialization in order to intitate National Centers of Excellence and Agency Space Commercialization activities. This presented a $5 million increase over the NASA request.

The conference agreement deletes the new line item for Space Commercialization but the House Science and Technology Committee and the Senate Commerce, Science, and Transportation Committee urge NASA to move expeditiously in establishing a high level focal point to facilitate space comercialization and direct that NASA propose a new line item for this activity in the fiscal year 1986 budget request.

6. NASA requested $342,400,000 for Aeronautical Research and Technology activities in fiscal year 1985.

The House authorized $347,400,000, a net increase of $5 million. This included: a $5 million decrease in Research and Technology Base activities—made up of a $5 million increase in high speed aeronautics, a $1 million increase in research on alternate fuels for general aviation aircraft, and a $11 million general reduction; and a $10 million increase in Advanced Propulsion Systems Technology to augment the Advanced Turboprop program. The House included language specifying that $24,000,000 million was authorized only for activities in the Advanced Turboprop Program which are designed to lead to a flight test no later than 1987.

The Senate authorized $357,400,000, a net increase of $15 million. This included: a $2 million redistribution within Research and Technology Base activities—with a $2 million increase for Advanced Ceramics Heat Engine Technology, offset by a $2 million general reduction; and a $15 million increase in Advanced Propulsion Systems Technolgy to augment the Advanced Turboprop program. The Senate included language specifying that $29 million was authorized only for activities which are designed to lead to a flight test of a single rotation or counter rotation turbo-prop concept no later than 1987.

The Conference agreement authorizes $352,400,000 for Aeronautical Research and Technology activities. This includes: an $8 million redistribution within the research and technology base made up of a $5 million increase in high-speed aeronautics, a $1 million increase in research on alternate fuel, for general aviation a $2 million increase for advanced ceramics heat engine technology and an $8 million general reduction; and a $10 million increase to augment the Advanced Turboprop Program. The Conferees adopt the Senate version of language relating to flight test of a turbo-prop concept, except that $24 million is authorized only for activities designed to lead to such a flight test.

The Committee of Conference understands that this amount is adequate to keep the program on track toward a flight test in 1987. Whether that test is conducted with the single rotation, counter rotation, or some other concept is a matter for the technical judgment of NASA. Nevertheless, the available funds should be applied so as to assure accomplishment of the flight test objective by 1987.

7. NASA requested $150,000,000 for Space Research and Technology activities in fiscal year 1985.

The House authorized the same total as that requested, but stipulated a $2 million redistribution of funds in Space Research and

Technology Base activities—with a $2 million increase to augment the SP-100 Nuclear Power program, offset by a $2 million general reduction.

The Senate authorized the NASA request.

The Conferees adopt the House position.

8. NASA requested $1,465,600,000 for Shuttle Production and Operational Capability activities in fiscal year 1985.

The House authorized $1,490,600,000, a net increase of $25 million. This included: a $50 million increase for augmentation of Orbiter structural spares and to maintain production readiness for a fifth Orbiter; a $15 million decrease in Launch and Mission Support through the deferment of less critical activities; and a $10 million decrease in Changes and Systems Upgrading—the Administrator's reserve.

The Senate authorized $1,470,600,000, a net increase of $5 million. This included: a $45 million increase for augmentation of Orbiter structural spares and to maintain production readiness for a fifth Orbiter; a $15 million decrease in Launch and Mission Support through the deferment of less critical activities; and a $25 million decrease in Changes and Systems Upgrading—the Administrator's reserve.

The Committee of Conference adopts the Senate position.

9. NASA requested $1,339,000,000 for Space Transportation Operations in fiscal year 1985.

The House authorized $1,329,000,000, a decrease of $10 million. This decrease reflected expected improvement in Shuttle operational efficiency.

The Senate authorized $1,319,000,000, a decrease of $20 million. This decrease reflected expected improvements in Shuttle operational efficiency.

The Conference agreement adopts the Senate position.

10. NASA requested $795,700,000 for Space Tracking and Data Acquisition activities in fiscal year 1985.

The House authorized $780,700,000, a decrease of $15 million. This decrease reflected expected improvements in operating efficiencies and modest reductions in service.

The Senate authorized the NASA request.

The Committee of Conference adopts the Senate position.

11. NASA requested $160,000,000 for Construction of Facilities in fiscal year 1985.

The House authorized $150,000,000, a decrease of $10 million. This decrease was the result of: a $5 million decrease in funding for the Numerical Aerodynamics Simulation Facility; and a $5 million decrease in funding for Rehabilitation and Modification activities.

The Senate authorized $150,000,000, a decrease of $10 million. This decrease was the result of: a $5 million decrease in funding for the Numerical Aerodynamics Simulation Facility; and a $5 million general reduction.

The Committee of Conference adopts the Senate position.

12. NASA requested $1,331,000,000 for Research and Program Management activities in 1985.

The House authorized the requested funding level, but stipulated that $1 million was authorized within available funds for the National Commission on Space.

The Senate authorization was the same as that for the House.

The substitute amendment authorizes $1,316,000,000 for Research and Program Management activities. One million of these funds shall be available for the activities of the National Commission on Space.

13. The House adopted Section 111 language reducing each sum in the Authorization bill by 0.55 percent.

The Senate authorization bill contains no such language.

The Conference agreement adopts the Senate position.

14. The substitute amendment resolves a number of minor technical language differences in the House and Senate actions.

15. The House bill included a new section 107 to direct NASA to continue to enhance the agency's programs of remote sensing research and development.

The Senate bill contained no similar language.

The Conference agreement includes the House provision as Section 108.

16. The Senate bill included a new Section 107 stating that the civil Space Station may not be used to carry or place into orbit any nuclear weapon or any other weapon of mass destruction, and that the Space Station may be used only for peaceful purposes.

The House bill contained no similar language.

The Conference agreement includes the Senate provision as Section 107.

17. The Senate bill included a new Section 108 stating that NASA will as expeditiously as possible finalize and enter into a contract for the development of the Advanced Communications Technology Satellite. The Section also stated that NASA must enter into that contract only with the entity with which it had been negotiating pursuant to the NASA request for proposal.

The House bill contained no similar language.

The Conference agreement deletes the Senate provision.

18. The House bill included a new Section 108 expressing the intent of Congress that government expenditures in supporting the development of prop fan technology be repaid by firms in the aircraft manufacturing industry when and if commercially successful products employing that technology are produced by such firms.

The Senate bill contained no similar language.

The Conference agreement adopts the House provision as Section 109. It is expected that NASA and the aeronautical industry will make a full faith effort to design a workable recoupment plan. The authorizing committees will then evaluate the pros and cons of the plan before making a final decision on implementation.

19. Both the House and Senate bills included a new Title II establishing a National Commission on Space. There were a number of language differences in the two bills. Some of the more important included:

The House bill provided for 14 members; the Senate 15.

The House bill specified the NASA Administrator as Vice Chairman; the Senate bill left this appointment to the President.

The Senate bill provided that members of the Commission would have to be drawn from State and local governments, industry, business, labor, and academia; the House bill contained no similar language.

The House bill specified the appointment of one individual from each of 8 Federal departments and agencies to serve as ex officio non-voting members; the Senate bill specified 4 individuals from the Federal Government without listing specific departments and agencies.

The House bill provided that Congressional advisory members be appointed by the President of the Senate and the Speaker of the House; the Senate bill provided for these appointments to be made by the President.

The Senate bill gives greater direction and identifies more issues that are to be addressed by the Commission, including:

A review of the adequacy of the National Aeronautics and Space Act

A review of the relationship between the civilian and military space programs

A review of the methods, occasions and circumstances under which the Nation should pursue a permanent presence in space.

The Conference agreement includes a revised Title II which represents a compromise. This compromise is an improvement on both the previous House and Senate versions in that it fully emphasizes the civilian and independent nature of the Commission. The House Committee on Science and Technology and the Senate Committee on Commerce, Science, and Transportation expect that the NASA Administrator will be appointed as a member of the Commission.

DON FUQUA,
DAN GLICKMAN,
HAROLD L. VOLKMER,
BILL NELSON,
MICHAEL A. ANDREWS,
MANUEL LUJAN, Jr.,
WILLIAM CARNEY
for section III only,
GEORGE E. BROWN, Jr.,
Managers on the Part of the House.

BOB PACKWOOD,
BARRY GOLDWATER,
SLADE GORTON,
HOWELL HEFLIN,
FRANK R. LAUTENBERG,
Managers on the Part of the Senate.

O

Public Law 98-361
98th Congress

An Act

July 16, 1984
[H.R. 5154]

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.

National Aeronautics and Space Administration Authorization Act, 1985.

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, 1985".

TITLE I—AUTHORIZATIONS OF APPROPRIATIONS

SEC. 101. There is hereby authorized to be appropriated to the National Aeronautics and Space Administration to become available October 1, 1984:

(a) For "Research and development", for the following programs:

(1) Space transportation capability development, $351,400,000;

(2) Space station, $150,000,000

(3) Physics and astronomy, $696,200,000;

(4) Life sciences, $63,300,000;

(5) Planetary exploration, $296,900,000:

(6) Space applications, $390,100,000 of which $45,000,000 is authorized only for the Advanced Communications Technology Satellite flight program which is designed to lead to a launch of such satellite no later than 1989;

(7) Technology utilization, $9,500,000;

(8) Aeronautical research and technology, $352,400,000, of which $24,000,000 is authorized only for activities which are designed to lead to a flight test of a single rotation or counter rotation turboprop concept no later than 1987 (and for supporting research and technology);

(9) Space research and technology, $150,000,000; and

(10) Tracking and data advanced systems, $15,300,000.

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

(1) Space shuttle production and operational capability, $1,470,600,000;

(2) Space transportation operations, $1,319,000,000; and

(3) Space and ground network, communications and data systems, $795,700,000.

(c) Except as provided in section 102(a), for "Construction of facilities", including land acquisition, as follows:

(1) Repairs to test stand 500, George C. Marshall Space Flight Center, $1,600,000;

(2) Space shuttle facilities at various locations as follows:

(A) Modifications of site electrical substation, Lyndon B. Johnson Space Center, $3,200,000;

(B) Modification for single engine testing, National Space Technology Laboratories, $3,000,000;

(C) Construction of launch complex 39 logistics facility, John F. Kennedy Space Center, $10,000,000;

(D) Construction of solid rocket booster assembly and refurbishment facility, John F. Kennedy Space Center, $15,000,000;

(3) Space shuttle payload facilities at various locations as follows:

(A) Construction of additions to cargo hazardous servicing facility, John F. Kennedy Space Center, $4,600,000;

(B) Construction of biomedical research facility, Ames Research Center, $2,100,000;

(4) Construction of addition to network control center, Goddard Space Flight Center, $2,200,000;

(5) Construction of Earth and space science laboratory, Jet Propulsion Laboratory, $12,200,000;

(6) Construction of numerical aerodynamic simulation facility, Ames Research Center, $11,500,000;

(7) Modifications of the 8-foot high temperature tunnel, Langley Research Center, $13,800,000;

(8) Construction of 34-meter antenna, Madrid, Spain, $6,000,000;

(9) Modifications of 64-meter antenna, DSS-63, Madrid, Spain, $7,800,000;

(10) Repair of facilities at various locations, not in excess of $750,000 per project, $20,000,000;

(11) Rehabilitation and modification of facilities at various locations, not in excess of $750,000 per project, $25,000,000;

(12) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of $500,000 per project, $5,000,000; and

(13) Facility planning and design not otherwise provided for, $12,000,000.

(d)(1) For "Research and program management", $1,316,000,000, and such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

(2) Of the funds authorized under paragraph (1) $1,000,000 shall be available for the activities of the National Commission on Space, established pursuant to title II of this Act.

(e) Notwithstanding the provisions of subsection (h), 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 insure 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 Speaker of the House of Representatives and the President of the Senate and the Committee on Science 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.

Grants.

42 USC 2459a.

(f) 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) maintenance and operation of facilities, and support services contracts may be entered into under the "Research and program management" appropriation for periods not in excess of twelve months beginning at any time during the fiscal year.

(g) 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.

(h) Of the funds appropriated pursuant to subsections (a), (b), and (d), not in excess of $100,000 for each 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: *Provided*, That, of the funds appropriated pursuant to subsection (a) or (b), not in excess of $500,000 for each project, including collateral equipment, may be used for any of the foregoing for unforeseen programmatic needs.

SEC. 102. (a) Notwithstanding the provisions of section 101(c) of the title, the total amount authorized to be appropriated by such section shall be $5,000,000 less than the sum of the amounts contained in paragraphs (1) through (13) of such section for individual projects.

(b) After the reduction specified in subsection (a) of this section is made, authorization is granted whereby any of the amounts prescribed in paragraphs (1) through (12) inclusive, of section 101(c)—

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

Report.

(2) following a report by the Administrator or the Administrator's designee to the Committee on Science 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 per centum, to meet unusual cost variations, but the total cost of all work authorized under such paragraphs shall not exceed the total of the amounts specified in such paragraphs.

SEC. 103. Not to exceed one-half of 1 per centum of the funds appropriated pursuant to section 101(a) or 101(b) hereof may be transferred to and merged with the "Construction of facilities" appropriation, and, when so transferred, together with $10,000,000 of funds appropriated pursuant to section 101(c) hereof (other than funds appropriated pursuant to paragraph (13) of such section) shall be available for expenditure to construct, expand, and modify laboratories and other installation at any location (including locations specified in section 101(c)), if (1) the Administrator determines such action to be necessary because of changes in the national program of

aeronautical and space activities or new scientific or engineering developments, and (2) the Administrator determines 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 funds so made available 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 portion of such sums may be obligated for expenditure or expended to construct, expand, or modify laboratories and other installations unless a period of thirty days has passed after the Administrator or the Administrator's designee has transmitted to the Speaker of the House of Representatives and to the President of the Senate and to the Committee on Science and Technology of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a written report containing a full and complete statement concerning (A) the nature of such construction, expansion, or modification, (B) the cost thereof including the cost of any real estate action pertaining thereto, and (C) the reason why such construction, expansion, or modification is necessary in the national interest.

Report.

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 House Committee on Science and Technology or the Senate Committee on Commerce, Science, and Transportation;

(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 sections 101(a), 101(b), and 101(d); and

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented to either such committeee;

unless a period of thirty days has passed after the receipt by the Speaker of the House of Representatives and the President of the Senate and 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.

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.

Funds.
42 USC 2459.

SEC. 106. The authorization for shuttle production and operational capability includes provisions for the production of structural spares and the critical skills necessary for installation of electrical, mechanical, and fluid systems thereby maintaining production readiness for a fifth orbiter vehicle.

SEC. 107. No civil space station authorized under section 101(a)(2) of this title 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.

Defense and national security.

15 USC 4261 note.

SEC. 108. (a) The Administrator of the National Aeronautics and Space Administration is directed to continue and to enhance such Administration's programs of remote-sensing research and development.

(b) The Administrator is authorized and encouraged to—

(1) conduct experimental space remote-sensing programs (including applications demonstration programs and basic research at universities);

(2) develop remote-sensing technologies and techniques, including those needed for monitoring the Earth and its environment; and

(3) conduct such research and development in cooperation with other public and private research entities, including private industry, universities, Federal, State, and local government agencies, foreign governments, and international organizations, and to enter into arrangements (including joint ventures) which will foster such cooperation.

SEC. 109. It is the intent of the Congress that expenditures made from sums appropriated pursuant to the authorization contained in subsection (a)(8) of section 101 of this Act for activities in the advanced turboprop program should be recouped by the National Aeronautics and Space Administration if and when commercially successful products are developed by the aircraft industry as a direct result of such activities. For this purpose the Administrator shall submit to Congress within sixty days of enactment of this Act a plan for the payment to the Administrator of royalties by firms in the aircraft industry with respect to any such products which may be so developed by them.

Royalty payments plan.

SEC. 110. (a) Section 102 of the National Aeronautics and Space Act of 1958, as amended, is amended—

42 USC 2451.

(1) by striking out "(e) and (f)" in subsection (g) and inserting in lieu thereof "(e), (f), and (g)";

(2) by redesignating subsections (c) through (g) as subsections (d) through (h); and

(3) by inserting after subsection (b) the following new subsection:

"(c) The Congress declares that the general welfare of the United States requires that the National Aeronautics and Space Administration (as established by title II of this Act) seek and encourage, to the maximum extent possible, the fullest commercial use of space."

Congress. Defense and national security.

(b) Section 102(d)(1) of the National Aeronautics and Space Act of 1958, as amended (and as redesignated by subsection (a) of this section), is amended by inserting "of the Earth and" after "knowledge".

SEC. 111. (a) Any Federal personal property may be disposed of in accordance with subsection (b) if such property—

Property, Federal.

(1) is scientific research or development equipment and is not personal property that may be used for general administrative purposes;

(2) has been loaned by the National Aeronautics and Space Administration to any academic institution or nonprofit organization; and

(3) as of March 31, 1984, has been on loan to any such institution or organization for at least two years.

(b) The Administrator may transfer title to property described in subsection (a) to an academic institution or nonprofit organization if the Administrator certifies that—

(1) such property is being used by the institution or organization holding such property for a purpose consistent with the use intended when the property was loaned; and

(2) the Administration will no longer need such property.

TITLE II—NATIONAL COMMISSION ON SPACE

PURPOSE

SEC. 201. It is the purpose of this title to establish a National Commission on Space that will assist the United States— 42 USC 2451 note.

(1) to define the long-range needs of the Nation that may be fulfilled through the peaceful uses of outer space;

(2) to maintain the Nation's preeminence in space science, technology, and applications;

(3) to promote the peaceful exploration and utilization of the space environment; and

(4) to articulate goals and develop options for the future direction of the Nation's civilian space program.

FINDINGS

SEC. 202. The Congress finds and declares that— Congress. 42 USC 2451 note.

(1) the National Aeronautics and Space Administration, the lead civilian space agency, as established in the National Aeronautics and Space Act of 1958, as amended, has conducted a space program that has been an unparalleled success, providing significant economic, social, scientific, and national security benefits, and helping to maintain international stability and good will; 42 USC 2451 note.

(2) the National Aeronautics and Space Act of 1958, as amended (42 U.S.C. 2451 et seq.), has provided the policy framework for achieving this success, and continues to be a sound statutory basis for national efforts in space;

(3) the United States is entering a new era of international competition and cooperation in space, and therefore this Nation must strengthen the commitment of its public and private technical, financial, and institutional resources, so that the United States will not lose its leadership position during this decade;

(4) while there continues to be a crucial Government role in space science, advanced research and development, provision of public goods and services and coordination of national and international efforts, advances in applications of space technology have raised many issues regarding public and private sector roles and relationships in technology development, applications, and marketing;

(5) the private sector will continue to evolve as a major participant in the utilization of the space environment;

(6) the Nation is committed to a permanently manned space station in low Earth orbit, and future national efforts in space will benefit from the presence of such a station;

(7) the separation of the civilian and military space programs is essential to ensure the continued health and vitality of both; and

(8) the identification of long range goals and policy options for the United States civilian space program through a high level, representational public forum will assist the President and Congress in formulating future policies for the United States civilian space program.

NATIONAL COMMISSION ON SPACE

President of U.S. 42 USC 2451 note.

SEC. 203. (a)(1) The President shall within ninety days of the enactment of this Act establish a National Commission on Space (hereinafter in this title referred to as the "Commission"), which shall be composed of 15 members appointed by the President. The members appointed under this subsection shall be selected from among individuals from Federal, State, and local governments, industry, business, labor, academia, and the general population who, by reason of their background, education training, or experience, possess expertise in scientific and technological pursuits, as well as the use and implications of the use of such pursuits. Of the fifteen members appointed, not more than three members may be employees of the Federal Government. The President shall designate one of the members of the Commission appointed under this subsection to serve as Chairman, and one of the members to serve as Vice Chairman. The Vice Chairman shall perform the functions of the Chairman in the Chairman's absence.

(2) Members appointed by the President under paragraph (1) of this subsection may be paid at a rate not to exceed the daily equivalent of the annual rate of basic pay in effect under section 5332 of title 5, United States Code, for grade GS-18 of the General Schedule for each day, including traveltime, during which such members are engaged in the actual performance of the duties of the Commission. While away from their homes or regular places of business, such members may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed under section 5703 of title 5, United States Code. Individuals who are not officers or employees of the United States and who are members of the Commission shall not be considered officers or employees of the United States by reason of receiving payments under this paragraph.

(b)(1) The President shall appoint one individual from each of the following Federal departments and agencies to serve as ex officio, advisory, non-voting members of the Commission (if such department or agency does not already have a member appointed to the Commission pursuant to subsection (a)(1)):

(A) National Aeronautics and Space Administration.
(B) Department of State.
(C) Department of Defense.
(D) Department of Transportation.
(E) Department of Commerce.
(F) Department of Agriculture.
(G) Department of the Interior.
(H) National Science Foundation.
(I) Office of Science and Technology Policy.

Congress.

(2) The President of the Senate shall appoint two advisory members of the Commission from among the Members of the Senate and the Speaker of the House of Representatives shall appoint two advisory members of the Commission from among the Members of the House of Representatives. Such members shall not participate,

except in an advisory capacity, in the formulation of the findings and recommendations of the Commission.

(3) Members of the Commission appointed under this subsection shall not be entitled to receive compensation for service relating to the performance of the duties of the Commission, but shall be entitled to reimbursement for travel expenses incurred while in the actual performance of the duties of the Commission.

(c) The Commission shall appoint and fix the compensation of such personnel as it deems advisable. The Chairman of the Commission shall be responsible for—

(1) the assignment of duties and responsibilities among such personnel and their continuing supervision; and

(2) the use and expenditures of funds available to the Commission.

In carrying out the provisions of this subsection, the Chairman shall act in accordance with the general policies of the Commission.

(d) To the extent permitted by law, the Commission may secure directly from any executive department, agency, or independent instrumentality of the Federal Government any information it deems necessary to carry out its functions under this Act. Each such department, agency, and instrumentality shall cooperate with the Commission and, to the extent permitted by law and upon request of the Chairman of the Commission, furnish such information to the Commission.

(e) The Commission may hold hearings, receive public comment and testimony, initiate surveys, and undertake other appropriate activities to gather the information necessary to carry out its activities under section 204 of this title.

(f) The Commission shall cease to exist sixty days after it has submitted the plan required by section 204(c) of this title. Expiration date.

FUNCTIONS OF THE COMMISSION

SEC. 204. (a) The Commission shall study existing and proposed space activities and formulate an agenda for the United States civilian space program. The Commission shall identify long range goals, opportunities, and policy options for United States civilian space activity for the next twenty years. In carrying out this responsibility, the Commission shall take into consideration— 42 USC 2451 note.

(1) the commitment by the Nation to a permanently manned space station in low Earth orbit;

(2) present and future scientific, economic, social, environmental, and foreign policy needs of the United States, and methods by which space science, technology, and applications initiatives might address those needs;

(3) the adequacy of the Nation's public and private capability in fulfilling the needs identified in paragraph (2);

(4) how a cooperative interchange between Federal agencies on research and technology development programs can benefit the civilian space program;

(5) opportunities for, and constraints on, the use of outer space toward the achievement of Federal program objectives or national needs;

(6) current and emerging issues and concerns that may arise through the utilization of space research, technology development, and applications;

(7) the Commission shall analyze the findings of the reviews specified in paragraphs (1) through (6) of this subsection, and develop options and recommendations for a long range national civilian space policy plan.

(b) Options and recommendations submitted in accordance with subsection (a)(7) of this section shall include, to the extent appropriate, an estimate of costs and time schedules, institutional requirements, and statutory modifications necessary for implementation of such options and recommendations.

Civilian space activity plan.

(c) Within twelve months after the date of the establishment of the Commission, the Commission shall submit to the President and to the Committee on Commerce, Science and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives, a long range plan for United States civilian space activity incorporating the results of the studies conducted under this section, together with recommendations for such legislation as the Commission determines to be appropriate.

Approved July 16, 1984.

LEGISLATIVE HISTORY—H.R. 5154:

HOUSE REPORTS: No. 98-629 (Comm. on Science and Technology) and No. 98-873 (Comm. of Conference).
SENATE REPORT No. 98-455 (Comm. on Commerce, Science, and Transportation).
CONGRESSIONAL RECORD, Vol. 130 (1984):
Mar. 28, considered and passed House.
June 21, considered and passed Senate, amended.
June 27, Senate agreed to conference report.
June 28, House agreed to conference report.

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98TH CONGRESS
2d Session
HOUSE OF REPRESENTATIVES
REPORT
98-803

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION BILL, 1985

MAY 23, 1984.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BOLAND, from the Committee on Appropriations, submitted the following

REPORT

together with

ADDITIONAL VIEWS

[To accompany H.R. 5713]

The Committee on Appropriations submits the following report in explanation of the accompanying bill making appropriations for the Department of Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1985, and for other purposes.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

1984 appropriation	$2,011,900,000
Estimate, 1985	2,400,100,000
Recommended in bill	2,422,600,000
Increase above estimate	+22,500,000

The research and development account of the National Aeronautics and Space Administration includes funding for the space station and various programs involving the application of space capabilities in remote sensing of land resources, ocean and atmospheric conditions; materials processing; and communications. In the area of space science it includes projects designed to explore the solar system and expand man's knowledge of the universe. Also included under this heading are development programs involving aeronautics technology which support the civilian and military capability of the United States in the area of airframe and engine manufacturing.

The committee recommends a total of $2,422,600,000 for this account in fiscal year 1985. This is an increase of $22,500,000 above the budget request. The recommendation includes the following increases, decreases and changes to the program areas described below:

+$10,000,000 for physics and astronomy and planetary research and analysis to be allocated at the Agency's discretion.

+$40,000,000 for the advanced communication technology satellite (ACTS). These funds are intended to restore the flight demonstration element of this experimental program. The committee recognizes that the ACTS program has been controversial owing to the question of whether or not the government should fund advanced communications satellite research and development—particularly given the health of the United States communications satellite industry. However, the ACTS proposal involves an innovative approach providing for both industry and government contributions. The total cost of the ACTS program for the government is estimated at $354,000,000, while an additional $100,000,000 is expected to be contributed by industry and associated experimenters.

The committee was instrumental in providing initial funding in the 1982 Urgent Supplemental for this program—a total of $15,400,000—to build and operate a satellite at the 30/20 gigahertz frequency. On the other hand, the committee is aware that the Hughes Aircraft Company has filed an application with the Federal Communications Commission indicating that it plans to build and operate a satellite at that frequency. The committee believes that there is no dispute over the need for 30/20 band communications satellites—nor over Hughes Aircraft Company's right to build and operate such satellites. Rather, the question is whether the ACTS program should be terminated in light of the Hughes proposal—particularly given the fact that it is generally agreed that the Hughes proposal, while clearly the next logical step in the evolution of commercial communications satellites, may not address all the high-risk technology development goals included in ACTS.

In summary, the committee believes that it would not be prudent for the United States to risk losing its preeminence in communications satellite technology—and, therefore, has included the additional funds to continue both the flight demonstration and ground testing portions of the ACTS program.

+$10,000,000 for advanced work on a "shuttle derived" expendable launch vehicle. The committee is aware that the Air Force is currently studying a new expendable launch vehicle to provide assured access to space for critical national security payloads. One possible approach to such an expendable launch vehicle is a shuttle derived ELV. Other expendable launch vehicle candidates under consideration include a new "seven segment" Titan-Centaur and the Atlas II-Centaur. The committee believes that the shuttle derived concept has a number of advantages, including the capacity to grow into a heavy lift vehicle; and, most importantly, commonality with shuttle production, operations and facilities—which contributes to reducing the cost of the space transportation system.

+$10,000,000 for continued work on the advanced turbo-prop program.

−$10,000,000 from the aeronautics research and technology base.

−$37,500,000 as a general reduction to be applied at the Agency's discretion.

The committee has also included bill language "capping" the 1985 amounts for the following programs at these levels:

1. Space station—$155,500,000
2. Upper stages—$92,400,000
3. Space telescope—$195,000,000
4. Gamma ray observatory—$120,200,000
5. Venus radar map emission—$92,500,000
6. Galileo—$56,100,000

As in the past, these programmatic "caps" reflect the budget request or changes recommended for this account by the committee.

In connection with space science and applications, the committee notes that progress on the development of the solar optical telescope (SOT) has been delayed owing to past and potential ongoing problems with the space telescope development. The solar optical telescope, a space-based facility which will make high resolution measurements of the Sun, is important to the scientific objectives of solar physics, space physics, and astrophysics. The committee urges NASA to accommodate the funding of the solar optical telescope from within the space science and applications budget and to work expeditiously towards the development of SOT hardware.

SPACE STATION

The budget request of $150,000,000 has been included for the space station. In addition, the committee recommends augmenting the $58,300,000 requested for systems definition/integration studies with $5,500,000 of 1984 funds—and has included language earmarking $15,000,000 of the total of $63,800,000 available for systems definition for "complementary" space station studies designed to define an optional concept employing an initial "man-tended" capability rather than an initial "permanently manned" capability.

Throughout the past two years the committee has reviewed the pro and con arguments concerning development of a space station. It is aware that a space station has considerable support from within both the scientific community and the aerospace industry. It is also aware that the space station concept has had its critics. It has been described, for example, as an unfortunate step backwards, and the Space Science Board of the National Research Council indicated that it could see no scientific need for a manned space station during the next 20 years.

However, the committee recognizes that if the nation is to continue to grow and prosper in space, it must ultimately provide an on-orbit facility for undertaking biological, commercial, science, applications and payload operations on a routine basis. It is that recognition which has prompted the committee to recommend the full budget request of $150,000,000 for the space station.

Still the committee does have two fundamental concerns with the existing space station proposal. First, the committee believes that if future budget deficits do not permit the full development of the station—it is essential that the permanently manned element not be the principal or sole survivor of budget retrenchments.

And second, the committee believes that it is important for NASA to also define an option which "phases in" the permanently manned feature of the station. The committee believes that this option, if pursued in good faith, could promote the maximum automation of various station functions.

Because of these concerns, the committee has recommended language which will provide for the complementary definition of an initial man-tended option. It is expected that this option would involve the same space station elements with the exception of the habitat. It is also suggested that this option may suggest alternative module capabilities and construction sequences than that envisioned for a permanently manned space station.

The committee wants to make clear that the limitation in the bill language does not envision two distinct definition studies. Rather, it is expected that there will be a single request for proposal for both variations. What the committee requires is that the complementary effort define how the various elements of the station would change if the station was initially man-tended rather than permanently manned. For example, it is likely that the energy module and the berthing adaptor may be identical or nearly identical to that under the permanently manned station definition. On the other hand, it is possible that the research and development module (science lab), the logistics module and the payload and the payload service assembly module could be defined differently to enhance the overall capability of a man-tended station.

The committee also wants to make clear that the complementary definition in no way should delay the schedule for the request for proposal—and that if some modest additional resources are necessary to undertake both the permanently manned and the complementary definition—the committee will consider providing such funds in a manner it deems most appropriate.

In addition, the committee expects NASA to abide by the following conditions as definition and development of the space station proceed:

—That all definition studies be structured to require that *both* the polar and contiguous unmanned platforms be included within the final proposals and cost projections; and

—That the space science and applications and aeronautics functions of the NASA budget be maintained at approximately the same ratio to the total NASA funding for the research and development and space flight accounts as is contained in the 1985 appropriation.

In summary, the committee is providing the full budget request for the space station—is permitting NASA to proceed with the definition of a permanently manned space station—and is requiring that a second "man-tended" alternative be defined in order to ensure that the Congress and the nation will have an opportunity to review both options when the first space station development funds are requested in fiscal year 1987.

SPACE FLIGHT CONTROL AND DATA COMMUNICATIONS

1984 appropriation	$3,791,600,000
Estimate, 1985	3,600,300,000
Recommended in bill	3,602,800,000
Increase above estimate	+2,500,000

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 and mission operations, control requirements, initial spares, production tooling, and related supporting activities. This account also provides the standard operational support services for the space shut-

tle and the 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 $3,602,800,000 for this account in fiscal year 1985. This is an increase of $2,500,000 above the budget request. The recommendation includes the following increases and decreases for the program areas described below:

+$40,000,000 for shuttle orbiter structural spares and systems hardware. The committee is including these funds to maintain the essential sub-assembly activities necessary for efficient orbiter production capability. Although the committee is recommending these funds it also believes that a final decision should be made in the fiscal year 1986 budget concerning whether to proceed with fabrication of a fifth orbiter. The committee does not believe it is either economically sound or technically prudent to continue indefinitely to maintain an orbiter production capability *without* a firm commitment to proceed with a fifth orbiter by the end of this calendar year. It is also critical that if the shuttle is to continue as this Nation's primary launch vehicle, NASA must outline a schedule for follow-on orbiter production in the late 1980's and 1990's.

−$37,500,000 as a general reduction to be applied at the agency's discretion.

Finally, the committee has also included bill language "capping" the amount for Shuttle Production and Operational Capability at $1,505,600,000 and Space Transportation Operations at $1,339,000,000.

CONSTRUCTION OF FACILITIES

1984 appropriation	$155,500,000
Estimate, 1985	160,000,000
Recommended in bill	150,000,000
Decrease below estimate	−10,000,000

The committee recommends $150,000,000 for the construction of facilities in 1985. This is a decrease of $10,000,000 below the budget request. The committee expects that the agency should reprioritize all projects and activities within the account and make the proposed reduction from those activities the agency deems of a lower priority.

RESEARCH AND PROGRAM MANAGEMENT

1984 appropriation	$1,238,500,000
Estimate, 1985	1,331,000,000
Recommended in bill	1,316,000,000
Decrease below estimate	−15,000,000

The committee recommends $1,316,000,000 for research and program management in 1985. This is a decrease of $15,000,000 below the budget estimate. It is not the intention of the committee that this reduction be construed in such a way as to reduce the 22,000 personnel ceiling currently authorized for NASA. Rather, the reduction should be applied to lower priority programs from other object classifications.

The committee encourages NASA to review institutions of higher learning having significant minority enrollments to find ways to build closer relations with such schools, meet NASA's research objectives and increase the number of individuals from underrepresented groups in the pool of graduate researchers. The committee instructs NASA to develop a plan containing options that could build a closer relationship with institutions serving significant numbers of minorities while not diminishing its efforts toward the Historically Black Colleges and Universities. The committee further instructs NASA to submit this plan to the committee by January 31, 1985.

The committee has also included language designed to test a locality-based flat rate per diem travel reimbursement system for NASA employees. The duration of the test is for one year and is expected to alleviate the increasing cost of processing travel vouchers and reduce the amount of documentation required from the traveler. The agency has advised the committee that processing costs have risen in the last year and will continue to climb because of the increasing number of space shuttle flights and other programmatic travel. The committee has been assured that this system will not increase the funds available for travel—but should result in savings in the processing of travel vouchers, including preparation, approval and audit procedures. The committee expects these savings to begin accruing immediately and will expect to receive a report detailing such savings and tests results by October 1, 1985.

TITLE IV

GENERAL PROVISIONS

The committee recommends that the general provisions applicable to the Department and agencies carried in the current fiscal year be continued in fiscal year 1985.

Inflationary Impact Statement

Clause 2(l)(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 the Government at the time, and the sectors of the economy which the spending may affect.

The amount proposed for appropriation totals $58,436,496,500. This is $3,767,998,500 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.

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 the 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 Consumer Product Safety Commission, the Environmental Protection Agency, the Federal Emergency Management Agency, the National Aeronautics and Space Administration, the National Science Foundation and the Veterans Administration.

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 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. Most of these items have been carried in previous appropriation 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 Veterans Administration, the Federal Emergency Management Agency and the Department of Housing and Urban Development. Some of these provisions could possibly be construed as changing the application of existing law.

Sections 401 through 415 of title IV of the bill, all of which are carried in the 1984 HUD-Independent Agencies Appropriation Act, are general provisions which place limitations on the use of funds in the bill and which might, under some circumstances, be construed as changing the application of existing law.

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 appropriation language on pages 2 and 3, in connection with annual contributions for assisted housing provides that certain authorities contained in previous acts shall be merged with authority provided in this bill.

The appropriation language on page 4, in connection with the rent supplement program, reduces the uncommitted balances of previously provided authority by not more than $81,617,000.

The appropriation language on page 4, in connection with rental housing assistance, reduces the uncommitted balances of previously provided authority by not more than $7,631,000.

The appropriation language on page 5, in connection with the housing for the elderly or handicapped fund, provides borrowing authority for the Secretary.

The appropriation language on page 5, in connection with the housing for the elderly or handicapped fund, provides that loans made in fiscal year 1985 shall bear an interest rate which does not exceed 9.25 percentum.

The provision on page 5, in connection with housing for the elderly or handicapped, provides that the receipts and disbursements of the fund shall be included in the totals of the Budget of the U.S. Government.

The language on pages 6 and 7, in connection with troubled projects operating subsidy, permitting the use of excess rental charges and, under certain circumstances, assistance payments to an owner of a multifamily housing project assisted but not insured under the National Housing Act, could be construed as changing the application of existing law.

The appropriation language on page 7, in connection with the Federal Housing Administration Fund, limits additional commitments to guarantee loans.

The appropriation language on page 8, in connection with nonprofit sponsor assistance, limiting direct loans could be construed as changing the application of existing law.

The appropriation language on page 8, in connection with guarantees of mortgage-backed securities, limits additional commitments to issue guarantees.

The appropriation language on pages 8 and 9, in connection with the special assistance functions fund, transfers all assets acquired and liabilities incurred under the fund to the management and liquidating functions fund and provides that all outstanding Treasury borrowings issued under the fund shall be forgiven.

The language on page 9, in connection with the emergency mortgage purchase assistance activity, transfers all assets to the management and liquidating functions fund and provides that all outstanding Treasury borrowings issued under this account shall be forgiven.

The appropriation language on page 10, in connection with community development grants, limiting expenses for planning and management development and administration activities could be construed as changing the application of existing law.

The language on page 10, in connection with community development grants, limiting commitments to guarantee loans, could be construed as changing the application of existing law.

The appropriation language on page 11, in connection with the rehabilitation loan fund, provides that the revolving fund shall consist of collections, unexpended balances of prior appropriations, and other amounts and could be construed as changing the application of existing law.

The language on page 13, in connection with the administrative provision, provides for the establishment of a number of permanent indefinite appropriations.

The provision on page 16, in connection with salaries and expenses of the Environomental Protection Agency, limits the use of funds for purposes of resource conservation and recovery panels.

The provision on pages 16 and 17, in connection with abatement, control and compliance, limits the availability of funds for purposes of the Resource Conservation and Recovery Act, as amended.

The language on page 17, in connection with buildings and facilities, limits funds for projects without the approval of the Committees on Appropriations.

The provision on page 18, in connection with the Hazardous Substance Response Trust Fund, limits administrative expenses and could be construed as changing existing law.

The language on page 18, in connection with construction grants, precludes the use of funds for certain purposes and could be construed as changing the application of existing law.

The appropriation language on page 19, in connection with the Office of Science and Technology Policy, requires that the office reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it, and could be construed as changing the application of existing law.

The language on page 21, in connection with the National Flood Insurance Fund, limits certain fund expenses without prior approval and could be construed as changing the application of existing law.

The appropriation language on page 22, in connection with the Consumer Information Center, limits certain fund expenses and administrative expenses and could be construed as changing the application of existing law.

The language on page 23, in connection with research and development, limits funds for certain projects without the approval of the Committees on Appropriations and earmarks funds for space station studies.

The language on page 24, in connection with space flight, control and data communications, limits funds for certain projects without the approval of the Committees on Appropriations.

The appropriation language on pages 24 and 25, in connection with construction of facilities, limits the funds that may be used for leasor construction of a new contractor-funded facility without the approval of the Committees on Appropriations.

The appropriation language on pages 26 and 27, in connection with research and program management, provides for the establishment of a flat rate per diem system for employee travel allowances.

The provisions on page 27, in connection with the National Credit Union Administration, Central Liquidity Facility, limiting new loans and administrative expenses, could be construed as changing the application of existing law.

The provisions on page 28, in connection with research and related activities, provide for the use of receipts from other research facilities and could require proportional reductions in legislative earmarkings.

The language on page 28, in connection with research and related activities, limits administrative expenses and contracts for various services.

The provisions on page 29, in connection with research and related activities, make the obligation of certain funds provided under this heading conditional and provide for Federal indemnification for the ocean drilling program.

The language on page 30, in connection with the United States Antarctic program activities, provides that certain receipts may be credited to this appropriation.

The provision on page 30, in connection with science education activities could require proportional reductions in legislative earmarkings.

The provision on page 31, in connection with the Selective Service System, permits the President to exempt the agency from apportionment restrictions of the Budget and Accounting Act of 1921.

The appropriation language for general operating expenses on page 35 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 35, in connection with construction, major projects, which limits the use of money for the design fund, could be construed as changing the application of existing law.

The language on pages 35 and 36, in connection with construction, major projects, establishes time limitations concerning the obligation of major construction funds.

The appropriation language on page 36, in connection with construction, major projects, repeals language carried in the 1984 HUD-Independent Agencies Appropriations Act.

The appropriation language for construction, minor projects, on page 37 provides that unobligated balances of previous appropriations may be used for any project with an estimated cost of less than $2,000,000.

The language on page 37, in connection with construction, minor projects, makes available funds for damage caused by natural disasters.

The appropriation language on page 39, in connection with the direct loan revolving fund, limits loans and could, under certain circumstances, be construed as changing the application of existing law.

The provision on page 40, in connection with corporations, requires release in an appropriation act of loans and mortgage purchase authority not otherwise required by law.

The appropriation language on pages 41 and 42, in connection with the limitations on administrative and nonadministrative expenses, Federal Home Loan Bank Board, provides for examination of Federal- and state-chartered institutions and for the training of state savings and loan examiners.

The language on page 42, in connection with the limitations on administrative and nonadministrative expenses, requires the approval of the Committees on Appropriations for certain reprogrammings.

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 that are not subject to the annual appropriation 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 Veterans Administration. The budget estimates that such permanent authorities will aggregate $1,881,137,000 in fiscal year 1985.

Limitations and Legislative Provisions

The following limitations and legislative provisions not heretofore carried in connection with any appropriation bill are recommended:

On page 19, in connection with the Office of Science and Technology Policy:

That the Office of Science and Technology Policy must reimburse other agencies for not less than one-half of the personnel compensation costs of individuals detailed to it

On page 23, in connection with the National Aeronautics and Space Administration, Research and Development:

including $155,500,000 for a space station, of which $5,500,000 shall be made available from prior year appropriations: Provided, That of this amount, $63,800,000 is available for space station systems definition and integration studies, including not less than $15,000,000 for complementary space station studies to define an alternative concept employing an initial "man-tended" capability rather than a "permanently manned" capability

On pages 26 and 27, in connection with the National Aeronautics and Space Administration, Research and Program Management:

That the National Aeronautics and Space Administration may test a flat rate per diem system for employee travel allowances under regulations prescribed by the Administrator: Provided further, That the rates will be consistent with those authorized by the Administrator of the General Services Administration: Provided further, That per diem allowances paid employees under a flat rate per diem system shall be amounts determined by the Administrator of NASA to be sufficient to meet normal and necessary expenses in the area in which travel is performed, but in no event will the travel allowances exceed $75 for each day in travel status within the continental United States: Provided further, That the test approved under this section shall expire on September 30, 1985, or upon the effective date of permanent legislation establishing a flat rate per diem system for civilian personnel, whichever occurs first

Comparison with Budget Resolution

Section 308(a)(1)(A) of the Congressional Budget and Impoundment Control Act of 1974 (Public Law 93-344) requires that the report accompanying a bill providing new budget authority contain a statement detailing how that authority compares with the reports submitted under section 302 of the Act for the most recently agreed to current resolution on the budget for the fiscal year. As of the date when this bill was reported, final Congressional action on the First Budget Resolution for fiscal year 1985 has not been completed, and it is therefore impossible to comply with this requirement.

The First Budget Resolution for fiscal year 1985 passed the House of Representatives on April 5, 1984. The amounts recommended in the accompanying bill are within the amounts assumed in the House passed Budget Resolution pursuant to section 302 of the Budget Act.

Five-Year Projections of Outlays

In accordance with section 308(a)(1)(B) of the Congressional Budget Act of 1974 (Public Law 93-344), the following table contains 5-year projections of the outlays associated with the budget authority provided in the accompanying bill:

Budget authority	$58,436,496,500
Outlays:	
1985	35,968,190,000
1986	8,044,025,000
1987	4,574,725,000
1988	2,161,314,000
1989 and future years	7,688,240,500

Assistance to State and Local Governments

In accordance with section 308(a)(1)(C) of the Congressional Budget Act of 1974 (Public Law 93-344), the new budget authority and outlays provided by the accompanying bill for financial assistance to state and local governments are as follows:

Fiscal year 1985 new budget authority	$16,067,233,000
Fiscal year 1985 outlays resulting therefrom	974,893,000

ADDITIONAL VIEWS OF HON. JERRY LEWIS, HON. LAWRENCE COUGHLIN, HON. LINDY (MRS. HALE) BOGGS, HON. SILVIO O. CONTE, HON. BOB TRAXLER, HON. WILLIAM HILL BONER, AND HON. LOUIS STOKES

It it our view that the Space Station initiative proposed in the NASA FR85 budget is an historic and sound investment in our nation's future. We fully support the full $150 million funding for this effort.

From its impact on young minds to the development of space-manufactured products to the increase in knowledge of our universe, the manned Space Station is a key to reaping the benefit of future space exploration. The Space Station is the first step in the expansion of U.S. manned capability since the decision to build the Space Shuttle in 1972. This bold undertaking has captured the imagination of the world, a fact evidenced by the enthusiasm with which the project has been greeted abroad and at home.

The permanently manned Space Station envisioned by NASA is a result of many years of hard work and planning. We are pleased to recommend the initial funding for this critical and exciting project.

Jerry Lewis,
Lawrence Coughlin,
Lindy (Mrs. Hale) Boggs,
Silvio O. Conte,
Bob Traxler,
William Hill Boner,
Louis Stokes.

COMPARATIVE STATEMENT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY FOR FISCAL YEAR 1984 AND BUDGET ESTIMATES AND AMOUNTS RECOMMENDED IN THE BILL FOR FISCAL YEAR 1985—Continued

Agency and item	New budget (obligational) authority fiscal year 1984	Budget estimates of new (obligational) authority fiscal year 1985	New budget (obligational) authority recommended in bill	Bill compared with—	
				New budget (obligational) authority, fiscal year 1984	Budget estimates of new (obligational) authority, fiscal year 1985
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION					
Research and development	2,011,900,000	2,400,100,000	2,422,600,000	+410,700,000	+22,500,000
Space flight, control and data communications	3,791,600,000	3,600,300,000	3,602,800,000	-188,800,000	+2,500,000
Construction of facilities	155,500,000	160,000,000	150,000,000	-5,500,000	-10,000,000
Research and program management	1,238,500,000	1,331,000,000	1,316,000,000	+77,500,000	-15,000,000
Total, National Aeronautics and Space Administration	7,197,500,000	7,491,400,000	7,491,400,000	+293,900,000	---

Calendar No. 967

98TH CONGRESS } SENATE { REPORT
2d Session } { 98-506

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT—INDEPENDENT AGENCIES APPROPRIATION BILL, 1985

JUNE 7 (legislative day, JUNE 6), 1984.—Ordered to be printed

Mr. GARN, from the Committee on Appropriations, submitted the following

REPORT

[To accompany H.R. 5713]

The Committee on Appropriations to which was referred the bill (H.R. 5713) making appropriations for the Department of Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1985, 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

	Fiscal year 1985
Amount of bill as recommended in House	58,436,496,500
Amount of change by Committee	−2,352,617,500
Amount of bill as reported to Senate	56,083,879,000
Amount of appropriations to date, 1984	56,111,731,000
Amount of budget estimates, 1985	54,668,498,000
Over estimates for 1985	1,415,381,000
Under appropriations for 1984	27,852,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

1984 appropriation	$2,011,900,000
1985 budget estimate	2,400,100,000
House allowance	2,422,600,000
Committee recommendation	2,424,100,000

The Committee recommends an appropriation of $2,424,100,000 for research and development activities. This amount is $24,000,000 more than the budget estimate and $1,500,000 more than the House allowance.

PROGRAM DESCRIPTION

The objectives of the National Aeronautics and Space Administration (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 provides for the following research, development, and procurement activities of NASA:

Space station.—The President has proposed that the United States proceed with the design and definition of a manned space station; initial orbital activities are planned for launch in the early 1990's. A U.S. space station will provide space-based facilities to allow for enhancement of the Nation's science and applications programs and for development of capabilities for commercial exploitation of space, while exploring advanced technologies potentially useful to the economy. In fiscal year 1985, preliminary design definition studies and advanced technology developments will be pursued. One of the main objectives of the definition and design period will be to clarify future costs and capabilities of any potential station configuration. In particular, emphasis will be placed on insuring that potential station configurations can be readily adaptable to changing future national requirements.

Space transportation systems.—The principal areas of activity in space transportation capability development are: efforts related to the Space-

lab, 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, and the development of the United States/Italy tethered satellite system. The European Space Agency developed Spacelab successfully completed its first mission in December 1983. Dedicated missions are scheduled for 1984 and 1985 involving Spacelab pallets and other minor structures. Efforts on space transportation system upper stages will be pursued further. Development of the common NASA/USAF Centaur/STS will continue. In 1985, two Centaur/STS upper stages will be delivered for the 1986 launches of the Galileo and the international solar polar mission. Additional STS upper stages will be procured for the Venus radar mapper and tracking and data relay satellite missions. The tethered satellite system, scheduled for initial flight in late 1987, will provide a new capability for conducting space experiments in regions remote from the Space Shuttle orbiter, especially in the upper atmosphere.

Space science and applications.—This 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, and 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. The major physics and astronomy activities in fiscal year 1985 include: completion of the fabrication of the major space telescope structures and initiation of integration activities on the entire system, continuation of the major fabrication and assembly efforts on the Gamma Ray Observatory and continuation of Shuttle/Spacelab instrument development and mission management activities. In the planetary exploration area, the major fiscal year 1985 activities will be the completion of the Galileo spacecraft flight acceptance program, the continuation of launch vehicle integration activities on the international solar polar mission, and the continuation of the Venus radar mapper spacecraft design and development activities. The Mars geoscience/climatology orbiter, a new initiative that will perform geochemical and climatological mapping of Mars, will begin design and development activities in fiscal year 1985. The major activities in the space applications area include evaluation and technique development of Shuttle imaging radar-B data for geological mapping, continuation of Shuttle/Spacelab development efforts along with definition activities on advanced instruments, and development of instruments to be flown on the tethered satellite system. The upper atmospheric satellite research mission, a new initiative that will conduct research on the Earth's upper atmosphere to assess its susceptibility to chemical change, will begin development activities in fiscal year 1985. Development will also be initiated on the scatterometer that will be flown on the Navy's remote ocean sensing system and will be used to measure wind velocity on the surface of the ocean. In the space communications area, activities will continue on the restructured advanced communications technology satellite program for the technology development and the ground testing of components for future communications satellites and research and analysis in support of advanced component and device technology for communications satellite systems.

Technology utilization.—This program is designed to facilitate the transfer of NASA technology to the nonaerospace industry, as well as State and local governments. During fiscal year 1985, NASA will continue its efforts to help foster widespread dissemination of new technology developed by the Agency's programs.

Aeronautics and space technology.—The objectives of the aeronautical research and technology program are the advancement of the aeronautical technology base; the maintenance of the long-term competitive position of the United States in the international aviation marketplace; and the support of the military in maintaining the superiority of the Nation's military aircraft. Specific technology efforts in fiscal year 1985 will continue to be directed toward major improvements in high-performance aircraft, subsonic aircraft, rotorcraft, advanced propulsion, and numerical aerodynamics simulation. Major thrusts of fiscal year 1985 activities include: continuing advancement in both basic aeronautical disciplines and systems research, maintaining and operating specialized facilities essential to aeronautical research, and pursuing technological advances in critical areas of high risk and potentially high payoff to the Nation. 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.

Tracking and data advanced systems.—The overall objective of the advanced systems program is to perform studies and provide for the development of required tracking and data systems and techniques.

COMMITTEE RECOMMENDATION

The Committee recommends $2,424,100,000 for this account. This is $24,000,000 more than the budget request and $1,500,000 more than the House allowance. This represents an increase of $412,200,000 or 20.5 percent over the fiscal year 1984 level. The fiscal year 1985 increase recommended by the Committee is the net result of $54,000,000 in increases and a $30,000,000 general decrease.

The Committee provided the full request of $150,000,000 for the space station program and strikes the House language directing NASA to plan for the design of a man-tended rather than permanently manned station. Instead, the Senate bill requires (under the research and program management account) a NASA automation report. This report and the ongoing NASA-sponsored automation study are expected

to be completed by no later than April 1, 1985. In order to assure that the results of these two efforts are incorporated in the systems definition and integration studies, the Committee has included language prohibiting the obligation or expenditure of funds for these definitional studies before April 1, 1985. The Committee expects that the results of the mandated automation study will be made a part of the contract efforts on the definition and integration contracts and has, accordingly, included bill language to this effect. The Committee also expects the contractors to devote a significant portion of their effort pursuing the study of the automation and robotic technologies identified in the mandated report with the objective of advancing the state-of-the-art in these technologies and increasing their terrestrial application.

The Committee acknowledges the need to pursue a manned space station, however, the Committee believes that NASA needs to pursue the areas of automation and robotics more vigorously. Consequently, the bill language is intended to assure that such advanced technologies are indeed made an integral part of the planning and development for a manned space station.

In light of the huge costs of the space station, the Committee expects that NASA's fiscal year 1986 and outyear budgets will honor the Agency's commitment to maintain the space science and applications functions of the NASA budget at approximately the same ratio to the total NASA funding for the research and development and space flight accounts as has historically been the case.

The Senate Committee and the House included an additional $40,000,000 for the Advanced Communications Technology Satellite (ACTS). When combined with the request of $5,000,000 in fiscal year 1985, the carryover of approximately $18,000,000 in fiscal year 1983 and approximately $5,000,000 in fiscal year 1984, a total of $68,000,000 will be available for ACTS in fiscal year 1985. This communications satellite will facilitate advances in scanning beam technology.

The Committee recognizes that the ACTS program has been controversial owing to the question of whether or not the Government should fund advanced communications satellite research and development—particularly given the health of the United States communications satellite industry. However, the ACTS proposal involves an innovative approach providing for both industry and Government contributions. The total cost of the ACTS program for the Government is estimated at $354,000,000, while an additional $100,000,000 is expected to be contributed by industry and associated experimenters.

Both the Committee and House added $10,000,000 to the planetary and physics and astronomy research and analysis (R&A) programs. However, the Committee directs that NASA apply no less than $7,000,000 of this amount to planetary R&A—bringing the total to at least $61,500,000 or a 3.4-percent increase over fiscal year 1984. The physics and astronomy R&A program level would be about $39,900,000 for an increase of 11.4 percent over the fiscal year 1984 level.

The Committee directs NASA to move rapidly to begin phase B studies of both SIRTF (Space Infrared Telescope Facility) and AXAF (Advanced X-ray Astronomy Facility) within the total amounts provided in the bill for research and analysis. Additionally, the Committee urges NASA to retain its commitment to basic research in areas such as theoretical astrophysics.

The Committee directs that $5,500,000 of unallocated fiscal year 1984 funds be made available for high priority aeronautics and space technology activities such as the advanced turbo-prop program. With this reallocation NASA's aeronautics and space technology program will be $501,900,000 or $62,600,000 (14.2 percent) over the fiscal year 1984 level.

In keeping with prior year practice, the Committee has deleted the program "caps" contained in the House bill. The House "caps" on the: space station; space telescope development; gamma ray observatory; Shuttle upper stages; Venus radar mapper mission; and the Galileo mission; will be considered in conference.

Finally, the Committee added $4,000,000 as part of the automation initiative. This increase would be added to NASA's sensor systems and automation programs under the space research and technology program—this would increase this activity by about 50 percent over the fiscal year 1985 request and restore it to the fiscal year 1984 request level.

SPACE FLIGHT, CONTROL, AND DATA COMMUNICATIONS

1984 appropriation	$3,791,600,000
1985 budget estimate	3,600,300,000
House allowance	3,602,800,000
Committee recommendation	3,600,300,000

The Committee recommends an appropriation of $3,600,300,000 in fiscal year 1985 for the space flight, control, and data communications activities of the National Aeronautics and Space Administration. This amount is the same as the budget estimate and $2,500,000 less than the House allowance.

PROGRAM DESCRIPTION

The space flight, control, and data communications appropriation provides for the production and capability development, and operational activities for the space transportation system and the continuation of tracking and data acquisition activities.

Space transportation system.—Shuttle production and capability development 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 operational control requirements initial structural and operational spares, production tooling, and related supporting activities. Columbia (OV-102) will undergo a major modification process that will strengthen the internal structure and provide Columbia

with greater vehicle load-carrying capability. Atlantis (OV–104) is scheduled for delivery in April 1985. Discovery (OV–103) is presently planned to be used for the first west coast launch in October 1985. Other major activities planned for fiscal year 1985 include: continued development and testing of the Space Shuttle's main engines, fabrication of engines, and space components and the continuance of the lay-in of spares to support the planning flight rate buildup to 24 per year, the ongoing fabrication of the various major structural spares (such as, the wings), and the completion of development work on a filament wound motor case for the solid rocket booster. Launch and mission support activities at the Kennedy Space Center will be enhanced to meet the increased flight rate of 20 east coast launches per year. The space transportation operations activity provides the standard operational support services for the Space Shuttle and the expendable launch vehicles. Within the Shuttle operations, external tank and solid rocket booster flight hardware is provisioned, overhauled, and repaired and the manpower, propellants, and other materials are furnished to conduct both flight and ground (launch and landing) operations.

The Space Shuttle operations program provides for the launch of NASA, Department of Defense, other U.S. Government, domestic commercial and international missions. The 1984–87 planned launch schedule allows for 6 flights in 1984, 11 flights in 1985, 16 flights in 1986, and 21 flights in 1987; the first west coast launch is scheduled for early 1986. The NASA expendable launch vehicle program (Scout, Delta, Atlas, Centaur, and Atlas F) will be completely funded on a reimbursable basis in 1985. The Delta program will continue to support the last five launches currently scheduled: three Government missions, one foreign mission, and one commercial mission. The Atlas Centaur program has seven remaining launches: four international missions and three Government missions. The Delta and Atlas Centaur vehicles are candidates for commercialization, proposals from commercial entities on these programs are currently being evaluated.

Space tracking and data acquisition.—This program provides for continuation of tracking and data acquisition for Earth-orbital spacecraft, planetary missions, sounding rockets, and research aircraft. This support is currently provided by a worldwide network of NASA ground stations interconnected by a communications system which provides the capability for instantaneous transmission of data and critical commands between spacecraft and the flight control centers. Facilities are also provided to process into meaningful form the scientific, applications, and engineering data which are collected from flight projects. In addition to providing support to NASA flight programs in 1985, the program will provide for continuing network consolidation upgrades, modernization program payments for tracking and data relay satellite systems service, and funding for other elements of the space network as selected stations in the ground network are phased out.

COMMITTEE RECOMMENDATION

The Committee recommends $3,600,300,000 for this account. This is the same as the budget request and $2,500,000 less than the House allowance.

In fiscal year 1984, the Congress added $50,000,000 to NASA's budget for Shuttle and engine spares. Also during fiscal year 1984, NASA internally reprogramed $118,000,000 for engines and engine spares.

For fiscal year 1985, the House provided an additional $40,000,000 for orbiter structural spares and took a general reduction of $37,500,000.

The Committee added $50,000,000 for Shuttle structural and engine spares bringing the total for structural spares to $160,000,000 and the total for engine spares to $101,700,000. This is the minimum level needed to retain the production capability until a decision on a fifth orbiter is made in fiscal year 1986.

Based on recent estimates, NASA could reduce the Shuttle related elements of the fiscal year 1985 space flight, control, and data communications request by approximately $50,000,000. Consequently, the Committee recommended a general offsetting reduction of $50,000,000 to be taken at the agency's discretion. In the event that the $50,000,000 reduction proves to be excessive, NASA could, under the provisions of the Senate bill, transfer funds from the R&D account to cover any shortfall.

In keeping with prior year practice, the Committee has deleted the program "caps" contained in the House bill. The House "caps" on: space shuttle production and operational capability; and space transportation operations; will be considered in conference.

CONSTRUCTION OF FACILITIES

1984 appropriation	$155,500,000
1985 budget estimate	160,000,000
House allowance	150,000,000
Committee recommendation	150,000,000

The Committee recommends an appropriation of $150,000,000 for facilities activities in fiscal year 1985. This amount is $10,000,000 less than the budget estimate and the same as the House allowance.

PROGRAM DESCRIPTION

This appropriation provides for the constructual 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 $150,000,000 for the construction of facilities in 1985. This is $10,000,000 less than the budget request and the same as the House allowance. The Committee expects the agency to reprioritize all projects and activities within the account and make the

proposed reduction from those activities that the agency deems of a lower priority.

In reprioritizing, the Committee expects NASA to retain the proposed modifications to the Main Propulsion Test (MPT) stand at the National Space Technology Laboratories (NSTL) to provide capability for single space shuttle main engine testing.

The Committee has included a legislative provision to fund a 170,000-square-foot engineering building housing approximately 825 people at the Jet Propulsion Laboratory. This $17,000,000 facility will be financed by Cal Tech at the prime rate plus 2 percent and paid off by NASA in 12 years, at which time the Government will own it. In taking this action the Committee followed the same procedure as used in fiscal year 1984 for a facility alteration associated with the solid rocket boosters.

The savings achieved in this account were applied to NASA's R&D account.

RESEARCH AND PROGRAM MANAGEMENT

1984 appropriation	$1,238,500,000
1985 budget estimate	1,331,000,000
House allowance	1,316,000,000
Committee recommendation	1,317,000,000

The Committee recommends an appropriation of $1,317,000,000 in fiscal year 1985 for research and program management. This amount is $14,000,000 less than the budget estimate and $1,000,000 more than the House allowance.

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 $1,317,000,000 for research and program management. This is $14,000,000 less than the budget request and $1,000,000 more than the House allowance. Both the House and Senate Committees took a general reduction in NASA's R&PM account. The Committee, however, added back $1,000,000 resulting in a fiscal year 1985 level increase of $78,500,000, or 6 percent, over the fiscal year 1984 level.

Although the agency is given the authority to take the reductions at its discretion, several areas stand out as possible candidates: travel, which is proposed to increase from $25,700,000 to $28,000,000, or 9 percent; and a $10,000,000 fiscal year 1985 augmentation in operational maintenance.

The $1,000,000 add-back is to permit NASA to continue its activities associated with automating its budget and cost tracking.

The Committee has also included bill language requiring the establishment of an Advanced Technology Advisory Committee on the space station program. This committee is instructed to report back to the Committees on Appropriations by April 1, 1985. Such report should identify promising advanced robotics or automation technologies, not in use in prior or existing spacecraft, totaling no less than 10 percent of the total development costs of the Space Station.

The Committee expects NASA to assign an ongoing and significant role to the Advanced Technology Advisory Committee and expects the Advisory Committee to submit semiannual reports on the status and progress of automation and robotics activities in conjunction with the space station.

The Committee has modified the House language establishing a flat rate per diem system for employee travel. The Senate modification allows the maximum rate to vary with GSA and congressional policy. The current statutory maximum rate for temporary duty travel in the continental United States is $75 per day. If, during the period of the NASA test of the flat rate per diem system, the Administrator of the GSA were to recommend an increase to the statutory maximum rate, and it were enacted by the Congress, this recommended language change in the bill would assure that NASA travelers would be reimbursed under the same rates used by the rest of the Government.

The Committee does not construe NASA's budget description of fiscal year 1985 procurement of upper stages as precluding from consideration any particular upper stage systems. The Committee encourages NASA to seek upper stages that will enhance the capability of the STS from the standpoint of performance, cost effectiveness, and launch assurance in the event of an upper stage failure. The Committee further encourages NASA to consider privately funded upper stages as a means of establishing or maintaining competition in upper stage procurement.

The Committee encourages NASA to review institutions of higher learning having significant minority enrollments to find ways to build closer relations with such schools, meet NASA's research objectives and increase the number of individuals from underrepresented groups in the pool of graduate researchers. The Committee instructs NASA to develop a plan containing options that could build a closer relationship with institutions serving significant numbers of minorities while not diminishing its efforts toward the historically black colleges and universities. The Committee further instructs NASA to submit this plan to the Committee by January 31, 1985.

The savings from this account were used to increase activities in NASA's R&D account.

GENERAL PROVISION

The Committee has included a general provision that provides for the future transfer of supercomputers (class VI) from NASA to the National Science Foundation (NSF). The provision further specifies that NSF can sell such equipment to universities in order to provide increased access to such supercomputers by the academic community. The Committee expects that one or more computers will be transferred during fiscal year 1985.

98TH CONGRESS 2d Session | HOUSE OF REPRESENTATIVES | REPORT 98-867

MAKING APPROPRIATIONS FOR THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS, AND OFFICES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1985, AND FOR OTHER PURPOSES

JUNE 26, 1984.—Ordered to be printed

Mr. BOLAND, from the Committee of Conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 5713]

The Committee of Conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 5713) "making appropriations for the Department of Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1985, and for other purposes," having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Amendment No. 32: 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:

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; including not to exceed (1) $155,500,000 for a space station; (2) $195,000,000 for space telescope development; (3) $120,200,000 for the gamma ray observatory; (4) $92,400,000 for upper stages; (5) $92,500,000 for the Venus radar mapper mission; and (6) $56,100,000 for Galileo; without the approval of the Committees on Appropriations; $2,422,600,000, to remain available until September 30, 1986; including $155,500,000 for a space station, of which $5,500,000 shall be made available from prior year appropriations: Provided, That of this amount, $63,800,000 is available for space station systems definition and integration studies, including $6,300,000 for systems engineering and integration support activities: Provided further, That within this amount, NASA shall conduct a study of an option which "phases-in" the permanently manned features of the station, as one of the reference configurations to be examined in the definition studies: Provided further, That the result of this study shall be reported to the House and Senate Committees on Appropriations prior to the selection by the Administrator of a configuration for the permanently manned space station: Provided further, That of this amount, $57,500,000 shall be withheld from obligation or expenditure until April 1, 1985: Provided further, That the recommendations contained in the report required under the head "Research and Program Management" be incorporated in any contract entered into as part of the systems definition and integration studies.

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 above amounts include the following changes from the budget: +$10,000,000 for research and analysis of which not less than $7,000,000 shall be for planetary research and analysis; +$40,000,000 for development of the advanced communications technology satellite (ACTS). These funds are intended to restore the flight demonstration element of this experimental program; +$6,000,000 for advanced work on a "shuttle derived" expendable launch vehicle; +$10,000,000 for continued work on the advanced turbo-prop program; −$10,000,000 from the aeronautics research and technology base; +$4,000,000 for the sensor systems and automation programs under the space research and technology program; and −$37,500,000 as a general unspecified reduction to be applied by the agency in areas other than those augmented above.

The conferees have melded the man-tended and automation provisions of the House and Senate into a workable package which supports the goals of both proposals. It is expected that NASA will commit to funding science and applications at the same rates to total NASA funding as approximately the 1985 level and that the agency retain the man-tended platforms as part of the overall space station program. The conferees agree with the Senate proposal that NASA integrate the recommendations of the Advanced Technology Advisory Committee concerning advanced automation and robotics into the overall system definition effort. It is expected that NASA will also recognize the value of an on-going role for the Committee in assessing progress in the automation effort.

The conferees support the concerns articulated in the House report regarding the lack of a space station option which "phases in" the permanently manned features of the station. Therefore, it is directed that NASA include a man-tended option as one of the reference configurations to be examined in the definition studies. This portion of the study will define how the various elements of the station would change if the introduction of the manned habitat were delayed from three to five years following initial deployment of the basic space station. The phased configuration will be studied and analyzed in the same manner and to the same schedule as the other reference configurations, and the result will be used by the study contractors and NASA during the systematic process of narrowing the range of configuration options under consideration during the course of the definition studies.

As the language incorporated in the bill indicates, NASA will submit the definition study of various reference configurations, including the man-tended option, to the House and Senate Committee for review. It is expected that the Committees may make use of other resources to undertake such a review.

The conferees do not intend that this additional reference configuration delay the schedule for the Request for Proposal, the initiation of the studies or the planned narrowing of options during the definition effort. It is expected that the man-tended option will require at least 10 to 15 percent of definition study funding. The conferees also recognize that the introduction of this additional reference configuration may necessitate the use of additional resources in the definition studies and will consider providing a modest increase if so requested by NASA.

Amendment No. 33: Restores language proposed by the House and stricken by the Senate amended to "cap" space shuttle production and operational capability at $1,510,600,000 instead of $1,505,600,000 as proposed by the House.

Amendment No. 34: Appropriates $3,601,800,000 for space flight, control and data communications instead of $3,602,800,000 as proposed by the House and $3,600,300,000 as proposed by the Senate.

The above amount includes the following changes from the budget: +$40,000,000 for orbiter structural spares; +$5,000,000 for shuttle main engine spares; and −$43,500,000 as a general unspecified reduction to be applied by the agency in areas other than those augmented above.

Amendment No. 35: Deletes language proposed by the Senate permitting a five percent transfer between "Research and Development" and "Space Flight, Control and Data Communications".

Amendment No. 36: 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 permitting a long-term contractual arrangement for constructing a Central Engineering Building at the Jet Propulsion Laboratory.

Amendment No. 37: Appropriates $1,317,000,000 for research and program managment as proposed by the Senate, instead of $1,316,000,000 as proposed by the House.

Amendment No. 38: 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 modifying language concerning a per diem travel experiment.

Amendment No. 39: 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 establishing an Advanced Technology Advisory Committee in conjunction with the Space Station program.

The Space Station program offers an opportunity to stimulate the development of advanced technologies in the fields of automation and robotics. To this end, the conferees adopted the Senate provision establishing an Advanced Technology Advisory Committee mandated to identify specific space station systems which advance those technologies that are not in use in existing spacecraft. Examples of such technologies include advanced vision sensors,

computers that can serve as expert systems, and manipulator systems with advanced multiple degrees of freedom. The conferees intend that, where appropriate, the Committee may as a secondary task also identify systems currently in use whose potential for enhancing automation and robotics technologies appears promising. The conferees both intend and expect that the technologies of Space Station automation and robotics will be identified and developed not only to increase the efficiency of the station itself but also to enhance the Nation's technical and scientific base leading to more productive industries here on earth.

Amendment No. 40: 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 providing authority for transferring or selling Class VI NASA computers to the National Science Foundation.

Conference Total—With Comparisons

The total new budget (obligational) authority for the fiscal year 1985 recommended by the Committee of Conference, with comparisons to the fiscal year 1984 amount, the 1985 budget estimates, and the House and Senate bills for 1985 follow:

New budget (obligational) authority, fiscal year 1984	$56,111,731,000
Budget estimates of new (obligational) authority, fiscal year 1985	54,668,498,000
House bill, fiscal year 1985	58,436,496,500
Senate bill, fiscal year 1985	56,289,923,000
Conference agreement, fiscal year 1985	56,543,299,775
Conference agreement compared with:	
New budget (obligational) authority, fiscal year 1984	+431,568,775
Budget estimates of new (obligational) authority, fiscal year 1985	+1,874,801,775
House bill, fiscal year 1985	−1,893,196,725
Senate bill, fiscal year 1985	+253,376,775

Edward P. Boland,
Bob Traxler,
Louis Stokes,
Lindy Boggs,
Martin Olav Sabo,
Bill Boner,
Jamie L. Whitten,
Bill Green,
Lawrence Coughlin,
Jerry Lewis,
Silvio O. Conte,
Managers on the Part of the House.

Jake Garn,
Lowell P. Weicker, Jr.,
Paul Laxalt,
Alfonse M. D'Amato,
James Abdnor,
Pete V. Domenici,
Mark O. Hatfield,
Walter D. Huddleston,
John C. Stennis,
Pat Leahy,
Jim Sasser,
Managers on the Part of the Senate.

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Public Law 98-371
98th Congress

An Act

Making appropriations for the Department of Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1985, and for other purposes.

July 18, 1984
[H.R. 5713]

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 Department of Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1985, and for other purposes, namely:

Department of Housing and Urban Development—Independent Agencies Appropriation Act, 1985

TITLE I

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; including not to exceed (1) $155,500,000 for a space station; (2) $195,000,000 for space telescope development; (3) $120,200,000 for the gamma ray observatory; (4) $92,400,000 for upper stages; (5) $92,500,000 for the Venus radar mapper mission; and (6) $56,100,000 for Galileo; without the approval of the Committees on Appropriations; $2,422,600,000, to remain available until September 30, 1986; including $155,500,000 for a space station, of which $5,500,000 shall be made available from prior year appropriations: *Provided,* That of this amount, $63,800,000 is available for space station systems definition and integration studies, including $6,300,000 for systems engineering and integration support activities: *Provided further,* That within this amount, NASA shall conduct a study of an option which "phases-in" the permanently manned features of the station, as one of the reference configurations to be examined in the definition studies: *Provided further,* That the result of this study shall be reported to the House and Senate Committees on Appropriations prior to the selection by the Administrator of a configuration for the permanently manned space station: *Provided further,* That of this amount, $57,500,000 shall be withheld from obligation or expenditure until April 1, 1985. *Provided further,* That the recommendations contained in the report required under the "Research and Program Management" be incorporated in any contract entered into as part of the systems definition and integration studies.

Study.

Report.

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; and including not to exceed (1) $1,510,600,000 for space shuttle production and operational capability; and (2) $1,339,000,000 for space transportation operations; without the approval of the Committees on Appropriations; $3,601,800,000, to remain available until September 30, 1986.

CONSTRUCTION OF FACILITIES

For construction, repair, rehabilitation and modification of facilities, minor construction of new facilities and additions to existing facilities, and for facility planning and design not otherwise provided, for the National Aeronautics and Space Administration, and for the acquisition or condemnation of real property, as authorized by law, $150,000,000, to remain available until September 30, 1987: *Provided,* That, notwithstanding the limitation on the availability of funds appropriated under this heading by this appropriation 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 appropriation 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, with the approval of the Committees on Appropriations, if he determines that deferral of such action until the enactment of the next appropriation Act would be inconsistent with the interest of the Nation in aeronautical and space activities: *Provided further,* That with funds appropriated under the Research and Development account and the Space Flight, Control and Data Communications account to NASA in this Act, and subsequent appropriations Acts, NASA may enter into a contract with the California Institute of Technology to amortize the Central Engineering Building over a twelve-year period for a total cost of not to exceed $17,000,000, plus applicable financing costs equal to the prime rate plus 2 percent, under the authority granted under Public Law 98-45. The building shall be built at the Jet Propulsion Laboratory with title to be vested initially in the California Institute of Technology, and to revert to NASA upon completion of payments.

97 Stat. 219.
Jet Propulsion Laboratory, California Institute of Technology.

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, maintenance and operation of administrative aircraft; purchase (not to exceed thirty 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; $1,317,000,000: *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 the National Aeronautics and Space Administration may test a flat rate per diem system for employee travel allowances under regulations prescribed by the Administrator: *Provided further,* That the rates will be consistent with those authorized by the Administrator of the General Services Administration: *Provided further,* That per diem allowances paid employees under a flat rate per diem system shall be amounts determined by the Administrator of NASA to be sufficient to meet normal and necessary expenses in the area in which travel is performed, but in no event will the travel allowances exceed $75 for each day in travel status within the continental United States, unless the statutory maximum rate of $75 per day is increased by the Congress and implemented by the Administrator of the General Services Administration: *Provided further,* That the test approved under this section shall expire on September 30, 1985, or upon the effective date of permanent legislation establishing a flat rate per diem system for civilian personnel, whichever occurs first: *Provided further,* That the Administrator shall establish an Advanced Technology Advisory Committee in conjunction with NASA's Space Station program and that the Committee shall prepare a report by April 1, 1985, identifying specific space station systems which advance automation and robotic technologies, not in use in existing spacecraft, and that the development of such systems shall be estimated to cost no less than 10 per centum of the total Space Station costs.

Report.

GENERAL PROVISIONS

The National Aeronautics and Space Administration has authority, notwithstanding any other provision of law, to take such actions as the Administrator deems necessary to provide to the National Science Foundation, on a fully reimbursable basis, Class VI Computers, otherwise acquired for service at NASA installations under authorized acquisition procedures, with accompanying peripheral equipment, as requested by the Foundation: *Provided,* That the National Science Foundation is authorized to receive from the National Aeronautics and Space Administration, Class VI Computers, with such accompanying peripheral equipment as NASA makes available, and, upon receipt, to sell said computer and peripheral equipment to an institution of higher education under such terms as it deems appropriate notwithstanding any other provision of law.

Computers.

TITLE IV

GENERAL PROVISIONS

SEC. 401. Where appropriations in titles I and II 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 Veterans Administration; 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; or to payments to interagency motor pools where separately set forth in the budget schedules.

42 USC 5121 note.

42 USC 9601 note.

SEC. 402. 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, as 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. 403. 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).

31 USC 9101 *et seq.*

12 USC 1749a.

SEC. 404. 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. 405. 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. 406. 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 the Secretary of the Department of Housing and Urban Development, who, under title 5, United States Code, section 101, is exempted from such limitation.

SEC. 407. 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. Research and development

SEC. 408. 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. 409. 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 without the approval of the Committees on Appropriations.

SEC. 410. None of the funds in this Act shall be used to pay the expenses of, or otherwise compensate, non-Federal parties intervening 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.). 15 USC 2056

SEC. 411. 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. 412. 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. 413. No part of any appropriation contained in this Act shall be available to implement, administer, or enforce any regulation which has been disapproved pursuant to a resolution of disapproval duly adopted in accordance with the applicable law of the United States.

SEC. 414. Except as otherwise provided in section 406, 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. 415. 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.

This Act may be cited as the "Department of Housing and Urban Development—Independent Agencies Appropriation Act, 1985".

Approved July 18, 1984.

LEGISLATIVE HISTORY—H.R. 5713:

HOUSE REPORTS: No. 98-803 (Comm. on Appropriations) and No. 98-867 (Comm. of Conference).
SENATE REPORT No. 98-506 (Comm. on Appropriations).
CONGRESSIONAL RECORD, Vol. 130 (1984):
May 30, considered and passed House.
June 21, considered and passed Senate, amended.
June 27, House agreed to conference report, receded and concurred in certain Senate amendments and in others with amendments; Senate agreed to conference report and concurred in House amendments.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 20, No. 29 (1984):
July 18, Presidential statement.

Public Law 99-88
99th Congress

An Act

Making supplemental appropriations for the fiscal year ending September 30, 1985, and for other purposes.

Aug. 15, 1985
[H.R. 2577]

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, to provide supplemental appropriations for the fiscal year ending September 30, 1985, and for other purposes, namely:

Supplemental Appropriations Act, 1985.

CHAPTER VI

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

Language under this heading in the Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1985 (Public Law 98-371), is amended by deleting "including $155,500,000 for a space station, of which $5,500,000 shall be made available from prior year appropriations: *Provided,*" and inserting in lieu thereof "including $150,000,000 for space station, to be combined with $5,500,000 to be made available from prior year appropriations for a total of $155,500,000: *Provided,* That the $5,500,000 so identified shall be in addition to $2,422,600,000 appropriated for Research and Development for fiscal year 1985: *Provided further,*".

98 Stat. 1225.

For an additional amount for "Research and development", $40,000,000, to remain available until September 30, 1986: *Provided,* That this amount shall be deferred and shall not become available until March 1, 1986.

RESEARCH AND PROGRAM MANAGEMENT

(RESCISSION)

Of available funds under this head, $6,000,000 are rescinded, of which $4,000,000 are rescinded pursuant to section 2901 of the Deficit Reduction Act of 1984.

TITLE II—INCREASED PAY COSTS FOR THE FISCAL YEAR 1985

For additional amounts for appropriations for the fiscal year 1985, for increased pay costs authorized by or pursuant to law as follows:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

"Research and program management", $21,300,000;