

The original documents are located in Box 46, folder “6/4/76 HR12453 National Aeronautics and Space Administration Authorization Act 1977 (2)” of the White House Records Office: Legislation Case Files at the Gerald R. Ford Presidential Library.

Copyright Notice

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material. Gerald R. Ford donated to the United States of America his copyrights in all of his unpublished writings in National Archives collections. Works prepared by U.S. Government employees as part of their official duties are in the public domain. The copyrights to materials written by other individuals or organizations are presumed to remain with them. If you think any of the information displayed in the PDF is subject to a valid copyright claim, please contact the Gerald R. Ford Presidential Library.

Exact duplicates within this folder were not digitized.

94TH CONGRESS
2D SESSION

H. R. 12453

IN THE HOUSE OF REPRESENTATIVES

MARCH 11, 1976

Mr. TEAGUE (for himself, Mr. MOSHER, Mr. HECHLER of West Virginia, Mr. BELL, Mr. DOWNING of Virginia, Mr. JARMAN, Mr. FUQUA, Mr. WYDLER, Mr. SYMINGTON, Mr. WINN, Mr. FLOWERS, Mr. FREY, Mr. ROE, Mr. GOLDWATER, Mr. McCORMACK, Mr. ESCH, Mr. BROWN of California, Mr. CONLAN, Mr. MILFORD, Mr. MYERS of Pennsylvania, Mr. THORNTON, Mr. EMERY, Mr. SCHEUER, Mr. PRESSLER, and Mr. OTTINGER) introduced the following bill; which was referred to the Committee on Science and Technology

A BILL

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.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 That there is hereby authorized to be appropriated to the
4 National Aeronautics and Space Administration:

5 (a) For "Research and development," for the follow-
6 ing programs:

7 (1) Space Shuttle, \$1,288,100,000;



- 1 (2) Space flight operations, \$198,200,000;
 2 (3) Expendable launch vehicles, \$151,400,000;
 3 (4) Physics and astronomy, \$169,800,000;
 4 (5) Lunar and planetary exploration, \$193,100,000;
 5 (6) Life sciences, \$22,125,000;
 6 (7) Space applications, \$185,700,000;
 7 (8) Earth resources operational systems,
 8 \$13,500,000;
 9 (9) Aeronautical research and technology,
 10 \$192,100,000;
 11 (10) Space research and technology, \$92,100,000;
 12 (11) Tracking and data acquisition, \$254,000,000;
 13 (12) Technology utilization, \$8,400,000.
- 14 (b) For "Construction of facilities", including land
 15 acquisition, as follows:
- 16 (1) Modification for high enthalpy entry facility,
 17 Ames Research Center, \$1,220,000;
 18 (2) Modification of flight simulator for advanced
 19 aircraft, Ames Research Center, \$1,730,000;
 20 (3) Construction of supply support facility, Ames
 21 Research Center, \$1,540,000;
 22 (4) Construction of addition to flight control
 23 facility, Hugh L. Dryden Flight Research Center,
 24 \$750,000;

- 1 (5) Construction of airlock to spin test facility,
 2 John F. Kennedy Space Center, \$360,000;
 3 (6) Modifications for utility control system, John
 4 F. Kennedy Space Center, \$2,445,000;
 5 (7) Construction of addition for aeroelastic model
 6 laboratory, Langley Research Center, \$730,000;
 7 (8) Construction of data reduction center annex
 8 Langley Research Center, \$2,970,000;
 9 (9) Construction of refuse-fired steam generating
 10 facility, Langley Research Center, \$2,485,000;
 11 (10) Modification of refrigeration system, electric
 12 propulsion laboratory, Lewis Research Center, \$680,-
 13 000;
 14 (11) Rehabilitation of combustion air drying sys-
 15 tem, engine research building, Lewis Research Center,
 16 \$1,490,000;
 17 (12) Large aeronautical facility: construction of
 18 national transonic facility, Langley Research Center,
 19 \$25,000,000;
 20 (13) Space Shuttle facilities at various locations as
 21 follows:
- 22 (A) Construction of Orbiter processing facil-
 23 ity, John F. Kennedy Space Center, \$3,750,000;

1 (B) Modifications to launch complex 39, John
2 F. Kennedy Space Center, \$17,855,000;

3 (C) Modifications for solid rocket booster pro-
4 cessing facilities, John F. Kennedy Space Center,
5 \$8,700,000;

6 (D) Construction of Shuttle/Carrier aircraft
7 mating facility, John F. Kennedy Space Center,
8 \$1,700,000;

9 (E) Rehabilitation and modification of Shut-
10 tle facilities, at various locations, \$1,760,000;

11 (F) Modification of manufacturing and final
12 assembly facilities for external tanks, Michoud As-
13 sembly Facility, \$1,930,000;

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

16 (A) Modifications to operations and checkout
17 building for Spacelab, John F. Kennedy Space
18 Center, \$3,570,000;

19 (B) Modifications and addition for Shuttle pay-
20 load development, Goddard Space Flight Center,
21 \$770,000;

22 (15) Rehabilitation and modification of facilities
23 at various locations, not in excess of \$500,000 per proj-
24 ect, \$17,875,000;

25 (16) Minor construction of new facilities and addi-

1 tions to existing facilities at various locations, not in
2 excess of \$250,000 per project, \$5,125,000;

3 (17) Facility planning and design not otherwise
4 provided for, \$12,655,000.

5 (c) For "Research and program management", \$810,-
6 455,000, and such additional or supplemental amounts as
7 may be necessary for increases in salary, pay, retirement,
8 or other employee benefits authorized by law.

9 (d) Notwithstanding the provisions of subsection 1 (g),
10 appropriations for "Research and development" may be
11 used (1) for any items of a capital nature (other than acqui-
12 sition of land) which may be required at locations other than
13 installations of the Administration for the performance of
14 research and development contracts, and (2) for grants
15 to nonprofit institutions of higher education, or to nonprofit
16 organizations whose primary purpose is the conduct of
17 scientific research, for purchase or construction of addi-
18 tional research facilities; and title to such facilities shall
19 be vested in the United States unless the Administrator de-
20 termines that the national program of aeronautical and
21 space activities will best be served by vesting title in any
22 such grantee institution or organization. Each such grant
23 shall be made under such conditions as the Administrator
24 shall determine to be required to insure that the United
25 States will receive therefrom benefit adequate to justify the

1 making of that grant. None of the funds appropriated for
 2 "Research and development" pursuant to this Act may be
 3 used in accordance with this subsection for the construction
 4 of any major facility, the estimated cost of which, including
 5 collateral equipment, exceeds \$250,000, unless the Admini-
 6 strator or his designee has notified the Speaker of the House
 7 of Representatives and the President of the Senate and the
 8 Committee on Science and Technology of the House of Rep-
 9 resentatives and the Committee on Aeronautical and Space
 10 Sciences of the Senate of the nature, location, and estimated
 11 cost of such facility.

12 (e) When so specified in an appropriation Act, (1)
 13 any amount appropriated for "Research and development"
 14 or for "Construction of facilities" may remain available
 15 without fiscal year limitation, and (2) maintenance and
 16 operation of facilities, and support services contracts may be
 17 entered into under the "Research and program management"
 18 appropriation for periods not in excess of twelve months
 19 beginning at any time during the fiscal year.

20 (f) Appropriations made pursuant to subsection 1 (c)
 21 may be used, but not to exceed \$35,000, for scientific con-
 22 sultations or extraordinary expenses upon the approval or
 23 authority of the Administrator and his determination shall
 24 be final and conclusive upon the accounting officers of the
 25 Government.

1 (g) Of the funds appropriated pursuant to subsections
 2 1 (a) and 1 (c), not in excess of \$25,000 for each project,
 3 including collateral equipment, may be used for construction
 4 of new facilities and additions to existing facilities, and not
 5 in excess of \$50,000 for each project, including collateral
 6 equipment, may be used for rehabilitation or modification of
 7 facilities: *Provided*, That of the funds appropriated pursuant
 8 to subsection 1 (a), not in excess of \$250,000 for each proj-
 9 ect, including collateral equipment, may be used for any
 10 of the foregoing for unforeseen programmatic needs.

11 SEC. 2. Authorization is hereby granted whereby any
 12 of the amounts prescribed in paragraphs (1) through (16),
 13 inclusive, of subsection 1 (b) —

14 (1) in the discretion of the Administrator or his
 15 designee, may be varied upward 10 per centum, or

16 (2) following a report by the Administrator or his
 17 designee to the Committee on Science and Technology
 18 of the House of Representatives and the Committee on
 19 Aeronautical and Space Sciences of the Senate on the
 20 circumstances of such action, may be varied upward 25
 21 per centum,

22 to meet unusual cost variations, but the total cost of all work
 23 authorized under such paragraphs shall not exceed the total
 24 of the amounts specified in such paragraphs.

25 SEC. 3. Not to exceed one-half of 1 per centum of the

1 funds appropriated pursuant to subsection 1 (a) hereof may
 2 be transferred to the "Construction of facilities" appropria-
 3 tion, and, when so transferred, together with \$10,000,000
 4 of the funds appropriated pursuant to subsection 1 (b) hereof
 5 (other than funds appropriated pursuant to paragraph (17)
 6 of such subsection) shall be available for expenditure to con-
 7 struct, expand, or modify laboratories and other installations
 8 at any location (including locations specified in subsection
 9 1 (b)), if (1) the Administrator determines such action to be
 10 necessary because of changes in the national program of
 11 aeronautical and space activities or new scientific or engi-
 12 neering developments, and (2) he determines that deferral
 13 of such action until the enactment of the next authorization
 14 Act would be inconsistent with the interest of the Nation in
 15 aeronautical and space activities. The funds so made available
 16 may be expended to acquire, construct, convert, rehabilitate,
 17 or install permanent or temporary public works, including
 18 land acquisition, site preparation, appurtenances, utilities,
 19 and equipment. No portion of such sums may be obligated
 20 for expenditure or expended to construct, expand, or modify
 21 laboratories and other installations unless (A) a period of
 22 thirty days has passed after the Administrator or his designee
 23 has transmitted to the Speaker of the House of Representa-
 24 tives and to the President of the Senate and to the Committee
 25 on Science and Technology of the House of Representatives

1 and to the Committee on Aeronautical and Space Sciences
 2 of the Senate a written report containing a full and com-
 3 plete statement concerning (1) the nature of such construc-
 4 tion, expansion, or modification, (2) the cost thereof in-
 5 cluding the cost of any real estate action pertaining thereto,
 6 and (3) the reason why such construction, expansion, or
 7 modification is necessary in the national interest, or (B)
 8 each such committee before the expiration of such period has
 9 transmitted to the Administrator written notice to the effect
 10 that such committee has no objection to the proposed action.

11 SEC. 4. Notwithstanding any other provision of this
 12 Act—

13 (1) no amount appropriated pursuant to this Act
 14 may be used for any program deleted by the Congress
 15 from requests as originally made to either the House
 16 Committee on Science and Technology or the Senate
 17 Committee on Aeronautical and Space Sciences,

18 (2) no amounts appropriated pursuant to this Act
 19 may be used for any program in excess of the amount
 20 actually authorized for that particular program by sec-
 21 tions 1 (a) and 1 (c), and

22 (3) no amount appropriated pursuant to this Act
 23 may be used for any program which has not been pre-
 24 sented to or requested of either such committee,
 25 unless (A) a period of thirty days has passed after the

1 receipt by the Speaker of the House of Representatives and
 2 the President of the Senate and each such committee of
 3 notice given by the Administrator or his designee containing
 4 a full and complete statement of the action proposed to be
 5 taken and the facts and circumstances relied upon in support
 6 of such proposed action, or (B) each such committee before
 7 the expiration of such period has transmitted to the Admin-
 8 istrator written notice to the effect that such committee has
 9 no objection to the proposed action.

10 SEC. 5. It is the sense of the Congress that it is in the
 11 national interest that consideration be given to geographical
 12 distribution of Federal research funds whenever feasible, and
 13 that the National Aeronautics and Space Administration
 14 should explore ways and means of distributing its research
 15 and development funds whenever feasible.

16 SEC. 6. The National Aeronautics and Space Adminis-
 17 tration is authorized, when so provided in an appropriation
 18 Act, to enter into a contract for tracking and data relay
 19 satellite services. Such services shall be furnished to the Na-
 20 tional Aeronautics and Space Administration in accordance
 21 with applicable authorization and appropriation Acts. The
 22 Government shall incur no costs under such contract prior to
 23 the furnishing of such services except that the contract
 24 may provide for the payment for contingent liability of the
 25 Government which may accrue in the event the Government

1 should decide for its convenience to terminate the contract
 2 before the end of the period of the contract. Facilities which
 3 may be required in the performance of the contract may be
 4 constructed on Government-owned lands if there is included
 5 in the contract a provision under which the Government may
 6 acquire title to the facilities, under terms and conditions
 7 agreed upon in the contract, upon termination of the con-
 8 tract.

9 The Administrator shall in January of each year report
 10 to the Committee on Science and Technology and the Com-
 11 mittee on Appropriations of the House of Representatives
 12 and the Committee on Aeronautical and Space Sciences and
 13 the Committee on Appropriations of the Senate the projected
 14 aggregate contingent liability of the Government under ter-
 15 mination provisions of any contract authorized in this section
 16 through the next fiscal year. The authority of the National
 17 Aeronautics and Space Administration to enter into and to
 18 maintain the contract authorized hereunder shall remain in
 19 effect as long as provision therefor is included in Acts au-
 20 thORIZING appropriations to the National Aeronautics and
 21 Space Administration for subsequent fiscal years.

22 SEC. 7. Paragraph (15) of section 5316, title 5, United
 23 States Code, is amended by striking out "(6)" and inserting
 24 in lieu thereof "(7)".

25 SEC. 8. Section 6 of the National Aeronautics and

1 Space Administration Authorization Act, 1968 (81 Stat.
2 170), is amended by striking out the words "the rate of
3 \$100" and inserting in lieu thereof the words "a rate not
4 to exceed the per diem rate equivalent to the rate for
5 GS-18".

6 SEC. 9. (a) The Congress hereby finds and declares
7 that—

8 (1) for the economic progress of the United States
9 and for national security, it is essential that the United
10 States preserve its role as a world leader in aeronautics;

11 (2) the facilities for the solution of research,
12 development, and evaluation problems in aeronautics
13 which were constructed pursuant to the Unitary Wind
14 Tunnel Plan Act of 1949 (63 Stat. 936) contributed
15 significantly to past advances in aeronautics, but those
16 facilities are no longer adequate to prove future
17 aeronautical designs by preflight analyses; and

18 (3) there is an urgent need for this Nation to
19 construct major new aeronautical test facilities and
20 to upgrade and modernize existing aeronautical test
21 facilities to test future aeronautical designs which will
22 reduce fuel consumption and provide greater efficiency
23 and safety.

24 (b) It is, therefore, the sense of the Congress that—

25 (1) the National Aeronautics and Space Admin-

1 istration should take all necessary and appropriate steps
2 to expedite the construction of the national transonic
3 facility, Langley Research Center, authorized under
4 paragraph (12) of subsection 1 (b) of this Act;

5 (2) as soon as practicable, but no later than the
6 time of submission of the Budget of the United States
7 Government, 1978, to the Congress, the National
8 Aeronautics and Space Administration should submit a
9 detailed project plan and budget estimates for the first
10 increment of work necessary for the modification of the
11 40- by 80-foot subsonic wind tunnel, Ames Research
12 Center, as authorized under paragraph (4) of subsection
13 1 (b) of Public Law 94-39; and

14 (3) the National Aeronautics and Space Admin-
15 istration, in conjunction with the Department of Defense
16 and other agencies, as appropriate, should continue (A)
17 to take effective steps to insure that all national aero-
18 nautical test facilities are available to industry in connec-
19 tion with the development of new civilian and military
20 aircraft, and (B) to study and report to the Congress
21 from time to time on the adequacy of national
22 aeronautical test facilities to meet changes in national
23 requirements and programs.

24 SEC. 10. (a) Section 102 of the National Aeronautics
25 and Space Act of 1958 (42 U.S.C. 2451) is amended

1 by redesignating subsection (d) as subsection (e), and
2 by inserting immediately after subsection (c) the following
3 new subsection:

4 “(d) The Congress declares that the general welfare
5 of the United States requires that the unique competence in
6 scientific and engineering systems of the National Aeronau-
7 tics and Space Administration also shall be directed toward
8 ground propulsion systems research and development.”.

9 (b) The subsection of section 102 of such Act redesi-
10 gnated as subsection (e) by subsection (a) of this section is
11 amended by striking out “and (c)” and inserting in lieu
12 thereof “(c), and (d)”.

13 SEC. 11. Section 103 of the National Aeronautics and
14 Space Act of 1958 (42 U.S.C. 2452) is amended by strik-
15 ing out “and” at the end of the paragraph (1), by strik-
16 ing out the period at the end of paragraph (2) and inserting
17 in lieu thereof “; and”, and by adding after paragraph (2)
18 the following new paragraph:

19 “(3) the term ‘ground propulsion system’ means
20 the engine, transmission, or drive, and associated con-
21 trols, necessary to power automobiles, trucks, trains,
22 buses, and selected light marine vehicles.”.

23 SEC. 12. This Act may be cited as the “National
24 Aeronautics and Space Administration Authorization Act,
25 1977”.

REFERRED TO THE COMMITTEE ON SCIENCE AND TECHNOLOGY
MAY 20 1978

Present and Mr. Ocasio
Thomson, Mr. Evans, Mr. Pomeroy, Mr.
Rohr, Mr. Ryan of Pennsylvania, Mr.
Brown of California, Mr. Gossett, Mr. Mc-
Waters, Mr. McCormack, Mr. Egan, Mr.
Fowler, Mr. Price, Mr. Row, Mr. Gar-
Horton, Mr. Hutchinson, Mr. Wynn, Mr.
Lipinski, Mr. Jaraman, Mr. Ertter, Mr.
Wool, Lipinski, Mr. Price, Mr. Downey, Mr.
By Mr. Tavel, Mr. Mian, Mr. Harkin of

Statement and for other purposes
facilities and research and budgetary man-
agement and development, cooperation of
Aeronautics and Space Administration for
to improve appropriations to the National

A BILL

TO BE ENACTED
BY THE CONGRESS
H. R. 15423

A BILL

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.

By Mr. TEAGUE, Mr. MOSHER, Mr. HECHLER of West Virginia, Mr. BELL, Mr. DOWNING of Virginia, Mr. JARMAN, Mr. FUQUA, Mr. WYDLER, Mr. SYMINGTON, Mr. WINN, Mr. FLOWERS, Mr. FREY, Mr. ROE, Mr. GOLDWATER, Mr. MCCORMACK, Mr. ESCH, Mr. BROWN of California, Mr. CONLAN, Mr. MILFORD, Mr. MYERS of Pennsylvania, Mr. THORNTON, Mr. EMERY, Mr. SCHEUER, Mr. PRESSLER, and Mr. OTTINGER

MARCH 11, 1976

Referred to the Committee on Science and Technology

**AUTHORIZING APPROPRIATIONS TO THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION**

MARCH 15, 1976.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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

REPORT

[To accompany H.R. 12453]

The Committee on Science and Technology, to whom was referred the bill (H.R. 12454) 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 considered the same, report favorably thereon without amendment and recommended that the bill do pass.

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to the National Aeronautics and Space Administration for fiscal year 1977 as follows:

Programs	Authorization fiscal year 1977	Page No.
Research and development.....	\$2, 768, 525, 000	19
Construction of facilities.....	117, 090, 000	136
Research and program management..	810, 455, 000	162
Total.....	3, 696, 070, 000	

This lengthy publication was not digitized. Please contact the Gerald R. Ford Presidential Library or the government documents department of a local library to obtain a copy of this item.

PROVIDING FOR THE CONSIDERATION OF H.R. 12453

MARCH 17, 1976.—Referred to the House Calendar and ordered to be printed

Mr. YOUNG of Texas, from the Committee on Rules,
submitted the following

REPORT

[To accompany H. Res. 1094]

The Committee on Rules, having had under consideration House Resolution 1094, by a nonrecord vote, report the same to the House with the recommendation that the resolution do pass.

○

NASA AUTHORIZATION FOR
FISCAL YEAR 1977

REPORT
OF THE
COMMITTEE ON
AERONAUTICAL AND SPACE SCIENCES
UNITED STATES SENATE

ON

H.R. 12453

AN ACT 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



MARCH 30, 1976.—Ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE

COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES

FRANK E. MOSS, Utah, *Chairman*

STUART SYMINGTON, Missouri	BARRY GOLDWATER, Arizona
JOHN C. STENNIS, Mississippi	PETE V. DOMENICI, New Mexico
HOWARD W. CANNON, Nevada	PAUL LAXALT, Nevada
WENDELL H. FORD, Kentucky	JAKE GARN, Utah
DALE BUMPERS, Arkansas	

GILBERT W. KEYES, *Staff Director*
 JAMES T. BRUCE, *Professional Staff Member*
 JAMES J. GEHRIG, *Professional Staff Member*
 CRAIG M. PETERSON, *Chief Clerk/Counsel*
 JOSEPH L. PLATT, *Assistant Chief Clerk*
 WILLIAM A. SHUMANN, *Professional Staff Member*
 CRAIG VOORHEES, *Professional Staff Member*
 Dr. GLEN P. WILSON, *Professional Staff Member*

CHARLES F. LOMBARD, *Minority Counsel*
 EARL D. EISENHOWER, *Professional Staff Member, Minority*

(II)

CONTENTS

	Page
Congressional adjustments to NASA fiscal year 1977 request.....	1
Purpose of bill.....	2
Legislative history.....	2
Summary.....	2
Research and development.....	4
Space Shuttle.....	4
Space flight operations.....	6
Expendable launch vehicles.....	8
Physics and astronomy.....	9
Lunar and planetary exploration.....	12
Life sciences.....	14
Space applications.....	15
Aeronautical research and technology.....	19
Space research and technology.....	21
Tracking and data acquisition.....	23
Technology utilization.....	25
Construction of facilities.....	27
Modification for high enthalpy entry facility, Ames Research Center.....	28
Modification of flight simulator for advanced aircraft, Ames Research Center.....	28
Construction of supply support facility, Ames Research Center.....	28
Construction of addition to flight control facility, Hugh L. Dryden Flight Research Center.....	28
Construction of addition to lunar sample curatorial facility, Lyndon B. Johnson Space Center.....	29
Construction of airlock to spin test facility, John F. Kennedy Space Center.....	29
Modifications for utility control system, John F. Kennedy Space Center.....	29
Construction of addition for aeroelastic model laboratory, Langley Research Center.....	30
Construction of data reduction center annex, Langley Research Center.....	30
Construction of refuse-fired steam generating facility, Langley Research Center.....	30
Modification of refrigeration system, electric propulsion laboratory, Lewis Research Center.....	31
Rehabilitation of combustion air drying system, engine research building, Lewis Research Center.....	31
Large aeronautical facility: Construction of national transonic facility, Langley Research Center.....	31
Space Shuttle facilities, various locations.....	32
Space Shuttle payload facilities, various locations.....	36
Rehabilitation and modification of facilities, various locations, not in excess of \$500,000 per project.....	37
Minor construction of new facilities and additions to existing facilities, various locations, not in excess of \$250,000 per project.....	37
Facility planning and design.....	38
Research and program management.....	38
Cost and budget data.....	40
Legislative changes.....	42
Changes in existing law.....	43
Tabulation of votes cast in committee.....	45
Space budgets of other agencies.....	45
Executive communications.....	46
Section-by-section analysis.....	52

(III)

AUTHORIZING APPROPRIATIONS TO THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION

MARCH 30, 1976.—Ordered to be printed

Mr. Moss, from the Committee on Aeronautical and Space Sciences,
submitted the following

REPORT

[To accompany H.R. 12453]

The Committee on Aeronautical and Space Sciences, to which was referred the bill (H.R. 12453) 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 considered the same, reports favorably thereon, with an amendment striking out all after the enacting clause and inserting the committee amendment, and recommends that the bill be passed.

CONGRESSIONAL ADJUSTMENTS TO NASA REQUEST
FOR FISCAL YEAR 1977—SUMMARY

Fiscal year 1977	Budget request	House action	Senate committee action
Research and development:			
Space Shuttle.....	\$1,288,100,000	\$1,288,100,000	\$1,288,100,000
Space flight operations.....	205,200,000	198,200,000	205,200,000
Expendable launch vehicles.....	151,400,000	151,400,000	151,400,000
Physics and astronomy.....	165,800,000	169,800,000	165,800,000
Lunar and planetary exploration.....	191,100,000	193,100,000	191,100,000
Life sciences.....	22,125,000	22,125,000	22,125,000
Space applications.....	198,200,000	185,700,000	198,200,000
Earth resources operational systems.....	0	13,500,000	0
Aeronautical research and technology.....	189,100,000	192,100,000	189,100,000
Space research and technology.....	82,000,000	92,100,000	82,000,000
Tracking and data acquisition.....	258,000,000	254,000,000	258,000,000
Technology utilization.....	7,900,000	8,400,000	8,100,000
Total.....	2,758,925,000	2,768,525,000	2,759,125,000
Construction of facilities.....	124,020,000	117,090,000	123,670,000
Research and program management.....	814,055,000	810,455,000	814,055,000
Grand total.....	3,697,000,000	3,696,070,000	3,696,850,000

PURPOSE OF THE BILL

The purpose of this bill is to authorize appropriations to the National Aeronautics and Space Administration totaling \$3,696,850,000 for fiscal year 1977 as follows:

Fiscal year 1977	Budget request	House action	Senate committee action
Research and development.....	\$2,758,925,000	2,768,525,000	2,759,125,000
Construction of facilities.....	124,020,000	117,090,000	123,670,000
Research and program management.....	814,055,000	810,455,000	814,055,000

LEGISLATIVE HISTORY

The budget request for fiscal year 1977 for the National Aeronautics and Space Administration was introduced in the House under H.R. 11573 and in the Senate as S. 2864. After holding hearings, the House Committee on Science and Technology reported out a clean bill, H.R. 12453, which was passed by the House, without amendment, and subsequently referred to this Committee.

The Committee held hearings on S. 2864 during January, February and March 1976. During its consideration of the bill, the Committee determined amendments were required.

The Committee reported out H.R. 12453 with an amendment striking all after the enacting clause and inserting the Committee amendment.

SUMMARY

The NASA budget request for fiscal year 1977 was for a total of \$3,697,000,000, of which \$2,758,925,000 was for "Research and Development", \$124,020,000 was for "Construction of Facilities", and \$814,055,000 was for "Research and Program Management". The House approved an authorization total of \$3,696,070,000, of which \$2,768,525,000 was for "Research and Development", \$117,090,000 was for "Construction of Facilities", and \$810,455,000 was for "Research and Program Management".

The Committee is recommending an authorization of \$3,696,850,000, an amount \$150,000 below the NASA request and \$780,000 above the amount in the House-approved bill. Of the total amount the Committee recommends \$2,759,125,000 for "Research and Development", which is \$200,000 above the NASA request and \$9,400,000 below the House-approved amount for this appropriations category; recommends \$123,670,000 for the "Construction of Facilities", which is \$350,000 below the NASA request and \$6,580,000 above the House amount; and, recommends \$814,055,000 for "Research and Program Management" which is identical with the amount requested by NASA and \$3,600,000 above the amount approved by the House.

This authorization recommendation, while reflecting a 4 percent increase over that recommended for NASA programs for fiscal year 1976, is, due to inflationary factors, below the fiscal year 1976 amount. It is also below the funding level for this agency which this Commit-

tee projected to the Congress in its 5-year estimate in its report on the fiscal year 1976 bill. Just prior to the submission of its fiscal year 1977 budget request NASA completed a comprehensive study of the roles and missions of its several field installations to clarify and redefine functional assignments, with reassignments as necessary, with the objective of increasing organizational efficiency and effectiveness in carrying out the responsibilities of the agency in the approaching Shuttle era. As a result of this study, the agency will reduce its Civil Service complement by 500 with a complementary reduction in base support contractor personnel of 1100. These reductions are factored into the funding recommendations presented in this bill. The Committee views the NASA fiscal year 1977 budget request as fiscally constrained and very carefully structured to maximize the use of available resources and accordingly, Committee adjustments are very minor.

This bill provides funding for continued development of the Space Shuttle, the principal element of a reusable space transportation system designed to significantly reduce the cost of space operations and thereby provide a new capability to explore and to utilize space in support of national needs. While this is the major development activity underway today, this bill supports several new initiatives which are endorsed strongly by the Committee. These encompass a solar maximum mission designed to measure solar activity during the forthcoming peak period of maximum solar activity, 1979-80; the development of the thematic mapper, an instrument with greatly enhanced capability over the present Landsat system to be used for earth resources surveys; a magnetic mapping satellite expected to be useful for the location of mineral resources; and, the start of construction of a new transonic wind tunnel designed to support national aeronautical research and development needs. The latter results from a joint study of such needs by NASA and the Department of Defense and is one of the three large aeronautical facilities recommended. This bill will also support, within the aeronautical research and technology program line item, the initiation of an aircraft energy technology development project designed to provide the technology base for a 50 percent improvement in fuel economy in commercial transports. This activity is designed to assure the continued competitiveness of U.S. built aircraft. In addition to these new initiatives and the Space Shuttle, the funds recommended in this bill will support ongoing space flight projects in space science and applications, the continuation of a series of research tasks in aeronautical and space research designed to provide a base for future undertakings, the construction of and/or modifications and upgrading of facilities to support these research and development programs, and the highly technical staff to conduct research and manage these multidisciplinary activities.

The Committee is recommending adoption of two legislative amendments, one adding an additional NASA position to Level V of the Executive Salary Schedule and one authorizing compensation to consultants serving on the Aerospace Safety Advisory Panel at rates equivalent to those established for other consultants. A third provision in S. 2864 relating to authorizations for FY 1978, and three provisions in the House-passed bill were not agreed to. The rationale underlying

Committee action in each instance is included in the section of the report entitled, "Legislative Changes".

The Committee held hearings on this bill on January 26 and 27, February 3, 5, 17, and 24, and on March 3. During the course of the hearings the Committee examined space and aeronautics programs of the various departments and agencies of the government wherein coordination is required with NASA programs. This included receiving testimony from the Departments of Interior, Commerce, Agriculture, and Defense, and the Energy Research and Development Administration.

The Committee met on March 18, 1976, to mark up the bill and prepare its recommendations to the Senate. The bill was ordered unanimously to be reported.

RESEARCH AND DEVELOPMENT

Summary

Fiscal Year 1977	Budget request	House action	Senate committee action
Research and Development:			
Space Shuttle.....	\$1,288,100,000	\$1,288,100,000	\$1,288,100,000
Space flight operations.....	205,200,000	198,200,000	205,200,000
Expendable launch vehicles.....	151,400,000	151,400,000	151,400,000
Physics and astronomy.....	165,800,000	169,800,000	165,800,000
Lunar and planetary exploration.....	191,100,000	193,100,000	191,100,000
Life sciences.....	22,125,000	22,125,000	22,125,000
Space applications.....	198,200,000	185,700,000	198,200,000
Earth resources operational systems.....	0	13,500,000	0
Aeronautical research and technology.....	189,100,000	192,100,000	189,100,000
Space research and technology.....	82,000,000	92,100,000	82,000,000
Tracking and data acquisition.....	258,000,000	254,000,000	258,000,000
Technology utilization.....	7,900,000	8,400,000	8,100,000
Total.....	2,758,925,000	2,768,525,000	2,759,125,000

SPACE SHUTTLE PROGRAM, \$1,288,100,000

OBJECTIVES

The Space Shuttle is the key element of the Space Transportation System that, employing a reusability concept, will provide economical round-trip access to space beginning in 1980. Configured to carry many different types of payloads to and from low Earth orbit, it will be the principal mode of transportation in the United States supporting both government (non-military and military) and commercial/industrial space operations.

The Space Shuttle will offer unique capabilities that cannot be achieved with today's expendable launch vehicles. It will be able to retrieve payloads from Earth orbit; such payloads might be the results of experiments brought back to Earth to be studied or an entire spacecraft to be refurbished and reused. The Space Shuttle will be able to service and repair satellites in space, to transport to orbit, operate and return space laboratories and to perform rescue missions. These capabilities should result in savings in the cost of space operations but most importantly will provide the flexibility to greatly enhance the use of the space environment to meet the needs of man.

Summary of resources requirements

Orbiter	\$842,500,000
Main engine	198,800,000
Solid rocket booster	82,600,000
External tank	64,000,000
Launch and landing	105,200,000
Total	1,288,100,000

Schedule

Space Shuttle:	Schedule	Date
Rollout of Orbiter No. 1.....	September 1976.	
First approach and landing test.....	4th quarter 1977.	
First manned orbital flight.....	Mid-1979.	
Developmental flights.....	3d quarter 1979-mid-1980.	
Initial operational capability.....	Mid-1980.	

The Space Shuttle consists of four basic flight hardware elements—the orbiter, the main engines, an external propellant tank and twin solid rocket boosters. Launch and landing systems support the flight operations. The orbiter, a reusable spacecraft, is roughly the size of a DC-9 aircraft and will be powered by three, liquid-fueled, reusable main engines. It will perform both as a space vehicle and, during the return to Earth phase, as an aircraft. A large payload volume of 285 cubic meters (370 cubic yards) and cargo carrying capacity of up to 29,500 kilograms (65,000 pounds) will permit payloads to be built to less restrictive design requirements. The orbiter will provide a habitable environment for the crew, including scientists and engineers, for missions of up to 30 days' duration.

The Space Shuttle will be boosted into orbit by the thrust of its three liquid oxygen/liquid hydrogen main engines, burning in parallel with the twin solid rocket boosters. Two minutes into the flight, at an altitude of about 45 kilometers (km) (25 nautical miles), the solid rocket boosters burn out, are separated and descend by parachute to a soft splashdown in the ocean about 295 km (160 nautical miles) down range. The boosters will be recovered for refurbishment and reuse. The orbiter, with its external fuel tank, will continue on into space for another six minutes at which time its three main engines will be shut down. At this point, just before orbital insertion, the external tank will be jettisoned and following a ballistic trajectory, the empty tank will fall in a remote ocean area about 18,500 km (10,000 nautical miles) down range. The orbiter, aided by its orbital maneuvering engines, will enter earth orbit to perform its mission. After completing its mission, the orbiter will again fire its orbital maneuvering engines to deorbit and re-enter the atmosphere at a high angle (about 34°) in a shallow flight path to minimize the frictional heating. At 21 km (about 70,000 feet) altitude, the orbiter will begin final maneuvering to align its approach and then land.

The Space Shuttle will have a flight crew of three: the commander, the pilot, and a mission specialist. On some missions a payload specialist will be added to check out complete payloads and deploy them in space. The Shuttle can carry up to seven people, including the flight crew, for periods up to seven days. They will experience forces no greater than three times that of gravity during launch and landing and will be able to perform their work in a shirt-sleeve environment.

The Space Shuttle system is in its period of peak development and testing, leading to the first manned orbital flight in mid-1979. All major Shuttle system elements are under contract and development is proceeding as planned with fabrication, assembly and testing well underway. Funding for FY 1977 will permit the development, manufacturing and testing of the four basic flight hardware elements of the Space Shuttle to continue on schedule.

FY 1977 funding will also support the first captive flight of the Orbiter No. 1 mated to the carrier aircraft, in the first half of 1977 and the first Orbiter approach and landing flight in late 1977. These flights will verify the orbiter's aerodynamic characteristics and approach and landing capability. The main engine propulsion test article components will be completed and delivered to the National Space Technology Laboratories leading to test firings in FY 1978 to verify the orbiter's main propulsion system performance at sea level. The main propulsion test article for the external tank will be delivered in FY 1977 and the tank structural test articles will be delivered in early 1978. The development firing test program for the solid rocket motors will be initiated in the second half of 1977. Delivery of the initial mini-computers and peripheral devices for the launch processing system to the Kennedy Space Center is also scheduled for FY 1977.

SPACE FLIGHT OPERATIONS PROGRAM, \$205,200,000

OBJECTIVES

The Space Flight Operations program provides for Space Transportation System Operations Capability Development, the common support activities conducted under Development, Test and Mission Operations, and Advanced Programs.

Summary of resources requirements

Space transportation system operations capability development-----	\$17,300,000
Development, test and mission operations-----	169,900,000
Advanced programs-----	18,000,000
Total -----	205,200,000

Space Transportation System (STS) Operations Capability Development activity consists of three major areas of effort: Spacelab, Interim Upper Stage (IUS) and Multi-use Mission Support Equipment. Spacelab development is divided into two categories—program and operations capability. Program activities support the European Space Agency Spacelab development effort with engineering and operations studies in areas such as payload safety and accommodations, operations and logistics. Additional efforts include the development of a crew transfer tunnel, and procurement of necessary mockups, trainers and other ground support equipment. The Spacelab operations capability activities include procurement of flight and ground hardware and system activation activities leading to an operational capability.

The IUS is a rocket stage that will be used to deploy Shuttle-launched payloads from low earth orbit to high energy and escape orbits. The U.S. Air Force is responsible for the development of the

IUS. NASA has the responsibility to define the non-DOD IUS design and operational requirements that are unique to NASA and other non-DOD missions.

Multi-use Mission Support Equipment consists of ground and flight hardware used for interfaces between the payloads and the space transportation system. This class of hardware will be developed into a standard, reusable inventory for all payloads.

Development, Test and Mission Operations (DTMO) provides the common engineering, scientific and technical support required to conduct ongoing and proposed space flight research and development at the Johnson Space Center, the Kennedy Space Center, the Marshall Space Flight Center and the National Space Technology Laboratories. DTMO functions include research and test operations, data systems and flight operations, operations support, and launch systems operations. These common support efforts are necessary to provide early project definition, including conceptual design, project specifications, and research and technology; to assure engineering support for in-depth technical examination of work performed by prime and major subcontractors on space flight systems; to provide common support equipment and supplies; and to perform backup design, testing and analysis in high technology areas. It is expected that future DTMO funding requirements will gradually decrease as the transition is made to STS operations. At that time, STS operational support activities, direct and indirect, will be funded under STS operations and only support of development efforts will be funded within DTMO.

Advanced Programs consists of two distinct areas of effort: Payload Integration and Mission Analysis and Advanced Systems. Activities under Payload Integration and Mission Analysis will concentrate on assuring that the use of the STS will be conducted in the most effective and economical manner and that payloads and the STS will be operationally compatible. Advanced Systems activities explore the future direction and opportunities for the nation's space transportation and operations systems. New space transportation concepts, future missions, and operations in space are studied. Selected hardware and software to support the future missions are developed to reduce program risks and development costs and to obtain significant performance and reliability improvements through the effective use of new technologies.

COMMITTEE COMMENT

The Committee recommends adoption of the NASA request for the Space Flight Operations program. The Committee recognizes the importance of the support-type functions included in the subprogram Development, Test and Mission Operations (DTMO) to the successful and economical accomplishment of NASA's present and future programs. The Committee further recognizes that this subprogram is characterized by its high labor content, and the fact that personnel ceilings have been established for each Center forcing reductions already factored into the budget structure for FY-1977. It is clear that any significant reduction in the DTMO funding would, of necessity, impact directly and adversely on the ability to staff essential DTMO

functions. Accordingly, the Committee does not concur with the House cut of \$8 million in the DTMO subprogram.

Further, the Committee, consistent with its belief that the proposed FY-1977 NASA budget is not only fiscally constrained but also carefully structured to make maximum use of requested resources, does not concur with the House addition of \$1 million to the Advanced Programs subprogram activity in the Space Flight Operations line item.

EXPENDABLE LAUNCH VEHICLES PROGRAM, \$151,400,000

OBJECTIVES

The expendable launch vehicles program provides for the centralized procurement of launch vehicle and launch support for NASA's automated spacecraft missions. This includes the procurement of vehicle hardware, launch services, engineering and maintenance, and, as required, development of improved vehicle systems including the necessary ground support equipment. Launch vehicles currently being procured are: Scout, Atlas Centaur, Titan III Centaur, Delta, and Atlas-F.

Summary of resources requirements

Scout	\$10,700,000
Centaur	90,700,000
Delta	43,800,000
Atlas-F	6,200,000
Total	151,400,000

The Scout vehicle is the smallest launch vehicle employed by NASA. It is a four-stage, all solid propellant launch vehicle. The vehicle is approximately 22.4 meters in length (73 feet) and the first stage booster has a diameter of 1.14 meters (3.75 feet). It is capable of placing a 180 kilogram (400 pound) payload in a 556 kilometer (300 nautical mile) orbit.

The Centaur program provides for the procurement and launch of two booster stages, the Atlas and Titan, and a high performance upper stage, the Centaur. The latter is used with the Atlas booster for high energy missions, particularly planetary and synchronous orbit missions. The Atlas Centaur vehicle is 40 meters (131 feet) in length and has a diameter of 3.1 meters (10 feet). The Centaur is also used with the Titan booster to launch heavier spacecraft beyond the capability of the Atlas Centaur. The Titan Centaur is 49 meters (160 feet) high and has a payload shroud diameter of 4.3 meters (14 feet).

The Delta launch vehicle is the most used vehicle in the NASA launch vehicle family. It is presently operational with two and three stage configurations and a multiburn second stage capability. The first stage is an elongated Thor booster with three, six, or nine strap-on solid motors for thrust augmentation. The second stage Delta, which provides a multiple restart capability, uses an inertial guidance system for guiding the first stage booster and the second stage Delta. The third stage utilizes the Thiokol TE-364 solid motor which is spin stabilized. This vehicle in its three-stage configuration is approximately 35.05 meters in length (115 feet) and has a diameter of 2.44 meters (8 feet). It is capable of placing a 1,772 kilogram payload (3,900 pounds) into a 555 kilometer (300 nautical mile) orbit.

The Atlas-F is a one and one-half stage vehicle which uses liquid oxygen and kerosene as propellants. The vehicle is a refurbished surplus Intercontinental Ballistic Missile being managed by the USAF for space missions.

Funding for each launch vehicle includes two major categories: vehicle hardware and supporting activities. Funding related to vehicle hardware is identifiable with specific missions and includes such items as solid rocket motors, boosters, upper stages, shrouds, adapters, and mission peculiar hardware. The supporting activities category includes preparation of hardware for launch, guidance and control services, mission software, prelaunch engineering analysis, transportation, propellants, and range support.

PHYSICS AND ASTRONOMY PROGRAM, \$165,800,000

OBJECTIVES

The objective of the Physics and Astronomy program is to obtain a better understanding of the Earth's space environment, the sun, stars, and other celestial bodies. Under this program research is conducted on the Earth's upper atmosphere and ionosphere, the magnetosphere and sun-earth interactions. Space-based observations of cosmic ray, gamma ray, X-rays, ultraviolet, infrared, and radio emissions not possible from ground-based observatories because of the obscuring effect of the Earth's atmosphere, provide investigators with data on the sun and other celestial bodies that would not otherwise be available. These investigations are the basis for increasing our understanding of the fundamental laws of nature, especially those which control the environment of the Earth.

Summary of resources requirements

Large observatories.....	\$61,500,000
Spacelab science program.....	10,000,000
Orbiting explorers.....	33,000,000
Suborbital programs.....	28,000,000
Supporting activities.....	35,300,000
Total	165,800,000

Flight Schedule

Project	Mission	Year
Large observatories:		
High energy astronomy observatories.....	HEAO-A.....	1977
	-B.....	1978
	-C.....	1979
Solar maximum mission.....	SMM-A.....	1979
Spacelab.....	Spacelab-A.....	1980
	-B.....	1980
Explorers:		
Solar terrestrial explorers.....	International Sun-Earth explorer-A/B.....	1977
	-C.....	1978
Astrophysics explorers.....	International ultraviolet explorer.....	1977
Suborbital programs:		
Sounding rockets.....	About 65 launches per year.....	
Balloon flights.....	About 40 to 50 launches per year.....	

To achieve the program objectives, NASA uses techniques ranging from theoretical and laboratory research through aircraft, balloon, and sounding rocket flights to small Explorer spacecraft, large automated observatories, and manned spacecraft. Research teams involved in this program are located at NASA field centers, other government laboratories, universities, and industrial laboratories. Foreign participation is encouraged, with the participating country providing for its share of the costs.

The information obtained and the technology developed in the program are made available to the scientific and technical community for applications and the advancement of scientific research, education, and technology. For example, major advances in special purpose microelectronics devices and photoelectric sensors made under this program have found broad-based applications outside the space program.

The Physics and Astronomy missions initiated in prior years have been highly successful. NASA missions include the relatively low cost Explorer series of satellites, begun in 1959, which have made a number of very basic discoveries, including the discovery of the Earth's radiation belts. Larger observatory missions undertaken to date include the Orbiting Solar Observatory (OSO) series and the Orbiting Astronomical Observatory (OAO) series. The highly successful OAO-3, launched in 1972, has completed three years of productive operations and is still obtaining significant data for analysis.

Under development at the present time are the High Energy Astronomical Observatories (HEAO) designed to explore source emissions in the X-ray, gamma ray and cosmic ray regions of the electromagnetic spectrum; these regions are inaccessible to ground based instruments. Launches of the HEAO spacecraft are scheduled for 1977, 1978, and 1979.

To study the sun during the solar maximum, which will occur during the period 1979 to 1980, NASA is proposing to initiate the development of a new spacecraft called the Solar Maximum Mission (SMM) to be launched in 1979 so as to take advantage of the peak of the solar cycle. These solar maximums only occur every 11 years.

Definition studies for a variety of shuttle payloads will be carried out. Development work will commence on several facility-type payloads.

A program of upper atmospheric research, which the Congress directed the agency to undertake, has been developed and will continue during Fiscal Year 1977. This program is designed to determine the effects of natural and man-caused events on this part of the atmosphere.

COMMITTEE COMMENT

Space Telescope.—The Committee supports fully the need for the Space Telescope recognizing its significance to on-going research in astronomy. Accordingly, the Committee requests that NASA, in formulating its FY 1978 budget request, make the initiation of the Space Telescope project the item of the highest priority. The Committee further requests that NASA re-analyze its proposed application of FY 1977 resources with the objective of making available the minimum funding necessary to sustain the Space Telescope pre-contract activi-

ties to assure an orderly and efficient transition into development. The Committee appreciates the intent of the House in adding \$3 million to the Physics and Astronomy program for the Space Telescope; however, the Committee does not believe it is in a position to make a meaningful determination, based upon testimony presented to it, as to how this project can be most economically and efficiently sustained until the initiation of formal development. Therefore, the Committee has not made any specific funding recommendations on this item.

Supporting Research and Technology.—The Committee, in furtherance of its general view as to the austerity of this overall budget, does not concur in the addition of \$1 million to supporting research and technology activities in the Physics and Astronomy program.

Upper Atmospheric Research.—Last year the Congress, in an amendment to the National Aeronautics and Space Act of 1958, directed NASA to initiate and carry out a comprehensive program of research, technology and monitoring of the upper atmosphere in order to provide an understanding of and to maintain the chemical and physical integrity of the earth's upper atmosphere.

The Committee believes that this task must rank among the highest priority responsibilities of the agency.

For fiscal year 1977, NASA has requested \$11.6 million for Upper Atmospheric Research. NASA witnesses testified that this will provide adequate support for research activities related to chlorofluoromethanes, space shuttle, and aircraft assessments and that sufficient funding is available to begin a firm program of basic science activity. To understand the upper atmosphere will require an interdisciplinary approach; and therefore a number of NASA and non-NASA institutions should be designated as centers for such activity. NASA has designated three NASA centers (Goddard Space Flight Center, Ames Research Center, and Jet Propulsion Laboratory) to be primary centers for atmospheric research but testified that the non-NASA centers will develop less quickly in a period of two or three years. Since the basic research capabilities required for a thorough understanding of the upper atmosphere and its interaction with other earth systems exist principally in a number of universities and because of the urgent need for a better understanding of the stratosphere and the anthropogenic effects on it, and how these in turn affect the health and welfare of man, waiting two or three years to establish such non-NASA centers is inadvisable. Consequently, the Committee urges NASA to initiate block funding of interdisciplinary groups at a small number of selected universities as soon as possible. Such centers should be structured to bring together the best talent available to study, do the research and make the measurements necessary to develop a fundamental understanding of the upper atmosphere and its relationship with other earth systems. The Committee agrees with NASA that, "Lengths of commitments to these centers should approach five years to insure level funding for center planning purposes". The Committee urges NASA to pursue the establishment of these non-NASA centers vigorously and to consider reprogramming of internal funds for this purpose. The Committee directs NASA to report back to the Committee with such a proposal and recommendations as to implementation before July 1, 1976.

To verify the Rowland and Molina theory and new theories as they develop, it is of the utmost importance to carry out measurements in the stratosphere at all altitudes. Aircraft can be used to make measurements in the lower stratosphere. However, the processes of most interest take place at higher altitudes inaccessible to aircraft. The principal vehicle for making measurements at these higher altitudes is the balloon. NASA requested \$1.5 million for about 30 balloon flights but testified that only 11 of these flights are potentially planned for upper atmospheric research; and, that the Upper Atmospheric Research program provides for only 12 additional balloon flights. This makes a total of at most 23 balloon flights available for measurement purposes in the upper atmosphere during FY 1977. Since balloon flights are so important for the verification of the theory, the Committee urges NASA to expand the balloon measurements program so that a sufficient number of world wide measurements will be obtained to provide for the adequate testing of the theoretical models.

LUNAR AND PLANETARY EXPLORATION PROGRAM, \$191,100,000

OBJECTIVES

The objective of the Lunar and Planetary Exploration program is to understand the origin and evolution of the solar system, the origin and evolution of life, the dynamic processes that shape man's environment, and to apply the results of such investigations toward a better understanding of the planet Earth.

Summary of resources requirements

Viking	\$24, 200, 000
Outer planets missions.....	50, 300, 000
Pioneer/Helios	47, 400, 000
Supporting research and technology/advanced studies.....	11, 600, 000
Planetary data analysis.....	2, 500, 000
Planetary astronomy.....	4, 800, 000
Planetary flight support.....	27, 900, 000
Lunar Research program.....	22, 400, 000
Total	191, 100, 000

Flight Schedule

Project and mission:	Year
Outer planets:	
Mariner Jupiter/Saturn.....	1977
Pioneer Venus orbiter.....	1978
Pioneer Venus probe.....	1978

This program has been very successful and has provided extensive information on the Moon and on the planets Mercury, Venus, Mars and Jupiter. Important new insights into the dynamic behavior of the Earth are being derived from the integrated analysis of this lunar and planetary data base.

Ground-based tasks in research, mission definition, technology and instrument development, and data analysis and synthesis will continue. Earth-based remote observations permit important data gathering via optical, radio, and airborne instruments, which complement and supplement measurements taken in space to achieve the best overall result. An important augmentation of these Earth-based capabilities

will be the Infrared Telescope currently being designed for installation on Mauna Kea peak in Hawaii.

On August 20 and September 9, 1975, NASA, in a continuation of the Mars exploration program, launched two Viking missions. Each mission includes an orbiter and a lander programmed to arrive at Mars and be placed in Martian orbits in the summer of 1976. It is planned to set down the first Viking lander on the Martian surface on July 4, 1976. The second will be landed about 60 days later. These Landers will give man the first in situ measurements on the surface of another planet and are the most sophisticated automated vehicles ever built. The Landers include several scientific "laboratories" including life detection instruments which will search for life on Mars.

In 1978, two Pioneer missions will be launched to further explore Venus. One of those missions will provide an overview of Venus from orbit while the second, using multiple probes, will make the first detailed in situ measurements of the Venusian atmosphere.

The Helios missions are cooperative missions between the United States and West Germany. The first was launched on December 10, 1974 and the second on January 15, 1976, and are designed to investigate the interplanetary medium closer to the sun than ever before.

The Pioneer 10 mission, having returned data on Jupiter in December 1973, is now on its way to escape the solar system. Pioneer 11, following a successful Jupiter flyby also, is on a trajectory such that it will encounter Saturn during September 1979.

In 1977 two Mariner Jupiter-Saturn missions will be launched to further expand our understanding of Jupiter and Saturn. These two spacecraft will also make the first scientific measurements of several of the large moons of these two great planets.

In the Lunar Program a concentrated scientific effort is underway to analyze and interpret the large and still growing body of data acquired from lunar flight programs, ground-based observations of the moon, and laboratory investigations. The analytical work that has been carried out to date has revolutionized previous theories of the formation, history, and structure of the moon, and promises to make vital contributions to our understanding of planetary bodies in general. About one hundred Principal Investigators and several hundred Co-Investigators are now participating in a Lunar Data Analysis and Synthesis program designed to combine and cross-correlate all available data on the moon. This effort is having an impact in areas of planetary research where experimental and theoretical studies are being conducted to answer specific questions raised by these investigators. While much of the information on which this effort is based has come from the analysis of lunar samples, only a small fraction of the collection has been analyzed to date. The main portion of the sample collection will be preserved to permit future analyses with advanced techniques.

New data on the physical characteristics of the moon over extended time periods is still being gathered by the Apollo Lunar Surface Experiments Packages (ALSEP's). In addition, other work, such as laser ranging, is being carried out to develop a more accurate ephemeris of the moon and a more precise libration model, and to contribute to the study of tectonic plate movement of the Earth and irregularities in the Earth's whole body movement. Also, studies are underway to

determine the scientific merit and feasibility of a small polar orbiter which would extend current measurements over the entire moon and helps to generalize our knowledge of that body.

COMMITTEE COMMENT

Based upon a review of the data supporting the NASA FY 1977 budget request and testimony of NASA witnesses thereon, the Committee is very concerned about the apparent absence of new initiatives in the Lunar and Planetary program to continue to add to and build on the scientific data base being established by the several successful missions already accomplished under this program. Historically, the program has supported increasingly sophisticated endeavors, i.e., progressing from planetary fly-bys to orbiters to landers, acquiring increasingly detailed knowledge with the more sophisticated spacecraft employed. This program for a well organized, systematic exploration of the planets appears to be nearing its end. Accordingly the Committee requests that NASA give particular attention in formulating its FY 1978 budget to new initiatives designed to reverse this trend. The Committee believes that adequate funds are available in its authorization recommendations to carry out this request and accordingly, it does not concur with the House addition of \$2 million to this program.

LIFE SCIENCES PROGRAM, \$22,125,000

OBJECTIVES

The objectives of the Life Sciences Program are: (1) to make space accessible to people without the need for special flight training; (2) to enhance people's capabilities to work efficiently in space; (3) to carry out a strong scientific program in the life sciences in space with current emphasis on developing experiments and facilities to be flown on Shuttle/Spacelab missions; (4) to prepare for long-duration manned space flight through research on medical and environmental control systems, and (5) to support NASA efforts in the search for extraterrestrial life.

Summary of resources requirements

Space life sciences.....	\$17,325,000
Planetary biology.....	3,300,000
Planetary quarantine.....	1,500,000
Total	22,125,000

There are no flight missions in this program.

The Life Sciences program is multifaceted and interdisciplinary in both content and approach. Research and development is carried out in life support and protection systems, biological instrumentation, man-machine technology, planetary biology and planetary quarantine.

The program is heavily involved in supporting the Spacelab medical activities including the development of new medical standards and selection criteria for Space Shuttle and Spacelab experimenters. Also, the unique aspects of the space environment such as radiation and the absence of gravity and their effects on biological systems are being investigated. However, these unique aspects can be studied directly only on space flight. Consequently, the Life Science experiment plan

for the Spacelab is heavily weighted to the use of this unique environments to study basic biological processes, such as cell division and metabolism, embryonic induction and morphogenesis, plant geotropic responses and psychological responses of humans and animals. The knowledge gained and the technology developed in the Life Sciences program are made available to the scientific, technical and medical communities and, consequently, to the public. Such medical and biological research has added a new dimension to the understanding of normal human physiology and human responses to stress.

The international scientific community is continually involved in this program. Recently, there has been an exchange of Life Sciences information of mutual interest with the USSR. Space flight opportunities aboard Russian satellites have been made available for U.S. biological experiments. In November 1975, four NASA Life Science experiments flew aboard the Russian launched biosatellite, KOSMOS 782. This successful effort is the basis of current planning for the flight of additional experiments on the next planned launch of a USSR biosatellite in 1977.

SPACE APPLICATIONS PROGRAM, \$198,200,000

OBJECTIVES

The objective of the Space Applications program is to conduct research and development activities that demonstrate the applications of space-related technology, systems and other capabilities which can be effectively applied and used for down to Earth practical benefits.

Summary of Resources Requirements

Earth resources detection and monitoring.....	\$67,800,000
Earth dynamics monitoring and forecasting.....	4,600,000
Ocean condition monitoring and forecasting.....	30,600,000
Environmental quality monitoring.....	26,100,000
Weather and climate observation and forecasting.....	36,300,000
Materials processing in space.....	9,200,000
Space communications.....	10,600,000
Information management.....	3,200,000
Applications explorer missions.....	10,300,000
Total	198,200,000

Flight Schedule

Project	Mission	Year
Earth resources detection and monitoring: Earth resources technology satellites.	LANDSAT-C.....	1977
Earth dynamics monitoring and forecasting: Laser geodynamics satellite....	LAGEOS.....	1976
Ocean condition monitoring and forecasting: Ocean dynamics satellite.....	SEASAT-A.....	1978
Environmental quality monitoring: Air pollution and oceanographic observing satellite	NIMBUS-G.....	1978
Weather and climate observation and forecasting:		
Operational temperature sounding satellite.....	TIROS-N.....	1978
Global atmospheric research program.....	Data systems test.....	1976
	First GARP global experiment.	1977-79
Materials processing in space: Sounding rocket missions.....	Launch about 6 annually..	1976
Space communications: Cooperative applications satellite.....	CAS-C.....	1976
Applications explorers:		
Heat capacity mapping mission.....	HCMM.....	1978
Stratospheric aerosols and gas experiment.....	SAGE.....	1979
Magnetic field satellite.....	MAGSAT.....	1980

Earth Resources Detection and Monitoring.—The effective utilization of the world's finite natural resources requires that their extent and accessibility be surveyed, their changes be monitored and that systems for wisely managing their exploration be developed. In the Earth resources survey area, two objectives have been established: (1) to develop the capabilities for remotely sensing the Earth's resources from aircraft and spacecraft in order to perform comprehensive global surveys; and (2) to apply the results to oceanography, geology, hydrology, geography, and cartography. Achieving these objectives will provide an information base that can be used in the management of the world's resources.

Significant activities being continued are involved with the Applications Systems Verification Tests program (ASVT) and LANDSAT-C. The Applications Transfer and Demonstration program is designed to demonstrate to the user community that remotely obtained information (from satellites and aircraft) provides new capabilities that may efficiently supplement and/or complement existing data gathering systems. The most significant demonstration taking place is the Large Area Crop Inventory Experiment (LACIE), an experiment using LANDSAT data to determine wheat production over the North American continent with possible extension to the entire world. LANDSAT-C, the third Earth Resources Technology Satellite, is currently under development and will provide greater resolution and additional information as well as provide continuity after LANDSAT-1 and 2 cease to operate. The resolution of the return beam vidicon system will be increased twofold, a change fully supported by the Department of Interior and many other Government agencies, and the multispectral scanner will incorporate a thermal sensing capability, providing better discrimination of both land and water features. Development of the thematic mapper, a second generation scanner having greater resolution and performance than the current LANDSAT instrument will provide significantly improved data to the users. The thematic mapper is a new start in FY 1977.

Earth Dynamics Monitoring and Forecasting.—Earth Dynamics research is centered on the study of the motions of the large solid plates (tectonic plates) which make up the surface of the earth. These motions are one of the causes of large earthquakes. Measurement of these motions using both the LAGEOS satellite, to be launched in 1976, and ground instruments will permit a better understanding of this dynamic process and may lead to an earthquake prediction capability. The third Applications Explorer Mission, Magnetic Field Satellite (MAGSAT), a new start, will provide information that will allow the United States Geological Survey to update maps of the Earth's magnetic field declination and to develop maps of the global magnetic field as well as enhance our knowledge of the geologic structure of the earth. Studies based on MAGSAT data are expected to provide useful information for location of natural resources such as coal, oil, and minerals.

Ocean Condition Monitoring and Forecasting.—The study of ocean dynamics from space provides data for ocean research which can lead to major advances in the ability to predict sea conditions, and the possible effects of large bodies of water or climate. The benefits of such a predictive capability include improved ship routing, ad-

vanced ocean structures design, storm damage avoidance, and coastal protection and development. The SEASAT-A satellite, now under development, is a significant forward step in achieving this predictive capability.

Environmental Quality Monitoring.—The pollution monitoring program encompasses the development and demonstration of systems capable of identifying and measuring pollutants in the air and water on global and regional scales. This will be done by: (1) determining the present composition of the atmosphere for use as a baseline against which the long-term trends of atmospheric pollutants can be measured; (2) monitoring changes in the composition from established patterns with respect to time and place; and (3) incorporating the data describing atmospheric constituents and their behavior into atmospheric circulation related environmental quality models. Significant data will be obtained by the second Applications Explorer Mission—Stratospheric Aerosol and Gas Experiment (SAGE)—which will fly a single instrument to detect and map stratospheric aerosols and gas concentrations. The information derived will complement the data to be obtained by the NIMBUS-G program which is also currently under development.

Weather and Climate Observation and Forecasting.—This program is directed toward the application of satellite data to problems in detection, prediction, and early warning of severe storms and the improvement of our capability for mid-range (1-14 days) and long-range (climatic) weather prediction. The atmospheric processes associated with these phenomena, i.e., severe storms and daily weather and climate, require different approaches and satellite systems to provide data to achieve better forecasts. The major activities will include: (1) continued emphasis on research and technology; (2) severe storm research; (3) the prototype development of third generation NOAA operational weather satellite (TIROS-N); and (4) planning for the first international Global Atmospheric Research Program experiment to be conducted in CY 1978; and (5) definition and development of experiments and payloads to be flown on early Shuttle/Spacelab missions.

Materials Processing in Space.—The objective of this program is to exploit the unique characteristics of zero gravity to prepare and process materials in ways that are not possible or economically practical on Earth. The benefits are expected to be directly applicable to industrial and biomedical processes on the ground, as well as the unique new products produced in space. Small rockets will be used to obtain weightless conditions for short periods to develop experiments that will be flown on the Shuttle/Spacelab. Early definition and design study efforts will also be conducted toward developing the hardware to conduct these experiments on the Spacelab missions.

Space Communications.—The current NASA effort is directed toward the development of advanced technology to carry out its responsibility to provide expert advice and consultation on satellite communications to various Government agencies. The highly successful series of Applications Technology Satellites (ATS-1, 3, 5, 6) and the cooperative U.S./Canadian Satellite (CAS-C) will continue to be used by various domestic and international experimenters. With the successful completion of the Indian Government's Instructional Television

Experiments, the ATS-6 satellite will return to the U.S. in the fall of CY 1976 for further experimentation by domestic users. A significant effort will be supported to provide technical consultation to U.S. agencies, including NASA, participating in the 1979 World Administrative Radio Conference (WARC), the first of its kind since 1959. NASA involvement is designed to assure availability of frequencies in the assignments for all types of satellites.

Information Management.—These activities are directed toward the systematic study, design, development, and demonstrations of the technology needed to improve the flow of data from the initial collection by satellite to the user. Satellite systems being developed require the extension of current technology to accommodate the increased volume, complexity, and exceedingly high rates of data, and reductions in origin-to-user transmission times. Concurrently, the user must also be provided with improved capabilities for rapidly storing, maintaining, and retrieving the required data products.

Applications Explorer Missions.—The Applications Explorer Mission (AEM) Program was established to develop low cost, Scout-launched spacecraft tailored to specific areas of research and orbital requirements. This program presently includes the following missions: (1) The Heat Capacity Mapping Mission (AEM-A) which will obtain temperature data on identifiable characteristics of various materials to develop heat capacity maps of rock types for applications to mineral-potential assessments and for studies of soil moisture, mapping of thermal effluents, measurement of plant canopy temperature, and for the mapping of snow coverage; (2) the Stratospheric Aerosol and Gas Experiment (SAGE) (AEM-B), which will help develop measurement techniques for the detection and mapping of stratospheric aerosols and ozone by observing the attenuation of the solar radiation through the Earth's atmosphere; and (3) the Magnetic Field Satellite (MAGSAT), AEM-C, a new start already discussed.

COMMITTEE COMMENT

The Committee notes with satisfaction that this bill contains funds to initiate the development of the thematic mapper, an advanced multispectral scanning instrument designed to provide a significant improvement in data acquisition capability from earth resources spacecraft. While the Committee fully supports this development, it continues to be concerned about the continuity of data from the Landsat series of satellites. This concern mounts as more, and more complex, applications verification experiments are undertaken, more users participate in data utilization and particularly as more foreign countries invest in ground data acquisition and processing facilities assuming that the United States will continue to fly Landsat-type spacecraft. The latter concern becomes most pertinent as NASA prepares to charge foreign nations for such data. Accordingly, the Committee, during its hearings on this authorization bill, requested NASA and other involved agency witnesses to submit suggested approaches to an operational system which addresses the concerns set forth. The Committee will evaluate these responses in the months ahead.

In the meantime, while the Committee is appreciative of the rationale underlying the recommendation of the House, as reflected in its action on the NASA request, to establish the Landsat C spacecraft project, currently in development, as a separate line item in the bill

entitled "Earth Resources Operational Systems", the Committee has reservations about separating out this project from the support and technical interchange which it currently enjoys as a part of the overall earth resources activity and the other related activities encompassed in the total Space Applications program. Therefore, in view of the foregoing, the Committee is not recommending a comparable line item in this bill.

The Committee agrees with the House on the importance of severe storm research and believes that all reasonable effort should be applied to this vital area. The Committee's view includes the application of additional resources, as may be necessary, from other elements of the Space Applications program rather than the addition of \$1 million from other programmatic areas as recommended by the House.

AERONAUTICAL RESEARCH AND TECHNOLOGY, \$189,100,000

OBJECTIVES

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

Summary of resources requirements

Research and technology base.....	\$89,700,000
Systems studies.....	3,000,000
Systems technology programs.....	60,800,000
Experimental programs.....	35,600,000
Total	189,100,000

A strong research effort will be maintained in the disciplinary areas of materials, structures, propulsion, avionics, aerodynamics and human-vehicle interactions to provide advanced technology to meet the future needs of civil aviation. The FY 1977 program will continue to focus on developing the technology to enable improved performance, reduced energy requirements, enhanced operating economy, reduced undesirable environmental effects such as noise and pollution, improved safety and reliability, and improved terminal area operation for all types of aircraft. These technology efforts are integrated with additional focused technology efforts to develop advanced long haul and short haul air transportation system concepts, including stationary-wing aircraft in the subsonic, supersonic and hypersonic speed regimes, as well as rotorcraft and hybrids.

The aeronautics research program has been refocused to emphasize the development of technologies that will contribute to the achievement of a substantial reduction in aircraft energy requirements through increased efficiency. These aircraft energy efficiency technology efforts represent a multifaceted activity encompassing a broad spectrum of disciplines and focusing primarily on those technologies that will lead not only to more energy efficient derivatives and/or retrofits of current aircraft, but also to more energy efficient designs of future aircraft.

The identified technology efforts are focused in five principal areas: Engine Component Improvement; Energy Efficient Engines; Laminar Flow Control; Energy Efficient Transport; and Composite Primary Aircraft Structures. Each of these elements has been defined in phases covering a span of 10 years, with only the primary phases being included in the FY 1977 budget estimate. Although the thrust of the technology in each of these areas is the development of energy efficient transports, it is recognized that in order to have the technology implemented in the civil air transportation system, other requirements must also be incorporated, such as environmental acceptability, safety, reasonable acquisition and maintenance cost, and passenger acceptance. Therefore, the efforts will address all aspects of air transport system efficiency, with fuel efficiency as a fundamental quantitative measure of success.

COMMITTEE COMMENT

NASA, in response to a Committee request early in 1975 to examine possibilities to make aircraft significantly more fuel efficient, appointed a task force which formulated a ten year aircraft energy efficiency technology development program. This technology program, reviewed by the Committee in hearings in the fall of 1975, has been initiated in the NASA FY 1977 budget. This initiative is most timely, and the results of this research should play a major role in assuring that United States aircraft retain their current superiority in the international marketplace—a position supported by the fact that 78% of the commercial transports flying are U.S. built. The importance of aeronautical research is also evidenced by the \$6 billion in civil aircraft and component exports during 1975.

The Committee desires that the aircraft energy efficiency program be pursued aggressively in subsequent years in order to meet the milestones established in the plan. The Committee notes that effort on the advanced prop fan concept was not included in the initial increment due to the unavailability of data essential to the full assessment of the readiness to proceed with focused effort on the concept at this time. The Committee urges that NASA follow this aspect closely and take such action as necessary to assure that all aircraft efficiency potentials are examined fully. The Committee also reiterates its original position that improvements in fuel efficiency should not be gained at the expense of the environment or of aircraft safety.

While stressing the timeliness of the aircraft energy efficiency program, the Committee does not desire in any way to underrate the importance of the other phases of the NASA aeronautical research and technology program. The Committee wishes to emphasize the potential of lighter-than-air (LTA) vehicles for meeting civilian and military needs especially in heavy-lift applications. In order to insure a more complete understanding of the economic and technical feasibility of LTA vehicles, the Committee believes that NASA should commit sufficient resources to enable cooperative programs with the Department of the Navy and other interested Federal agencies. The Committee also urges that appropriate effort be applied to variable cycle engine technology as recommended by the House utilizing available resources as necessary. Noting that the budget reflects a meaningful in-

crease over prior years, the Committee believes that emphasis on the activities addressed herein can be accommodated within the amount requested for the program. Accordingly, it does not concur with the House addition of \$3 million to this program.

SPACE RESEARCH AND TECHNOLOGY PROGRAM, \$82,000,000

OBJECTIVES

The objectives of the Space Research and Technology program are to provide a technology base which will adequately support current and future space activities, and to implement approaches for further reducing the costs of these future space activities through standardization.

Summary of resources requirements

Research and technology base.....	\$82,100,000
System studies	1,600,000
Systems technology programs.....	3,100,000
Experimental programs.....	6,900,000
Low cost systems program.....	8,300,000
Total	82,000,000

In the research and technology base a strong research effort will be maintained in the disciplinary areas of materials, structures, fundamental electronics, guidance and control, information systems, chemical and electric propulsion, energy systems and aerothermodynamics to meet the needs of current and future space activities.

Highlights of this effort will include work on very thin metal oxide semiconductor structures including solar cells. Metal matrix composites capable of withstanding up to 1000° F are under development as well as thermal control systems for advanced spacecraft. NASA is also examining new concepts for large erectable space structures. Work on fundamental electronics is aimed at improving the resolution sensitivity, and spectral range of active and passive remote sensing systems for application in space and on Earth. In the guidance and control area a robot demonstration vehicle will be completed in FY 1977 and tethered operations will be evaluated.

The primary focus of research in chemical propulsion is on: (a) small oxygen-hydrogen propulsion systems designed for reusable space vehicles that will operate from the Shuttle low Earth orbit to higher orbits and beyond, (b) component technology for a fluorine-hydrazine propulsion system for unmanned planetary probes, (c) low cost solid propulsion, (d) atomic and metallic hydrogen and excited state helium.

NASA is also doing the research and technology necessary for electric propulsion systems of specific impulses greater than 1000 seconds for near Earth and planetary-interplanetary applications. Actual engines for auxiliary and primary propulsion are being tested and evaluated.

In the area of solar power for use in space interest centers on design and fabrication of solar cells with efficiencies of over 13-14 percent and on design for a 200-watt per kilogram solar array. Mini-Brayton components will be delivered to ERDA and tests are continuing on a 2-15 kilowatt Brayton rotating unit.

Work continues on thermionic energy conversion with a goal of efficiencies up to 30% with operating temperatures as low as 1,100 degrees centigrade; and gaseous fuel reactor research aimed at electric power generation up to 70% efficiency and conversion of nuclear energy directly into laser beams.

System studies will be pursued to investigate future space mission alternatives and to identify and evaluate the technology requirements of future missions. Studies include single-stage-to-orbit launch systems, solar and nuclear powered spacecraft missions, solar sailing feasibility, and detection of extra-terrestrial communication systems.

Systems Technology Program efforts will continue toward extending the temperature limits for composite materials to 600° F in the case of polyimide resin composites. Also, NASA is seeking a "no-moving-part" data storage system for aerospace vehicles. In FY 1977 increased Systems Technology emphasis will be given to the areas of multipurpose, user-oriented software technology, and to the demonstration of the readiness by FY 1980 of an advanced planetary orbiter spacecraft propulsion system utilizing high performance space storage fluorine-hydrazine propellants. The thrust of the software activity will be to develop generalized compiler systems capable of translating user needs into a standard higher order language, and thereby reduce future software development costs. Increased activity in the Space Technology payloads area is aimed at defining a series of flight experiments to be flown on the Space Shuttle during the early 1980's. In the Low Cost Systems area, the FY 1977 emphasis will continue to be on the development and upgrading of various standard spacecraft components.

COMMITTEE COMMENT

Energy.—The Committee notes with considerable dismay the handling of funding for NASA energy initiatives directed to this vital national need. At the instigation of this Committee, NASA, over the past three years, has developed an aggressive energy initiative identification and verification program that has resulted in a substantial amount of reimbursable work funded by ERDA. ERDA has a legislative mandate as the Government energy R. & D. manager; it also has a directive to use the technical competence and facilities of other agencies in carrying out its total responsibility. To this end NASA's capabilities to contribute to the national energy need have been recognized in an ERDA/NASA agreement signed June 23, 1975.

In spite of this agreement and the several cooperative projects underway, NASA witnesses testified that the Office of Management and Budget deleted \$8.5 million from the FY 1977 NASA request for energy initiatives, which included \$5 million for solar power satellites, directing that all such activities for terrestrial applications should be conducted on a reimbursable basis for ERDA. ERDA, however, apparently due to time constraints in finalizing the budget, did not provide an equivalent amount in its budget. While this omission is unfortunate, the Committee is greatly disturbed by the apparent inability of the Executive Branch to correct the deficiency promptly so as to continue to apply these capabilities to the national energy problem. For instance, the Committee believes that it would be a serious mistake to allow budgeting time constraints to halt research on the solar power

satellite concept. The Committee strongly urges ERDA to support this research in its FY 1977 budget.

The Committee is of the view that for the nation to be able to tap the potential contributions of all agencies to the problem of energy self-sufficiency, these agencies, including NASA, should not only be permitted but also encouraged to use nominal amounts of their regular resources to identify, and verify to some extent, possibilities which would be presented to ERDA for evaluation against competing alternatives and for subsequent funding as appropriate. Certainly agencies should account for funds so applied so that such activities are conducted within the framework of sound energy R. & D. management. It would be difficult, on the other hand, for ERDA to attempt to anticipate appropriate funding levels for these very preliminary identification activities because of the difficulty of trying to schedule inventions or determine where they might occur. The risk here is that of not fully utilizing the total resources the nation possesses. Following the identification and verification activity, the assessment of an initiative should be an ERDA responsibility. The point at which an initiative passes from one phase to another undoubtedly is not absolutely definable and probably would vary from case to case.

The Committee is concerned from its review of the NASA FY 1977 budget experience that existing policies will not capitalize on the total capability for new energy initiatives that may exist within the government, that adequate verification will not be accomplished to assess properly the potential of an initiative and perhaps more important, that all possibilities are not being evaluated.

Against this background the Committee, while sensitive to the additions by the House in the energy area, believes there is little point in adding specific amounts for energy activities. Rather, it stresses the need for the Executive Branch to promptly clarify the policies and procedures for carrying out the intent of the Energy Reorganization Act of 1974 and assure that budgeting responsibilities are conducive to an aggressive and effective energy research and development program. The Committee trusts that the planning and budgeting for the FY 1978 program will be conducted on a fully integrated basis. In the meantime the Committee urges NASA to continue its highly productive energy identification and verification program utilizing such resources as can be made available from the total available to the agency.

Research and Technology Base.—With respect to the funding for the activities in the Space Research and Technology program as requested by NASA, the Committee notes that the request contains a \$7 million increase or about 10 percent over FY 1976. Accordingly, the Committee believes that sufficient resources are provided so that additional effort can be applied to advanced propulsion research without adding funds as recommended by the House.

TRACKING AND DATA ACQUISITION PROGRAM, \$258,000,000

OBJECTIVES

The purpose of this program is to provide the tracking and data acquisition support for manned and unmanned near earth flights, including orbital and suborbital spacecraft, sounding rockets, and re-

search aircraft, for lunar and planetary missions, and for space probes to meet the requirements of all NASA projects and, as mutually agreed, for projects of the Department of Defense, other Government agencies, commercial firms, and other countries and international organizations engaged in space flight.

This involves: (a) tracking to determine the position and trajectory of vehicles in space; (b) acquisition of scientific data from on-board experiments; (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 of information between the various ground facilities and central control centers; (f) processing of data acquired from the launch vehicles and spacecraft, and (g) during Space Shuttle testing, communication with the astronauts and acquisition of biomedical data on their physical condition.

Summary of resources requirements

Operations	\$206, 800, 000
Systems implementation	42, 500, 000
Advanced systems	8, 700, 000
Total	258, 000, 000

Tracking and data acquisition support is provided by a worldwide network of NASA ground stations and one instrumentation ship, supplemented by appropriate instrumented aircraft. These facilities are interconnected by a network of ground communications lines, undersea cables, and communication satellite circuits which are leased from communications carriers, both domestic and foreign. This interconnection provides the communications capability between spacecraft and the control centers in the United States from which the flights are directed.

Computation facilities also are provided to process into meaningful form the large amounts of scientific, applications and engineering data which are collected from flight projects. In addition, instrumentation facilities are provided for support of sounding rocket launchings and flight testing of aeronautical research aircraft.

FY 1977 funds will provide for: (a) the operation and maintenance of the worldwide facilities; (b) the engineering and procurement of equipment to sustain and modify the network systems to support continuing, new, and changing flight project requirements; and (c) the investigation of advanced tracking and data acquisition techniques and the development of advanced tracking and data acquisition instrumentation.

No flight missions are planned under this program for fiscal year 1977. However, a major aspect of the Tracking and Data Acquisition program in future years will be the Tracking and Data Relay Satellite System (TDRSS). The TDRSS will consist of two relay communication satellites in geosynchronous orbit and a ground terminal in the continental United States that will relay data, commands, and voice to and from Earth orbital spacecraft and the ground control center. The TDRSS, when operational, will support most of the NASA earth orbital missions and will greatly improve NASA earth orbital tracking and data capabilities. Many on-the-ground stations in the present Space Flight Tracking and Data Network will be closed with resulting savings. NASA is planning to acquire this capability under

contract to provide the service. Under this arrangement, NASA funding for the TDRSS will not be required until the service actually begins in late 1979. The schedule for the development and construction of the TDRSS is based upon having a fully operational TDRSS by early 1980.

COMMITTEE COMMENT

The Committee notes that in order to meet fiscal constraints in prior years NASA has stretched out and/or deferred its equipment augmentation for future missions. The time has come, however, when such acquisition can no longer be deferred if missions such as SEASAT, Nimbus, Mariner Jupiter/Saturn and Pioneer Venus are to be supported. Testimony presented also shows that network operations, with its high labor content, is encountering severe inflationary cost increases. The Committee believes that after making substantial investments in the planning, development, and launch of space missions adequate provision must be made for equipment and operations support to avoid loss of data or, in a worst case situation, risk of loss of spacecraft due to insufficient operational coverage. Accordingly, the Committee recommends adoption of the NASA request for the Tracking and Data Acquisition Program and does not concur with the \$4 million cut assessed by the House.

While the Committee appreciates the need to restrict access to information contained in proposals for the TDRSS until the evaluation process is complete, this restriction does prevent the Committee from accomplishing an in-depth review of the comparative costs of leasing the service versus Government ownership of the system. Therefore, the Committee requests that NASA present detailed data on both approaches for its review prior to the award of any contract for the acquisition of TDRSS services. Further, the Committee requests that NASA cooperate fully with the General Accounting Office during its review of the lease versus purchase plan which it is conducting for the Committee.

TECHNOLOGY UTILIZATION PROGRAM, \$8,100,000

OBJECTIVES

The NASA Technology Utilization program is designed to encourage the application and use of aerospace-developed technology in the Nation's industrial and public sector communities. NASA employs a spectrum of transfer and dissemination mechanisms to effectively interact with potential users in the non-aerospace community.

Summary of resources requirements

Industrial applications	\$3, 445, 000
Technology applications	3, 640, 000
Program control and evaluation	1, 015, 000
Total	8, 100, 000

The Industrial Applications effort in FY 1977 will focus on the expanded distribution of new technology to a broader industrial community, with specific attention given to small business firms. Distribution and packaging improvements as well as modifications in technical presentation are planned. Special emphasis will also be placed on in-

creasing technology-user exposure through the use of trade and professional journals.

NASA plans to further augment and extend its Industrial Applications Centers (IAC) "outreach program". Additional IAC territorial representatives will be located in urban industrial centers not now covered; and the effort to increase awareness of the availability of NASA technology for use by private and public sector users will be increased through the use of journals, periodicals and exhibits.

The Technology Applications program is directed toward solution of technological problems identified by user organizations at the federal, state, and local levels.

Multidisciplinary application teams are employed by NASA to assist user organizations in problem definition and technology matching activities. In addition to the existing teams which now cover the fields of medicine, transportation, and public safety, NASA proposes during FY 1977 to develop new teams in manufacturing processing and in agriculture.

Technology applications projects to assist in the demonstration of the applicability of NASA technology will emphasize biomedical, transportation, and public safety efforts. Such projects, selected on a priority basis, are conducted at NASA field installations to adapt, modify, or otherwise re-engineer existing aerospace technology to meet performance requirements defined by public sector user organizations. Prototype solutions are also used to stimulate industrial manufacturing and commercialization interest, thus providing increased probability for nationwide availability.

Program evaluation studies will be continued with particular emphasis on IAC outreach efforts to expand geographical coverage and penetration of nationwide industrial users. These evaluation efforts will determine the extent and effectiveness of marketing activities attendant with IAC programs. Additionally, analyses of specific economic benefits resulting from the secondary application of NASA technology in selected fields, such as health care, will be initiated in FY 1977.

At the same time, NASA plans to improve its methods for documenting specific evidence of technology transfer, and to expand its efforts to disseminate such information to the media and general public.

COMMITTEE COMMENT

The Committee's Subcommittee on Aerospace Technology and National Needs, in recent months, held a series of hearings on the effectiveness of this technology transfer activity and made several recommendations since adopted by NASA. The budget reflects that program funding has increased from \$5.5 million in FY 1975 to a proposed \$7.9 million in FY 1977, a worthwhile increase. Nevertheless, the Committee believes some additional field effort is warranted and therefore, it is increasing the program by \$200,000 to initiate one additional regional applications center. The Committee's total program recommendation is \$8.1 million, \$300,000 less than the amount approved by the House.

CONSTRUCTION OF FACILITIES

Summary

Item	FISCAL YEAR 1977	Amount
1. Modification for high enthalpy entry facility, Ames Research Center		\$1,220,000
2. Modification of flight simulator for advanced aircraft, Ames Research Center		1,730,000
3. Construction of supply support facility, Ames Research Center		1,540,000
4. Construction of addition to flight control facility, Hugh L. Dryden Flight Research Center		750,000
5. Construction of addition to lunar sample curatorial facility, Lyndon B. Johnson Space Center		2,800,000
6. Construction of airlock to spin test facility, John F. Kennedy Space Center		360,000
7. Modifications for utility control system, John F. Kennedy Space Center		2,445,000
8. Construction of addition for aeroelastic model laboratory, Langley Research Center		730,000
9. Construction of data reduction center annex, Langley Research Center		2,970,000
10. Construction of refuse-fired steam generating facility, Langley Research Center		2,485,000
11. Modification of refrigeration system, electric propulsion laboratory, Lewis Research Center		680,000
12. Rehabilitation of combustion air drying system, engine research building, Lewis Research Center		1,490,000
13. Large aeronautical facility: construction of national transonic facility, Langley Research Center		25,000,000
14. Space Shuttle facilities at various locations as follows:		
(a) Construction of Orbiter processing facility, John F. Kennedy Space Center		3,750,000
(b) Modifications to launch complex 39, John F. Kennedy Space Center		19,855,000
(c) Modification for solid rocket booster processing facilities, John F. Kennedy Space Center		9,700,000
(d) Construction of Shuttle/Carrier aircraft mating facility, John F. Kennedy Space Center		1,700,000
(e) Modifications for crew training facilities, Lyndon B. Johnson Space Center		780,000
(f) Rehabilitation and modification of Shuttle facilities, at various locations		1,760,000
(g) Modification of manufacturing and final assembly facilities for external tanks, Michoud Assembly Facility		1,930,000
15. Space Shuttle payload facilities at various locations as follows:		
(a) Modifications to operations and checkout building for Spacelab, John F. Kennedy Space Center		3,570,000
(b) Modifications and addition for Shuttle payload development, Goddard Space Flight Center		770,000
16. Rehabilitation and modification of facilities at various locations, not in excess of \$500,000 per project		17,875,000
17. Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$250,000 per project		5,125,000
18. Facility planning and design not otherwise provided for		12,655,000
Total		123,670,000

1. MODIFICATION FOR HIGH ENTHALPY ENTRY FACILITY, AMES RESEARCH CENTER, \$1,220,000

This project provides for the fabrication and installation of a 160 MW constricted arc heater and nozzle in an existing test facility, and the modification of the existing electrical, gas, water, and vacuum systems to support its operation. Construction and equipment costs are estimated at \$905,000 and \$315,000, respectively.

This test facility is required to design and qualify the heat shield thermal protection systems of probes for entry into planetary atmospheres. No facility exists capable of simulating these entry environments.

2. MODIFICATION OF FLIGHT SIMULATOR FOR ADVANCED AIRCRAFT, AMES RESEARCH CENTER, \$1,730,000

This project consists of the fabrication of three new platforms, acquisition of cockpit and communications equipment, and the necessary modifications to provide a quick module change and/or readily changeable platform system for the existing simulator. Equipment and construction costs are estimated at \$1,680,000 and \$50,000, respectively.

This simulator, the most advanced in existence, is fully utilized supporting FAA, DOD and NASA aircraft programs. The new system will allow off-simulator alterations and checkout of simulator cockpits for different aircraft projects thereby reducing cockpit change-over time between tests. The time savings are estimated to provide the capability to handle an additional five simulator projects per year.

3. CONSTRUCTION OF SUPPLY SUPPORT FACILITY, AMES RESEARCH CENTER, \$1,540,000

This project provides for the construction of an 80,000 sq. ft. one-story, steel frame with sheet metal wall, high bay structure complete with supporting utilities and roadways to accommodate warehousing and shipping and receiving functions.

No reasonably suitable warehouse facility exists at this Center. Currently an area in the 40 ft. x 80 ft. wind tunnel building, exposed to severe noise levels and vibrations, and space at Camp Parks, 37 miles distant, is used for these functions. The existing space is inadequate to support the present as well as the future needs of this advanced research center.

4. CONSTRUCTION OF ADDITION TO FLIGHT CONTROL FACILITY, HUGH L. DRYDEN FLIGHT RESEARCH CENTER, \$750,000

This project provides for an 8,410 sq. ft. two-story addition to the present flight control facility extending the existing areas of the second and third floors.

This addition will provide space to co-locate members of the flight control team and their supporting equipment in a central control area with ready access to flight display boards, other technical specialists involved, and computer data outputs, which is essential to operational

efficiency, safety of flight monitoring and flight data processing requirements of the aeronautical research programs.

5. CONSTRUCTION OF ADDITION TO LUNAR SAMPLE CURATORIAL FACILITY, LYNDON B. JOHNSON SPACE CENTER, \$2,800,000

This project provides for the construction of a 15,000 sq. ft. two-story addition to the existing Lunar Sample Curatorial Facility with an ultraclean and highly secure vault, with processing, experiment, and simulation laboratories, and with data storage and other support areas.

The Apollo program brought 842 pounds of lunar material to Earth, much more than originally anticipated and for which no adequate storage and scientific investigation facilities exist. While representative samples (20% to 30%) of the total material are being placed in secured dead storage, the existing facility must be expanded to provide for the storage, inspection, study, and scientific analysis of these extremely valuable lunar samples.

COMMITTEE COMMENT

At this Committee's request after this project was denied by both the House and the Senate authorizing Committees last year, NASA made a further study of alternatives for supporting the storage, processing, and analysis of the lunar samples. The remote storage site and a restatement of need for the original fiscal year 1976 project resulted. The Committee believes that adequate storage facilities and additional space for processing and analysis of these samples, acquired at great expense, are required. This is a long-term, and not a transitory, requirement for which solutions have been examined extensively, and therefore, the Committee is recommending approval of this facility item which was deleted by the House in its action on the fiscal year 1977 NASA authorization request.

6. CONSTRUCTION OF AIRLOCK TO SPIN TEST FACILITY, JOHN F. KENNEDY SPACE CENTER, \$360,000

This project consists of the construction of a 35 ft. x 50 ft. x 45 ft. high blast-proof airlock structure as an addition to the existing Spin Test Building complete with utility and other systems to support pre-launch spacecraft processing activities.

This addition is required to reduce contamination and relieve overcrowded conditions in the spin test bay by providing space in which preliminary operations for the launch vehicle third stage/spacecraft processing can be accomplished in a clean environment.

7. MODIFICATIONS FOR UTILITY CONTROL SYSTEM, JOHN F. KENNEDY SPACE CENTER, \$2,445,000

This project is a continuation and extension to facilities in the Vehicle Assembly Building and Launch Complex 39, Pad A areas of a utilities control system initiated in prior years, and it involves the procurement and installation of sensors and controls in various utility

subsystems and connections to central computing and control equipment via the communications cable system. Construction and equipment costs are estimated at \$1,408,000 and \$1,037,000, respectively.

This project is designed to reduce costs and increase efficiency in the operation and maintenance in this portion of the Center's utility systems both during the phasedown of activities prior to and through the operations phase of the Shuttle program. It is estimated that cost savings will pay for this project in about 1.88 years.

8. CONSTRUCTION OF ADDITION FOR AEROELASTIC MODEL LABORATORY, LANGLEY RESEARCH CENTER, \$730,000

This project involves the construction of a 4,965 sq. ft. third floor addition to the existing Transonic Dynamics Tunnel with provision for an aeroelastic model preparation area including an active cable mount support, for a model shake test run-up area, and for a data system and instrumentation service area. Necessary utilities systems will be provided. Construction and equipment costs are estimated at \$545,000 and \$185,000, respectively.

This addition is needed to increase the operational efficiency of this tunnel which has a current program backlog of two years on NASA and DOD aircraft projects. It will allow extensive pre-test preparation of models outside of the tunnel test section thereby increasing the available test time by 15-20%. It will also consolidate all pre-test model preparation activities, including the separately located model shake test run-up, into one work area.

9. CONSTRUCTION OF DATA REDUCTION CENTER ANNEX, LANGLEY RESEARCH CENTER, \$2,970,000

This project provides for the construction of a 30,000 sq. ft. steel frame, brick and metal curtain wall annex to the existing Data Reduction Center complete with utilities and with special features to support computer operations.

This annex is required to house the computers, data handling equipment, and associated operations to support the continually increasing requirements of present and future research programs for computational and data handling capabilities. Reassignments and consolidations of existing space to accommodate new computer equipment have been exhausted.

10. CONSTRUCTION OF REFUSE-FIRED STEAM GENERATING FACILITY, LANGLEY RESEARCH CENTER, \$2,485,000

This project provides for construction of a 225-ton daily waste capacity, refuse-fired steam generating facility with an output of about 56,000 pounds of steam per hour at the Langley Research Center. This project, estimated to cost \$8,410,000 is jointly sponsored by NASA, USAF/Langley Air Force Base, and the City of Hampton, Virginia. Under the agreement between the parties NASA will provide \$2,485,000 (plus \$37,000 in planning funds), the USAF \$800,000 and the City of Hampton the remaining \$5,088,000.

This project responds to Executive Order 11752 which encourages the full cooperation of the federal government with local governments for the prevention, control and abatement of environmental pollution and it also responds to the current energy situation. When this facility is activated it will eliminate landfill disposal problems in the area as well as use the refuse to reduce energy requirements. The Center's existing oil-fired steam generating plant will be used for peak loads experienced in supporting research activities or during severe weather conditions.

11. MODIFICATION OF REFRIGERATION SYSTEM, ELECTRIC PROPULSION LABORATORY, LEWIS RESEARCH CENTER, \$680,000

This project involves the procurement and installation of a 40-ton capacity "closed-loop" mechanical refrigeration system with stainless steel cold walls (baffles), refrigeration piping, utility services, electrical power and controls, and the construction of a 690 sq. ft. building addition to house the equipment. Equipment and construction costs are estimated at \$640,000 and \$40,000, respectively.

This installation will be a substitute for the existing liquid nitrogen "open-loop" refrigeration system in this laboratory which provides a simulated space environment for testing spacecraft, solar arrays, and ion propulsion systems. The nitrogen-based system, to remain in place for possible future use, is extremely expensive to operate and provides a greater capability than required. Cost savings from the new system are expected to repay this capital investment in one year.

12. REHABILITATION OF COMBUSTION AIR DRYING SYSTEM, ENGINE RESEARCH BUILDING, LEWIS RESEARCH CENTER, \$1,490,000

This project involves the complete removal of the existing, badly deteriorated dryer equipment and the installation of new dryer equipment consisting of three heat exchangers, two 250-ton capacity package-type water chillers, three desiccant dryer tanks with a regeneration system, interconnecting piping, and associated concrete foundations. Equipment and construction costs are estimated at \$1,430,000 and \$60,000, respectively.

The engine research building has 55 individual test cells supporting a wide variety of engine research projects that require an air system capable of simulating a broad spectrum of test environments. The existing air drying system has been in service for over 30 years and now experiences many leaks, requires continually increasing maintenance and reflects a general degradation in performance thereby reducing system capability below that required for some of the engine research projects.

13. LARGE AERONAUTICAL FACILITY: CONSTRUCTION OF NATIONAL TRANSONIC FACILITY, LANGLEY RESEARCH CENTER, \$25,000,000

This project provides for the procurement of long lead items and the initial site preparation for construction of a fan-driven, closed circuit, transonic wind tunnel 200 feet long by 48 feet wide varying in diameter from 40 feet to 11 feet having an operating pressure range

from 14.7 psia to a maximum of 130 psia and an operating temperature range from 155° F. to -300° F. using a cryogenic approach for achieving high Reynolds numbers and using the evaporation of liquid nitrogen to obtain a low temperature test medium. The tunnel will be constructed on the site of the existing 4 ft. x 4 ft. supersonic tunnel and will use its electric motor drive system with the addition of one 60,000 HP synchronous drive motor to provide the higher Reynolds numbers. The new facility will also utilize the existing cooling tower, pumps, auxiliary equipment and buildings. However, a new 33,500 sq. ft. two-story shop addition is required to accommodate the larger transonic test section. This shop will include space for a control and data acquisition room and for an improved model preparation area. A three dimensional model support and angle-of-attack systems, controls, process monitors, data acquisition systems and other support equipment, including a liquid nitrogen storage and supply system, are included in this project. The total cost of this project is estimated to be \$65,000,000 to be funded over three fiscal years. Construction and equipment costs for FY 1977 are estimated to be \$18,900,000 and \$6,100,000, respectively.

The requirement for this facility results from an in-depth NASA/DOD study to identify the facilities required to support the advanced aeronautical research and development activities necessary to maintain and to enhance the Nation's leadership in aeronautics. Originally, four facilities were identified—two transonic tunnels, one to support NASA research and one for DOD development activities, a large DOD propulsion facility, and a major upgrading and expansion of the NASA 40 ft. x 80 ft. low speed tunnel. A combination of rising costs, further examination, and a breakthrough in transonic tunnel technology—the cryogenic concept—resulted in the subsequent decision to build one transonic facility to serve the national needs for both research and development. The basic need is occasioned by difficulties encountered in predicting advanced flight vehicle performance due to misleading or inadequate experimental data obtained from existing low Reynolds numbers wind tunnels. This is especially true for conditions where local velocities over the vehicle's surface exceed the speed of sound and where shock-boundary layer interaction effects occur. The transonic flight environment is common to a broad spectrum of civilian, commercial, military and space flight vehicles. This environment also produces Reynolds numbers sensitive aerodynamic problems which are generally not amenable to analytical study and thus require accurate experimental data at or near flight Reynolds numbers for an adequate solution. There is no known wind tunnel in existence either here or abroad that will satisfy these requirements.

14. SPACE SHUTTLE FACILITIES, \$39,475,000

(a) *Construction of Orbiter Processing Facility, John F. Kennedy Space Center, \$3,750,000.*—This facility is being incrementally funded with a high and low bay provided in FY 1975 and a second high bay in FY 1976. This project provides for outfitting the second high bay which includes installing the special and launch-related systems such as hypergolic, hydraulic, instrumentation/communication, environmental control, electrical, gaseous hydrogen, nitrogen, helium and oxygen,

liquid hydrogen and oxygen, compressed air, coolants, and utility control systems. It also provides for the construction of a 10,000 sq. ft. two-story, structural steel frame and masonry, addition to the north end of the low bay complete with supporting utility systems, and for the installation of 2000 feet of fencing around the entire facility. This project completes presently known requirements for the Orbiter Processing Facility.

The Orbiter Processing Facility will provide the work space and special equipment and facilities required to conduct the safing, maintenance and checkout operations on the orbiter vehicle after returning from flight and preparatory to the next mission. These operations involve payload removal and insertion as well as activities directly related to the vehicle itself. The low bay extension will provide a staging area for personnel and equipment, and the fencing will provide for safety and security of processing operations.

(b) *Modifications to Launch Complex 39, John F. Kennedy Space Center, \$19,855,000.*—This project continues modifications to Apollo Program Launch Complex 39 initiated with FY 1975 and FY 1976 funding to prepare the Complex for shuttle launches. The prior year projects provided for modifications to two high bays in the Vehicle Assembly Building, the Launch Control Center, one mobile launcher and to Launch Pad A. The FY 1977 project provides for modifying a second mobile launcher which involves removing the launch umbilical tower to decrease weight, providing exhaust holes for the orbiter main engines and the solid rocket boosters, and altering the mobile launch platform's structural, electrical and mechanical systems to accommodate the shuttle vehicle configuration. This project also provides for modifications to Pad A to reduce high acoustic levels generated from firing the shuttle main engines and solid rocket boosters up to the time of lift-off so that orbiter payloads will not be damaged.

FY 1977 funding will complete those facility modifications included in the 3-year project to provide an initial shuttle launch capability except for possible work, estimated to cost \$3-5 million, to reduce the acoustic impact immediately after lift-off, a recently identified problem still under study.

COMMITTEE COMMENT

The Committee traditionally has observed the policy of full funding of NASA facility projects unless there are logical funding phases for a multi-year project. The Committee understands that NASA proposes to award a single contract for a major element of this project—modifications to a mobile launcher—and therefore it believes the requested funding is necessary in order to proceed with the acquisition process in an orderly manner. Accordingly, the Committee does not concur with the House reduction of \$2 million in this project.

(c) *Modification for Solid Rocket Booster Processing Facilities, John F. Kennedy Space Center, \$9,700,000.*—This project includes modifications to existing facilities and some new construction to provide (1) recovery and disassembly facilities involving enlargement of the existing barge basin at the Apollo Saturn dock, construction of a slip and 120-ton crane at the dock and a dolly rail system to an existing

hangar, construction of an outside wash station and the extension and modification of supporting utility systems; (2) SRB refurbishment and subassembly facilities involving modification and outfitting of part of the Vehicle Assembly Building low bay area including removal of existing work stands and installing new specifically configured work stands with cranes for servicing the SRB components, the installation of paint and insulation application capability and the provision of supporting utility services as required; and (3) parachute refurbishment facilities involving modification of, and construction of two additions totaling 20,000 sq. ft. to, existing Building M7-657, the installation of a monorail system, construction of a parachute washer and dryer, and the extension of utility systems as necessary.

This is the second and final increment of funding for handling the solid rocket boosters at the launch site. FY 1976 funding provided for receiving and processing the motors and assembling the booster components for integration with the external tank and orbiter. This project provides for modifications to existing facilities at the Kennedy Space Center and Cape Canaveral Air Force Station to support retrieval of the boosters from the ocean and the cleaning, disassembling, refurbishing, and processing of SRB components, parachutes, and associated hardware for re-use.

COMMITTEE COMMENT

Testimony presented to the Committee reflects a firm requirement on a specific schedule for the work included in this project. The Committee, therefore, does not agree with the House reduction of \$1 million in this project, and recommends \$9.7 million, as requested by NASA, for the second increment of funding for solid rocket booster processing facilities.

(d) *Construction of Shuttle/Carrier Aircraft Mating Facility, John F. Kennedy Space Center, \$1,700,000.*—This project provides for the procurement, fabrication, and erection of a Boeing 747 carrier aircraft/shuttle orbiter mating/demating facility as well as the necessary site preparation, foundation work and utilities for the facility to be located at the south end of the orbiter landing runway.

This mating facility is required to permit transport of the shuttle orbiter to and from the launch site—to the launch site from the assembly plant and from alternate landing sites, and from the launch site to the factory for major overhaul and for launch availability at the Western Test Range when that facility is activated.

COMMITTEE COMMENT

In testimony subsequent to the submission of the FY 1977 budget, NASA advised the Committee of the plan to tow, rather than fly, the orbiter from the Palmdale assembly plant to the Dryden Flight Research Center. Therefore, steel and hoists, procured in advance for the Palmdale mating facility which will not now be built, are available for use in constructing the facility at the Kennedy Space Center. Consequently, the Committee made a compensating reduction of \$350,000 in this facility request, an action also taken by the House. The Committee recommends \$1.7 million for this line item.

(e) *Modifications for Crew Training Facilities, Lyndon B. Johnson Space Center, \$780,000.*—This project involves modifications to existing Building 29, the Flight Acceleration Facility, to provide a water immersion facility including construction of a concrete and steel water tank 30 ft. x 78 ft. x 25 ft. deep with viewing ports, platforms, and a water supply, filtering and drainage system. Construction and equipment costs are estimated at \$649,000 and \$131,000, respectively.

The water immersion facility will provide the capability to train shuttle crews and mission specialists in an environment closely simulating the weightless condition of outer space. Large enough to accommodate shuttle test training articles such as the payload bay, airlock and the crew module simulators, the facility helps crew members learn how to handle tools and equipment so as to work more effectively and assists in compiling crew instruction manuals as procedures for performing tasks in a weightless environment are developed.

COMMITTEE COMMENT

The Committee examined carefully both the construction and the operating costs of this proposed facility at the Johnson Space Center and the costs of adapting and operating the existing Marshall Space Flight Center neutral buoyancy facility for shuttle crew training. Since operating costs are the significant factor influencing cost comparisons, it appears that the availability of this crew training facility at the Johnson Center on the schedule proposed is the most economical approach to fulfilling this requirement. Consequently, the Committee is recommending approval of this facility item on which the House deferred action this year.

(f) *Rehabilitation and Modification of Shuttle Facilities at Various Locations, \$1,760,000.*—This project provides for several small (under \$500,000 each) rehabilitation and modifications to existing facilities that are specifically required in support of the space shuttle program and, accordingly, are included as a shuttle line item and are also included in the total space shuttle facilities cost estimate. These include (1) at the Johnson Space Center, \$660,000 of which \$220,000 is for modifying an existing vacuum system to support testing on components for the environmental control and life support system, of which \$150,000 is for modifications to an existing building to support the establishment of the shuttle data processing complex, of which \$290,000 is for rehabilitation and upgrading test facilities in the thermochemical test area to support testing of vernier thrusters and pyrotechnic devices used in the shuttle system; (2) at the NASA Industrial Plant, Downey, \$210,000 for modification of several plant systems to accommodate alternate energy sources to back up the existing natural gas fueled systems to avoid work stoppages in the event supply is curtailed; (3) at the Michoud Assembly Facility, \$430,000 of which \$75,000 is for rehabilitating the chemical waste holding pond and accessory equipment to support shuttle external tank production, of which \$170,000 is for repairing aprons and roadways to facilitate movement of the external tank, and of which \$185,000 is for the installation of fuel oil transfer and distribution piping to provide a backup system for the gas-fired steam generating plant in the event of an interruption in the natural gas supply; and, (4) at the Flight Research Center

\$460,000 to install an air handling system in the space shuttle hangar to provide a clean and partially controlled, contamination-free environment during payload handling operations following return of the orbiter from space missions. This installation is required to support the initial shuttle missions scheduled for landing at this Center.

(g) *Modification of Manufacturing and Final Assembly Facilities for External Tanks, Michoud Assembly Facility, \$1,930,000.*—This project provides for construction, within an existing building, of a 45 ft. diameter 119 ft. high concrete silo with a mechanically operated lid complete with work platforms, access stairways, doors, and with supporting electrical, air-conditioning, fume abatement, fire detection, sprinkler and vacuum systems. Construction and equipment costs are estimated at \$1,909,000 and \$21,000, respectively.

This project represents the third funding increment in the program to modify the Michoud Assembly Facility to produce external tanks for the space shuttle program at the initial rate of 24 to 28 tanks per year. The silo will provide additional capability to apply the thermal protection system to the tanks. The added requirement results from recent studies and tests that show the need for an ablative covering over portions of the tank as well as for more of the foam insulation originally contemplated.

15. SPACE SHUTTLE PAYLOAD FACILITIES, \$4,340,000

(a) *Modifications to Operations and Checkout Building for Spacelab, John F. Kennedy Space Center, \$3,570,000.*—This project provides for modifying the existing Operations and Checkout Building and involves removal of existing equipment, area and utilities rearrangements, and the acquisition and installation of new assembly and checkout stands to service Spacelab.

Spacelab, a prime Shuttle payload, is an experiment carrier providing crew accommodations, mounts for experiments, and supporting systems. This project will provide the capability to receive experiments, integrate them with a Spacelab simulator for checkout, and to install in the Spacelab for final checkout operations prior to delivery of Spacelab to and installation in the orbiter. Following a mission this facility will be used to disassemble and process Spacelab and returned experiments, and to refurbish Spacelab and prepare it for the next mission.

(b) *Modifications and addition for Shuttle Payload Development, Goddard Space Flight Center, \$770,000.*—This project involves (1) modification of approximately 3,600 sq. ft. of space in existing Building 22 including relocation of an existing solar array illuminator, installation of a clean room, and installation of a truck airlock and a 7.5-ton bridge crane, and (2) modification of 2,700 sq. ft. in Building 15 including the installation of a reverberant chamber and supporting equipment. Construction and equipment costs are estimated at \$510,000 and \$260,000, respectively.

This project, combined with other existing facilities at the Center, will provide the space and test facilities for developing, assembling, integrating and testing "free-flyer" Shuttle payloads, using a multi-

mission modular spacecraft as well as for the development of the spacecraft itself. This spacecraft will be designed specifically for Shuttle use as well as to accommodate a variety of applications, communications, and astronomical mission payloads.

16. REHABILITATION AND MODIFICATION OF FACILITIES AT VARIOUS LOCATIONS, NOT IN EXCESS OF \$500,000 PER PROJECT, \$17,875,000

This Construction of Facilities line item provides a lump sum amount of \$17,875,000 for 56 individual facility rehabilitation and modification projects at various NASA installations ranging in estimated cost from \$110,000 to \$490,000 each and for a group of small (under \$100,000 each) miscellaneous unidentified projects. The latter group accounts for \$1,600,000 of the total amount recommended for this line item. Approximately thirty percent of the recommended amount is for upgrading utility systems, thirty percent for general purpose buildings improvements, and twenty-five percent for technical facilities improvements, with the remainder scheduled for fire protection, building exterior, and paving and drainage projects. While the budget documentation identifies the larger, individual projects recommended herein, the Committee recognizes that the priority of need for this type of work at the many NASA installations may change during the fiscal year and, therefore, understands that changes or substitutions in the projects may be necessary.

These facility rehabilitation and modification projects are part of a continuing program required to offset the accumulative effects of wear and deterioration on the NASA plant (with an estimated value of about \$5.9 billion) to assure the availability and reliability of these facilities and their capabilities to support NASA functions, to improve the capabilities and the usefulness of existing facilities to accommodate new technologies and offset obsolescence, and to achieve more efficient energy utilization by upgrading utility systems (including the installation of utility control systems) and using elements thereby reducing energy demand. This work is of such a nature and magnitude that it cannot be accomplished by routine day-to-day facility maintenance, and it excludes major rehabilitation and modification projects estimated to cost more than \$500,000 each which are presented as individual line items in this section of the bill. This line item also excludes new facility construction or additions to existing facilities which are provided for separately in the bill.

17. MINOR CONSTRUCTION OF NEW FACILITIES AND ADDITIONS TO EXISTING FACILITIES AT VARIOUS LOCATIONS, NOT IN EXCESS OF \$250,000 PER PROJECT, \$5,125,000

This Construction of Facilities line item provides a lump sum amount of \$5,125,000 for 25 individual minor construction and/or facility addition projects at the several NASA installations ranging in estimated cost from \$60,000 to \$245,000 each and for a group of small (under \$50,000 each) miscellaneous unidentified projects. The latter represents \$625,000 of the total amount recommended. These projects support construction of new freestanding structures or the expansion of existing facilities as opposed to the rehabilitation and modification

of existing facilities, without the expansion thereof, as provided for in item 16 above. Projects of this nature estimated to cost more than \$250,000 are recommended as individually authorized line items in the bill.

The projects for which this authorization is recommended are necessitated by changing technology and missions and by ongoing research, development, and test activities, and support required therefor. Examples of these projects are construction of an addition to the electrical distribution system at the Ames Research Center to provide a loop to increase reliability of service to research facilities, construction of an addition to the radar tracking station at Ely, Nevada, which supports aeronautical research flight projects as a replacement for deteriorated temporary facilities, and an addition to the optical research facility at the Goddard Space Flight Center, to house laser systems to support experiments with spacecraft in orbit. The Committee recognizes that flexibility in the use of these funds is necessary to accommodate changing needs during the year and, therefore, authorizes NASA to make changes to and/or substitutions for the specific work items set forth in the budget justification on a priority-of-need basis.

18. FACILITY PLANNING AND DESIGN, \$12,655,000

These funds will provide for two general categories of work. First, the regular, continuing, planning and design activities for facilities projects such as the conduct of studies and investigations, the preparation of preliminary engineering reports, cost estimates, and construction schedules for proposed projects, the preparation of final construction contract plans, specifications, schedules and cost estimates for approved projects, and the development and updating of master plans for field installations. Secondly, these funds will support facility planning and design activities for large, complex projects or specific programs which require longer range and more detailed engineering effort. Projects of this type to be supported in fiscal year 1977 are Space Shuttle facilities, Spacelab facilities, and large aeronautical facilities, particularly the National Transonic Facility. Approximately \$5,155,000 of the funds recommended for the program will be applied to the first category and \$7,500,000 to the second category described above.

RESEARCH AND PROGRAM MANAGEMENT

Summary

Fiscal year 1977	Budget request	House action	Senate committee action
Personnel compensation.....	\$58,830,000		
Personnel benefits.....	53,040,000		
Benefits for former personnel.....	504,000		
Travel and transportation of persons.....	17,143,000		
Transportation of things.....	2,552,000		
Rent, communications and utilities.....	61,689,000		
Printing and reproduction.....	4,164,000		
Other services.....	99,150,000		
Supplies and materials.....	13,863,000		
Equipment.....	2,498,000		
Lands and structures.....	540,000		
Grants, subsidies and contributions.....	70,000		
Insurance claims and indemnities.....	12,000		
Total.....	814,055,000	810,455,000	814,055,000

The Research and Program Management appropriation includes funding for research in Government laboratories, management of programs, and other activities of the National Aeronautics and Space Administration. Principally, it is intended to (1) provide the civil service staff to conduct in-house research, and to plan, manage, and support the Research and Development programs, and (2) provide other elements of operational capability to the laboratories and facilities such as logistics support (travel and transportation, maintenance, and operation of facilities), and technical and administrative support.

Approximately three-fourths of this authorization recommendation for fiscal year 1977, or \$615,630,000, is required to pay the salaries and related personnel costs of NASA employees during the fiscal year. This amount will support 23,816 permanent positions, of which approximately 65 percent will be assigned to scientific, engineering and supporting technician personnel. This personnel complement reflects a reduction of 500 from the FY 1976 level principally as a result of an agency-wide study of the roles and missions of the several NASA research installations. The study, directed to an examination of projected workloads and responsibilities in the approaching shuttle era, was designed to clarify the roles of the NASA installations, to eliminate any unnecessary duplication of research functions, and to maximize the utilization of personnel and facilities. While total employment will decline as noted, total personnel costs will be about \$4 million above FY 1976 primarily due to the federal pay raise effective in October 1975. The impact of this pay action in FY 1977 is estimated to be \$27,055,000.

The remaining funding in this appropriations category is, for convenience, grouped into the functional budget categories of travel, facilities services, technical services, and administrative support for which a total of \$198,425,000 is recommended. After net adjustments, this amount is about \$15,000,000 above the FY 1976 budget plan primarily due to rising utility rates and wage increases for support contractor personnel at the several installations. The total cost of utility services continues to rise in spite of an aggressive energy management program and the significant reductions already realized from its implementation.

COMMITTEE COMMENT

In view of the reduction in personnel structured into this budget request, the agency-wide examination of Center responsibilities to achieve greater efficiency and manpower utilization, and the factors contributing to the increase over the previous fiscal year, the Committee is recommending adoption of the budget request of \$814,055,000 for this appropriations category.

It is the Committee's belief that while the House assessed a \$3,600,000 cut against the functional categories in this appropriation other than NASA personnel, the impact is, in reality, against base support personnel due to the high labor content and to the inflexibility of the other cost elements, particularly utilities services, in these categories. The Committee believes that any further reductions in base support services reduce that support to a level that is inconsistent with the ongoing responsibilities assigned to NASA.

COST AND BUDGET DATA

The NASA request for new budget authority for FY 1977 was \$3,697,000,000. This bill, H.R. 12453, as recommended by the Committee, authorizes appropriations to the National Aeronautics and Space Administration in the amount of \$3,696,850,000 for that fiscal period. This amount is \$150,000 less than the budget request.

In accordance with the requirements of Section 252(a) of the Legislative Reorganization Act of 1970, the estimates for the next five years of NASA budget authority are as follows:

[In millions of dollars]

Fiscal year:	NASA estimate	Committee estimate
1977.....	3,697	3,697
1978.....	3,610	3,610
1979.....	3,343	3,343
1980.....	3,131	3,131
1981.....	2,824	2,824

The above estimates are future funding requirements for the continuation or completion of the NASA programs (including the development of the Space Shuttle) provided for in this bill. These estimates do not provide for the impact of inflation, do not include a provision for administrative adjustments that may be required, and do not provide for the initiation of any new programs. Further, these estimates are not an estimate of what the NASA budget will be in future years. As existing programs and projects are phased out new programs and projects may be requested. The Congress will have an opportunity to exercise its judgment on these new programs and projects when authority and funds are requested to proceed with them. The Committee does expect, however, that the budgets for the fiscal years through 1981 will approximate \$3.7 billion, in current years dollars, as new initiatives are proposed from studies currently underway and as developments demonstrate the need for and the worthiness of new starts in space science and applications, building on and capitalizing on the data and experience already acquired.

With respect to Section 308(a) of the Congressional Budget and Impoundment Control Act of 1974, a concurrent resolution pertaining to this authorization for FY 1977 has not been agreed to. However, the amounts recommended in this bill for Functional Code 250—\$3.333 billion, and for Functional Code 400—\$364 million, are in complete agreement with the estimates submitted to the Senate Budget Committee on March 3, 1976.

This bill contains no budget authority to provide financial assistance to State and local governments.

The Congressional Budget Office has submitted to the Committee its estimate on this bill pursuant to Section 403 of the Congressional Budget and Impoundment Control Act of 1974. The CBO submission of March 19, 1976, follows:

MARCH 19, 1976.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill Number: S. 2864.
2. Bill Title: The National Aeronautics and Space Administration Authorization Bill, Fiscal Year 1977.
3. Purpose of Bill: The bill authorizes appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and research and program management, and for other purposes for fiscal year 1977. The bill is for authorization, and therefore, is subject to appropriations action.
4. Cost Estimate: The bill has no budget effects for fiscal year 1976 or the transition quarter. Only the authorization included in this bill is considered, and no judgment is made about the authorizations this bill implies for future fiscal periods. The overall budget impact follows.

BUDGET EFFECTS

[In millions of dollars]

	Fiscal year—				
	1977	1978	1979	1980	1981
Authorization level.....	3,697				
Costs.....	2,578	919	168	12	

5. Basis for Estimate: All the funding authorized in this bill is assumed to be obligated in fiscal year 1977. Funding is authorized according to the type of activity, and the stream of costs associated with an authorization can best be estimated in the same manner.

Research and Development.—Funding through this account supports NASA's exploration and utilization of space, and other space and aeronautics research and development. The assumed spend-out rate for the funds obligated in this account is 65 percent in FY 1977, 30 percent in FY 1978, and 5 percent in FY 1979. This yields the following budget effects.

	Fiscal year—				
	1977	1978	1979	1980	1981
Authorization level.....	2,759				
Costs.....	1,793	828	138		

Construction of Facilities.—Funding through this account provides for the construction of new facilities, the purchase of land and construction equipment, facility modifications and rehabilitation, and other similar activities. The capital intensive nature of activity in this account means that the actual expenditures for obligations occur over a longer period of time. This spend-out pattern assumed is that 10 percent is spent in FY 1977, 40 percent in FY 1978, 40 percent in FY 1979, and 10 percent in FY 1980. This yields the following estimates.

	Fiscal year—				
	1977	1978	1979	1980	1981
Authorization level.....	124				
Costs.....	12	90	50	12	

Research and Program Management.—Funds for this account support the management of NASA programs and other activity such as in-house research efforts. Because personnel compensation and other operating expenses dominate this account, expenditures occur fairly quickly after obligation. The spend-out pattern assumed here is 95 percent in fiscal year 1977 and 5 percent in fiscal year 1978. The resulting budget estimates follow.

	Fiscal year—				
	1977	1978	1979	1980	1981
Authorization level.....	814				
Costs.....	773	41			

6. Estimate Comparison: None.

7. Previous CBO Estimate: An estimate has been prepared for H.R. 11573, the House NASA authorization bill (now H.R. 12453). The minor changes from that estimate reflect the different authorization levels contained in this bill.

LEGISLATIVE CHANGES

The Committee considered six legislative amendments in its action on this NASA authorization bill.

The Committee deleted Section 7 of S. 2864 which would have authorized to NASA total amounts for each appropriations category for fiscal year 1978. Since separate legislative action will be undertaken on the fiscal year 1978 authorization request, no action is necessary at this time. There is no provision for fiscal year 1978 authorizations in the House bill.

Section 7 of H.R. 12453 amends paragraph (15) of Section 5316, Title 5, United States Code, to increase from six to seven the number of Associate Administrator positions authorized to the National Aeronautics and Space Administration in Level V of the Executive Salary schedule. The additional position would encompass those functions assigned to the comptroller of the agency, functions which are judged to have responsibilities equivalent to those assigned to the other Associate Administrator positions. This amendment was proposed by NASA in its draft legislation accompanying the FY 1977 authorization request. This Senate Post Office and Civil Service Committee stated it had no objection to this action. This provision is included in the House bill as Section 7 also.

Section 8 of H.R. 12453 amends Section 6 of the National Aeronautics and Space Administration Authorization Act, 1968 (Public Law 90-67), which established the Aerospace Safety Advisory Panel,

to permit members of that Panel to be compensated at the same rate NASA is authorized to pay other experts and consultants. The amendment authorizes compensation up to the maximum payable to a GS-18 under the General Schedule whereas Panel members are limited currently to \$100 per day. This change is requested by NASA as a matter of equity to those individuals serving on this advisory group established at the direction of the Congress. The House bill contains an identical provision in Section 8 also.

The House added, as Section 9 of its bill, H.R. 12453, a provision stating that it is the sense of the Congress that NASA, in conjunction with the Department of Defense as appropriate, should take specific actions, including periodic reports thereon, in connection with the acquisition of large aeronautical research facilities to support national initiatives in aeronautical research and development. Testimony before this Committee states that construction of two of the three facilities making up this agreed upon facility plan will be initiated with FY 1977 funds, one funded by NASA and one funded by DOD. Testimony further states that NASA plans to fund the final facility beginning in FY 1978. Consequently, the Committee considered this provision unnecessary and accordingly did not include a comparable section in its action on this legislation.

The House adopted, in Sections 10 and 11 of its bill, H.R. 12453, complementary amendments to Sections 102 and 103 of the National Aeronautics and Space Act of 1958 which would broaden NASA's charter to engage in research on ground transportation propulsion systems. The Committee has held no hearings on or received testimony on this amendment to the basic NASA legislation, and consequently, the Committee is not persuaded that this amendment is necessary or appropriate. NASA, in accordance with the general mandate to widely disseminate information under Section 203 (a) (3) of the Act, and with the full encouragement and support of the Committee, has conducted for many years activities designed to apply the research findings and technology advancements emanating from its basic program to non-aerospace national needs. This effort today represents the application of a unique national competence that has grown significantly and that is now an integral part of NASA's program, both on a reimbursable and non-reimbursable basis. The Committee has not had the opportunity to assess the desirability of the assignment to NASA of a direct charter to engage in ground propulsion research and development as opposed to continuing a successful technology transfer and application role in several areas in support of the agency with principal responsibility. Accordingly, the Committee did not adopt this amendment to the Space Act as presented in the House bill.

CHANGES IN EXISTING LAW

In compliance with subsection 4 of Rule XXIX of the Standing Rules of the Senate changes in existing law made by the bill are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

SECTION 5316 OF TITLE 5, UNITED STATES CODE

CHAPTER 53—PAY RATES AND SYSTEMS

SUBCHAPTER II—EXECUTIVE SCHEDULE PAY RATES

§ 5316. Positions at Level V

(1) * * *

[(15) Associate Administrators, National Aeronautics and Space Administration (6)]

(15) Associate Administrators, National Aeronautics and Space Administration (7)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1968

Public Law 90-67 (81 Stat. 170)

SEC. 6. There is hereby established an Aerospace Safety Advisory Panel consisting of a maximum of nine members who shall be appointed by the Administrator for terms of six years each. The Panel shall review safety studies and operations plans referred to it and shall make reports thereon, shall advise the Administrator with respect to the hazards of proposed or existing facilities and proposed operations and with respect to the adequacy of proposed or existing safety standards and shall perform such other duties as the Administrator may request. One member shall be designated by the Panel as its Chairman. Members of the Panel who are officers or employees of the Federal Government shall receive no compensation for their services as such, but shall be allowed necessary travel expenses (or in the alternative, mileage for use of privately owned vehicles and a per diem in lieu of subsistence not to exceed the rates prescribed in 5 U.S.C. 5702, 5704), and other necessary expenses incurred by them in the performance of duties vested in the Panel, without regard to the provisions of subchapter I, chapter 57 of title 5 of the United States Code, the Standardized Government Travel Regulations, or 5 U.S.C. 5731. Members of the Panel appointed from outside the Federal Government shall each receive compensation at [the rate of \$100] a rate not to exceed the per diem rate equivalent to the rate for GS-18 for each day such member is engaged in the actual performance of duties vested in the Panel in addition to reimbursement for travel, subsistence, and other necessary expenses in accordance with the provisions of the foregoing sentence. Not more than four such members shall be chosen from among the officers and employees of the National Aeronautics and Space Administration.

TABULATION OF VOTES CAST IN COMMITTEE

Pursuant to Section 133(b) of the Legislative Reorganization Act of 1946 as amended, the following roll call vote is reported. During the Committee's mark-up of S. 2864, a motion was made by the Senator from New Mexico (Mr. Domenici), and seconded by the Senator from Nevada (Mr. Laxalt), that the Committee adopt the amendments to S. 2864 recommended by the Chairman; that the Committee amend H.R. 12453 by striking everything after the enacting clause and substitute therefor the amended Senate Bill, S. 2864; and that the Committee report H.R. 12453 as amended to the Senate. The roll call vote on the motion was unanimous as follows:

YEAS—10

- | | |
|-------------------|---------------|
| Mr. Moss—Chairman | Mr. Goldwater |
| Mr. Symington | Mr. Domenici |
| Mr. Stennis | Mr. Laxalt |
| Mr. Cannon | Mr. Garn |
| Mr. Ford | |
| Mr. Bumpers | |

NAYS—0

SPACE BUDGETS OF OTHER AGENCIES

(The following table, the source for which is the Office of Management and Budget, shows new budget authority of all Government agencies:)

SPACE ACTIVITIES OF THE U.S. GOVERNMENT—HISTORICAL SUMMARY AND 1977 BUDGET RECOMMENDATIONS
JANUARY 1976¹

[In millions of dollars (may not add due to rounding)]

	NASA		Department of Defense	ERDA	Commerce	Interior	Agriculture	NSF	Total space
	Total	Space ²							
1955.....	56.9	56.9	3.0						59.9
1956.....	72.7	72.7	30.3	7.0				7.3	117.3
1957.....	78.2	78.2	71.0	21.3				8.4	178.5
1958.....	117.3	117.3	205.6	21.3				3.3	347.9
1959.....	305.4	235.4	489.5	34.3					759.2
1960.....	523.6	461.5	560.9	43.3				.1	1,065.8
1961.....	964.0	926.0	813.9	67.7				.6	1,868.2
1962.....	1,824.9	1,796.8	1,298.2	147.8	50.7			1.3	3,294.8
1963.....	3,673.0	3,626.0	1,549.0	213.9	43.2			1.5	5,434.5
1964.....	5,099.7	5,046.3	1,599.3	210.0	2.8			3.0	6,861.4
1965.....	5,249.7	5,167.6	1,573.9	228.6	12.2			3.2	6,985.5
1966.....	5,174.9	5,094.5	1,688.8	186.8	26.5			3.2	6,999.8
1967.....	4,967.6	4,862.2	1,663.6	183.6	29.3			2.8	6,741.5
1968.....	4,588.8	4,452.5	1,921.8	145.1	28.1	0.2	0.5	3.2	6,551.4
1969.....	3,990.9	3,822.0	2,013.0	118.0	20.0	.2	.7	1.9	5,975.8
1970.....	3,745.8	3,547.0	1,678.4	102.8	8.0	1.1	.8	2.4	5,340.5
1971.....	3,311.2	3,101.3	1,512.3	94.8	27.4	1.9	.8	2.4	4,740.9
1972.....	3,306.6	3,071.0	1,407.0	55.2	31.3	5.8	1.6	2.8	4,574.7
1973.....	3,406.2	3,093.2	1,623.0	54.2	39.7	10.3	1.9	2.6	4,824.8
1974.....	* 3,036.9	2,758.5	1,766.0	41.7	60.2	9.0	3.1	1.8	4,640.3
1975.....	* 3,229.1	2,917.3	1,890.7	29.6	64.4	8.3	2.3	2.0	4,914.6
Budget:									
1976 estimate... ³	3,552.8	3,231.8	1,985.9	34.1	70.9	10.4	3.9	2.4	5,339.4
T.O. ⁴ estimate...	931.7	852.6	499.1	8.4	21.9	2.6	1.0	0.6	1,365.2
1977 estimate... ³	3,695.0	3,332.8	2,329.5	34.2	89.8	8.4	4.7	2.4	5,801.8

¹ Historical amounts are estimates based on best data available.
² Excludes amounts for aircraft technology in 1959 and succeeding years. Amounts for NASA-NACA aircraft and space activities not separately identifiable prior to 1959.
³ Adjusted for net offsetting receipts.
⁴ Transitional quarter.

EXECUTIVE COMMUNICATIONS

The following documents constitute the departmental data received by the Committee with reference to the provisions of this bill.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
OFFICE OF THE ADMINISTRATOR,
Washington, D.C., January 21, 1976.

HON. NELSON A. ROCKEFELLER,
President of the Senate,
Washington, D.C.

DEAR MR. PRESIDENT: Submitted herewith is a draft of a bill, "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," together with the sectional analysis thereof. It is submitted to the President of the Senate pursuant to Rule VII of the standing rules of the Senate.

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 1977. For that fiscal year, the bill would authorize appropriations totaling \$3,697,000,000 to be made to the National Aeronautics and Space Administration as follows:

- (1) for "Research and development" amounts totaling \$2,758,925,000;
- (2) for "Construction of facilities" amounts totaling \$124,020,000; and
- (3) for "Research and program management," \$814,055,000.

In addition, the bill would authorize appropriations totaling \$3,700,000,000, to be available October 1, 1977, i.e., in fiscal year 1978.

The enclosed draft bill follows generally the format of the National Aeronautics and Space Administration Authorization Act, 1976 (Public Law 94-39). However, the bill differs in substance from the prior Act in several respects.

First, subsections 1(a), 1(b), and 1(c), which would provide the authorization to appropriate for the three NASA appropriations, differ in the dollar amounts and/or the line items for which authorization to appropriate is requested.

Second, section 7 of P.L. 94-39, which provided authorization for appropriations to be available in the three-month transition period between fiscal years 1976 and 1977, has been deleted.

Third, section 8 of the prior Act, which amended the National Aeronautics and Space Act of 1958 and is, therefore, permanent law, has been omitted.

Fourth, as noted above, in addition to providing authorization of appropriations in the amounts recommended by the President in his Budget for fiscal year 1977, the bill also would provide in section 7

authorization for appropriations to be available in fiscal year 1978. 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 7.

Fifth, section 8 of the bill would amend 5 U.S.C. 5316 by amending paragraph (15) to increase by one (from six to seven) the number of "Associate Administrators, National Aeronautics and Space Administration" which are included in Level V of the Executive Schedule. Enactment of this section of the bill will enable the Administrator of the National Aeronautics and Space Administration to establish a new position of "Associate Administrator/Comptroller" at Level V of the Executive Schedule, in recognition of the fact that under NASA's present organizational arrangements the roles and responsibilities of the Comptroller are comparable in importance and authority to other NASA positions currently included within Level V of the Executive Schedule. Among other things, the NASA Comptroller is responsible for budget preparation, resources control, financial management and overall control of NASA's construction of facilities program.

Sixth, section 9 of the bill would amend the law which established the Aerospace Safety Advisory Panel (Public Law 90-67, August 21, 1967) to permit members of the Panel to be compensated at the same rate NASA is authorized to pay other experts and consultants. Compensation for Panel members is currently limited to \$100 per day, whereas NASA experts and consultants hired pursuant to section 203(c)(9) of the Space Act (42 U.S.C. 2473) may be paid up to the maximum payable to a GS-18 under the General Schedule (approximately \$145). When the \$100 per diem rate for Panel members was originally established, it matched the amount then payable to NASA's experts and consultants. However, the \$100 limit as to experts and consultants was removed from the National Aeronautics and Space Act by section 6 of the NASA FY 1975 Authorization Act (88 Stat. 243). Legislation necessary to effect a similar change in the statute controlling the pay of Aerospace Safety Advisory Panel members was not submitted at that time.

Finally, the last section of the draft bill, section 10, has been changed to provide that the bill, upon enactment, may be cited as the "National Aeronautics and Space Administration Authorization Act, 1977", rather than "1976".

Where required by section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)), environmental impact statements covering NASA installations and the programs to be funded pursuant to the bill have been furnished to the Committee on Aeronautical and Space Sciences.

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 C. FLETCHER,
Administrator.

Enclosure.

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.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby authorized to be appropriated to the National Aeronautics and Space Administration:

- (a) For "Research and development," for the following programs:
- (1) Space Shuttle, \$1,288,100,000;
 - (2) Space flight operations, \$205,200,000;
 - (3) Expendable launch vehicles, \$151,400,000;
 - (4) Physics and astronomy, \$165,800,000;
 - (5) Lunar and planetary exploration, \$191,100,000;
 - (6) Life sciences, \$22,125,000;
 - (7) Space applications, \$198,200,000;
 - (8) Aeronautical research and technology, \$189,100,000;
 - (9) Space research and technology, \$82,000,000;
 - (10) Tracking and data acquisition, \$258,000,000;
 - (11) Technology utilization, \$7,900,000;
- (b) For "Construction of facilities," including land acquisition, as follows:
- (1) Modification for high enthalpy entry facility, Ames Research Center, \$1,220,000;
 - (2) Modification of flight simulator for advanced aircraft, Ames Research Center, \$1,730,000;
 - (3) Construction of supply support facility, Ames Research Center, \$1,540,000;
 - (4) Construction of addition to flight control facility, Hugh L. Dryden Flight Research Center, \$750,000;
 - (5) Construction of addition to lunar sample curatorial facility, Lyndon B. Johnson Space Center, \$2,800,000;
 - (6) Construction of airlock to spin test facility, John F. Kennedy Space Center, \$360,000;
 - (7) Modifications for utility control system, John F. Kennedy Space Center, \$2,445,000;
 - (8) Construction of addition for aeroelastic model laboratory, Langley Research Center, \$730,000;
 - (9) Construction of data reduction center annex, Langley Research Center, \$2,970,000;
 - (10) Construction of refuse-fired steam generating facility, Langley Research Center, \$2,485,000;
 - (11) Modification of refrigeration system, electric propulsion laboratory, Lewis Research Center, \$680,000;
 - (12) Rehabilitation of combustion air drying system, engine research building, Lewis Research Center, \$1,490,000;
 - (13) Large aeronautical facility: construction of national transonic facility, Langley Research Center, \$25,000,000;
 - (14) Space Shuttle facilities at various locations as follows:
 - (A) Construction of Orbiter processing facility, John F. Kennedy Space Center, \$3,750,000;
 - (B) Modifications to launch complex 39, John F. Kennedy Space Center, \$19,855,000;

(C) Modifications for solid rocket booster processing facilities, John F. Kennedy Space Center, \$9,700,000;

(D) Construction of Shuttle/Carrier aircraft mating facility, John F. Kennedy Space Center, \$2,050,000;

(E) Modifications for crew training facilities, Lyndon B. Johnson Space Center, \$780,000;

(F) Rehabilitation and modification of Shuttle facilities, at various locations, \$1,760,000;

(G) Modification of manufacturing and final assembly facilities for external tanks, Michoud Assembly Facility, \$1,930,000;

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

(A) Modifications to operations and checkout building for Spacelab, John F. Kennedy Space Center, \$3,570,000;

(B) Modifications and addition for Shuttle payload development, Goddard Space Flight Center, \$770,000;

(16) Rehabilitation and modification of facilities at various locations, not in excess of \$500,000 per project, \$17,875,000;

(17) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$250,000 per project, \$5,125,000;

(18) Facility planning and design not otherwise provided for, \$12,655,000.

(c) For "Research and program management," \$814,055,000, and such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

(d) Notwithstanding the provisions of subsection 1(g), appropriations for "Research and development" 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" 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 \$250,000, unless the Administrator or his 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 Aeronautical and Space Sciences of the Senate of the nature, location, and estimated cost of such facility.

(e) When so specified in an appropriation Act, (1) any amount appropriated for "Research and development" 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.

(f) Appropriations made pursuant to subsection 1(c) may be used, but not to exceed \$35,000, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator and his determination shall be final and conclusive upon the accounting officers of the Government.

(g) Of the funds appropriated pursuant to subsections 1(a) and 1(c), not in excess of \$25,000 for each project, including collateral equipment, may be used for construction of new facilities and additions to existing facilities, and not in excess of \$50,000 for each project, including collateral equipment, may be used for rehabilitation or modification of facilities: *Provided*, That of the funds appropriated pursuant to subsection 1(a), not in excess of \$250,000 for each project including collateral equipment, may be used for any of the foregoing for unforeseen programmatic needs.

SEC. 2. Authorization is hereby granted whereby any of the amounts prescribed in paragraphs (1) through (17), inclusive, of subsection 1(b)—

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

(2) 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 Aeronautical and Space Sciences 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. 3. Not to exceed one-half of 1 per centum of the funds appropriated pursuant to subsection 1(a) hereof may be transferred to the "Construction of facilities" appropriation, and, when so transferred, together with \$10,000,000 of the funds appropriated pursuant to subsection 1(b) hereof (other than funds appropriated pursuant to paragraph (18) of such subsection) shall be available for expenditure to construct, expand, or modify laboratories and other installations at any location (including locations specified in subsection 1(b)), 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) he 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) a period of thirty days has passed after the Administrator or his 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 Aeronautical and Space Sciences of the Senate a written report containing a full and complete statement concerning (1) the nature of such construction, expansion or modification, (2) the cost thereof including the cost of any real estate action pertaining thereto, and (3) the reason why such construction, expansion, or modification is necessary in the national interest, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 4. 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 Aeronautical and Space Sciences,

(2) no amounts appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by sections 1(a) and 1(c), and

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented to or requested of either such committee,

unless (A) 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 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, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 5. 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. 6. The National Aeronautics and Space Administration is authorized, when so provided in an appropriation Act, to enter into a contract for tracking and data relay satellite services. Such services shall be furnished to the National Aeronautics and Space Administration in accordance with applicable authorization and appropriation Acts. The Government shall incur no costs under such contract prior to the furnishing of such services except that the contract may provide for the payment for contingent liability of the Government which may accrue in the event the Government should decide for its convenience to terminate the contract before the end of the period of the contract. Facilities which may be required in the performance of the contract may be constructed on Government-owned lands if there is included in

the contract a provision under which the Government may acquire title to the facilities, under terms and conditions agreed upon in the contract, upon termination of the contract.

The Administrator shall in January of each year report to the Committee on Science and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Aeronautical and Space Sciences and the Committee on Appropriations of the Senate the projected aggregate contingent liability of the Government under termination provisions of any contract authorized in this section through the next fiscal year. The authority of the National Aeronautics and Space Administration to enter into and to maintain the contract authorized hereunder shall remain in effect as long as provision therefor is included in Acts authorizing appropriations to the National Aeronautics and Space Administration for subsequent fiscal years.

SEC. 7. In addition to the amounts authorized to be appropriated under section 1 of this Act, there is hereby authorized to be appropriated to the National Aeronautics and Space Administration, to be available no earlier than October 1, 1977:

- (a) For "Research and development," \$2,708,000,000;
 - (b) For "Construction of facilities," \$175,000,000;
 - (c) For "Research and program management," \$817,000,000,
- and such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

All of the limitations and other provisions of this Act which are applicable to amounts appropriated pursuant to subsections (a), (b), and (c) of section 1 of this Act shall apply in the same manner to amounts appropriated pursuant to subsections (a), (b), and (c), respectively, of this section.

SEC. 8. Paragraph (15) of section 5316, title 5, United States Code, is amended by striking out "(6)" and inserting in lieu thereof "(7)".

SEC. 9. Section 6 of the National Aeronautics and Space Administration Authorization Act, 1968 (81 Stat. 170), is amended by striking out the words "the rate of \$100" and inserting in lieu thereof the words "a rate not to exceed the per diem rate equivalent to the rate for GS-18".

SEC. 10. This Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1977".

SECTION-BY-SECTION ANALYSIS

Section 1. Subsections (a), (b), and (c) authorize to be appropriated to the National Aeronautics and Space Administration funds, in the total amount of \$3,696,850,000, as follows: (a) for "Research and development," a total of 11 program line items aggregating the sum of \$2,759,125,000; (b) for "Construction of facilities," a total of 18 line items aggregating the sum of \$123,670,000; and (c) for "Research and program management," \$814,055,000. Subsection (c) 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.

Subsection 1(d) authorizes the use of appropriations for "Research and development" without regard to the provisions of subsection 1(g) 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 non-profit 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 may be used for the construction of a facility in accordance with the subsection the estimated cost of which, including collateral equipment, exceeds \$250,000, 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 1(e) provides that, when so specified in an appropriation Act, (1) any amount appropriated for "Research and development" 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 1(f) authorizes the use of not to exceed \$35,000 of the "Research and program management" appropriation for scientific consultations or extraordinary expenses, including representation and official entertainment expenses, upon the authority of the Administrator, whose determination shall be final and conclusive.

Subsection 1(g) provides that of the funds appropriated for "Research and development" and "Research and program management," not in excess of \$25,000 per project (including collateral equipment) may be used for construction of new, or additions to existing, facilities, and not in excess of \$50,000 per project (including collateral equipment) may be used for rehabilitation or modification of existing facilities; however, of the funds appropriated for "Research and development," not in excess of \$250,000 per project (including collateral equipment) may be used for construction of new facilities or additions to, or rehabilitation or modification of, existing facilities required for unforeseen programmatic needs.

Section 2. Section 2 authorizes upward variations of the sums authorized for the "Construction of facilities" line items (other than facility planning and design) of 10 per centum in the discretion of the Administrator or his designee, or 25 per centum 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

Aeronautical and Space Sciences 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" under subsection 1(b), paragraphs (1) through (17).

Section 3. Section 3 provides that not more than one-half of 1 per centum of the funds appropriated for "Research and development" may be transferred to the "Construction of facilities" appropriation and, when so transferred, together with \$10,000,000 of the funds appropriated for "Construction of facilities," shall be available for the construction of facilities and land acquisition at any location if (1) the Administrator determines that such action is necessary because of changes in the 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 necessary in the national interest, or each such committee before the expiration of such 30-day period has notified the Administrator that no objection to the proposed action will be made.

Section 4. Section 4 provides 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 Aeronautical and Space Sciences;

(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 subsections 1(a) and 1(c); and,

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented to or requested of either such committee,

unless (A) a period of 30 days has passed after 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, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

Section 5. Section 5 expresses 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 6. Section 6 authorizes the National Aeronautics and Space Administration, when so provided in an appropriation Act, to enter into a contract (or contracts) for tracking and data relay satellite services. The Government would incur no costs under such contract prior to the furnishing of such services except that the contract could provide for the payment for contingent liability of the Government which may accrue in the event the Government should decide for its convenience to terminate the contract before the expiration of the contract period. Such tracking and data relay satellite services would be furnished to the Administration in accordance with applicable authorization and appropriation Acts. It is envisaged that facilities may be required to be provided under such a contract in order to provide such services. The bill would authorize the construction of such facilities on Government-owned land if there is included in the contract a provision under which the United States may, in accordance with terms and conditions agreed upon in the contract, acquire title to the facilities upon contract termination. In January of each year the Administrator would be required to report to the Committee on Science and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Aeronautical and Space Sciences and the Committee on Appropriations of the Senate the projected aggregate contingent liability, through the next fiscal year, of the Government under termination provisions of any contract authorized under this section. It is specified that the authority of the National Aeronautics and Space Administration to enter into and maintain the contract (or contracts) authorized in this section shall remain in effect as long as provision therefor is included in acts authorizing appropriations to the National Aeronautics and Space Administration for subsequent fiscal years.

Section 7. Section 7 amends 5 U.S.C. 5316 by amending paragraph (15) to increase by one (from six to seven) the number of "Associate Administrators, National Aeronautics and Space Administration" which are included in Level V of the Executive Schedule.

Enactment of the bill will enable the Administrator of the National Aeronautics and Space Administration to establish a new position of "Associate Administrator/Comptroller" at Level V of the Executive Schedule, in recognition of the fact that under NASA's present organizational arrangements the roles and responsibilities of the Comptroller are comparable in importance and authority to other NASA positions currently included within Level V of the Executive Schedule.

Section 8. Section 8 amends section 6 of the National Aeronautics and Space Administration Authorization Act, 1968 (81 Stat. 170), to remove the limit of \$100 per diem payable to members of the Aerospace Safety Advisory Panel, and substitute therefor a provision that such members may be paid at a rate not in excess of the daily rate paid to a GS-18.

Section 9. Section 9 provides that the Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1977".

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION, FISCAL YEAR 1977

MAY 17, 1976.—Ordered to be printed

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

CONFERENCE REPORT

[To accompany H.R. 12453]

The committee of conference on the disagreeing votes of the two Houses on the amendment of the Senate to the bill (H.R. 12453) 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 there is hereby authorized to be appropriated to the National Aeronautics and Space Administration:

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

- (1) Space Shuttle, \$1,288,100,000;
- (2) Space flight operations, \$202,700,000;
- (3) Expendable launch vehicles, \$151,400,000;
- (4) Physics and astronomy, \$166,300,000;
- (5) Lunar and planetary exploration, \$192,100,000;
- (6) Life sciences, \$22,125,000;
- (7) Space applications, \$198,000,000;
- (8) Earth resources operational systems, \$200,000;
- (9) Aeronautical research and technology, \$191,100,000;
- (10) Space research and technology, \$86,300,000;
- (11) Tracking and data acquisition, \$255,000,000;
- (12) Technology utilization, \$8,100,000.

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

- (1) Modification for high enthalpy entry facility, Ames Research Center, \$1,220,000;

- (2) Modification of flight simulator for advanced aircraft, Ames Research Center, \$1,730,000;
- (3) Construction of supply support facility, Ames Research Center, \$1,540,000;
- (4) Construction of addition to flight control facility, Hugh L. Dryden Flight Research Center, \$750,000;
- (5) Construction of addition to lunar sample curatorial facility, Lyndon B. Johnson Space Center, \$2,200,000;
- (6) Construction of airlock to spin test facility, John F. Kennedy Space Center, \$360,000;
- (7) Modifications for utility control system, John F. Kennedy Space Center, \$2,445,000;
- (8) Construction of addition for aeroelastic model laboratory, Langley Research Center, \$730,000;
- (9) Construction of data reduction center annex, Langley Research Center, \$2,970,000;
- (10) Construction of refuse-fired steam generating facility, Langley Research Center, \$2,485,000;
- (11) Modification of refrigeration system, electric propulsion laboratory, Lewis Research Center, \$680,000;
- (12) Rehabilitation of combustion air drying system, engine research building, Lewis Research Center, \$1,490,000;
- (13) Large aeronautical facility: construction of national transonic facility, Langley Research Center, \$25,000,000;
- (14) Space Shuttle facilities at various locations as follows:
- (A) Construction of Orbiter processing facility, John F. Kennedy Space Center, \$3,750,000;
- (B) Modifications to launch complex 39, John F. Kennedy Space Center, \$18,855,000;
- (C) Modification for solid rocket booster processing facilities, John F. Kennedy Space Center, \$8,700,000;
- (D) Construction of Shuttle/Carrier aircraft mating facility, John F. Kennedy Space Center, \$1,700,000;
- (E) Rehabilitation and modification of Shuttle facilities, at various locations, \$1,760,000;
- (F) Modification of manufacturing and final assembly facilities for external tanks, Michoud Assembly Facility, \$1,930,000;
- (15) Space Shuttle payload facilities at various locations as follows:
- (A) Modifications to operations and checkout building for Spacelab, John F. Kennedy Space Center, \$3,570,000;
- (B) Modifications and addition for Shuttle payload development, Goddard Space Flight Center, \$770,000;
- (16) Rehabilitation and modification of facilities at various locations, not in excess of \$500,000 per project, \$17,875,000;
- (17) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$250,000 per project, \$5,125,000;
- (18) Facility planning and design not otherwise provided for, \$12,655,000.
- (c) For "Research and program management," \$813,455,000, and such additional or supplemental amounts as may be necessary for in-

creases in salary, pay, retirement, or other employee benefits authorized by law.

(d) Notwithstanding the provisions of subsection 1(g), appropriations for "Research and development" 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" 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 \$250,000, unless the Administrator or his 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 Aeronautical and Space Sciences of the Senate of the nature, location, and estimated cost of such facility.

(e) When so specified in an appropriation Act, (1) any amount appropriated for "Research and development" 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.

(f) Appropriations made pursuant to subsection 1(c) may be used, but not to exceed \$35,000, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator and his determination shall be final and conclusive upon the accounting officers of the Government.

(g) Of the funds appropriated pursuant to subsections 1(a) and 1(c), not in excess of \$25,000 for each project, including collateral equipment, may be used for construction of new facilities and additions to existing facilities, and not in excess of \$50,000 for each project, including collateral equipment, may be used for rehabilitation or modification of facilities: Provided, That of the funds appropriated pursuant to subsection 1(a), not in excess of \$250,000 for each project, including collateral equipment, may be used for any of the foregoing for unforeseen programmatic needs.

SEC. 2. Authorization is hereby granted whereby any of the amounts prescribed in paragraphs (1) through (17), inclusive, of subsection 1(b) —

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

(2) 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 Aeronautical and Space Sciences 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. 3. Not to exceed one-half of 1 per centum of the funds appropriated pursuant to subsection 1(a) hereof may be transferred to the "Construction of facilities" appropriation, and, when so transferred, together with \$10,000,000 of the funds appropriated pursuant to subsection 1(b) hereof (other than funds appropriated pursuant to paragraph (18) of such subsection) shall be available for expenditure to construct, expand, or modify laboratories and other installations at any location (including locations specified in subsection 1(b)), 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) he 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) a period of thirty days has passed after the Administrator or his 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 Aeronautical and Space Sciences of the Senate a written report containing a full and complete statement concerning (1) the nature of such construction, expansion, or modification, (2) the cost thereof including the cost of any real estate action pertaining thereto, and (3) the reason why such construction, expansion, or modification is necessary in the national interest, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 4. 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 Aeronautical and Space Sciences,

(2) no amounts appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by sections 1(a) and 1(c), and

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented to or requested of either such committee,

unless (A) 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 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, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 5. 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. 6. The National Aeronautics and Space Administration is authorized, when so provided in an appropriation Act, to enter into a contract for tracking and data relay satellite services. Such services shall be furnished to the National Aeronautics and Space Administration in accordance with applicable authorization and appropriations Acts. The Government shall incur no costs under such contract prior to the furnishing of such services except that the contract may provide for the payment for contingent liability of the Government which may accrue in the event the Government should decide for its convenience to terminate the contract before the end of the period of the contract. Facilities which may be required in the performance of the contract may be constructed on Government-owned lands if there is included in the contract a provision under which the Government may acquire a title to the facilities, under terms and conditions agreed upon in the contract, upon termination of the contract.

The Administrator shall in January of each year report to the Committee on Science and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Aeronautical and Space Sciences and the Committee on Appropriations of the Senate the projected aggregate contingent liability of the Government under termination provisions of any contract authorized in this section through the next fiscal year. The authority of the National Aeronautics and Space Administration to enter into and to maintain the contract authorized hereunder shall remain in effect as long as provision therefor is included in Acts authorizing appropriations to the National Aeronautics and Space Administration for subsequent fiscal years.

SEC. 7. Paragraph (15) of section 5316, title 5, United States Code, is amended by striking out "(6)" and inserting in lieu thereof "(7)".

SEC. 8. Section 6 of the National Aeronautics and Space Administration Authorization Act, 1968 (81 Stat. 170), is amended by striking out the words "the rate of \$100" and inserting in lieu thereof the words "a rate not to exceed the per diem rate equivalent to the rate for GS-18".

SEC. 9. This Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1977".

And the Senate agree to the same.

FRANK E. MOSS,
JOHN C. STENNIS,
WENDELL H. FORD,
BARRY GOLDWATER,
PETE V. DOMENICI,

Managers on the Part of the Senate.

OLIN E. TEAGUE,
THOMAS N. DOWNING,
DON FUQUA,
JIM SYMINGTON,
ROBERT A. ROE,
DALE MILFORD,
JAMES SCHEUER,
C. A. MOSHER,
LARRY WINN, JR.,

Managers on the Part of the House.

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. 12453) to authorize appropriations to the National Aeronautics and Space Administration for fiscal year 1977 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 effect of the action agreed upon by the Managers and recommended in the accompanying conference report.

The NASA request for fiscal year 1977 totaled \$3,697,000,000. The House authorized \$3,696,070,000 and the Senate amendment authorized \$3,696,850,000. The committee of conference agrees to a total authorization for fiscal year 1977 of \$3,695,170,000 as follows:

FISCAL YEAR 1977—SUMMARY

	Budget request	House	Senate	Committee of conference
Research and development:				
Space Shuttle.....	\$1,288,100,000	\$1,288,100,000	\$1,288,100,000	\$1,288,100,000
Space flight operations.....	205,200,000	198,200,000	205,200,000	202,700,000
Expendable launch vehicles.....	151,400,000	151,400,000	151,400,000	151,400,000
Physics and astronomy.....	165,800,000	169,800,000	165,800,000	166,300,000
Lunar and planetary exploration.....	191,100,000	193,100,000	191,100,000	192,100,000
Life sciences.....	22,125,000	22,125,000	22,125,000	22,125,000
Space applications.....	198,200,000	185,700,000	198,200,000	198,000,000
Earth resources operational systems.....	0	13,500,000	0	200,000
Aeronautical research and technology.....	189,100,000	192,100,000	189,100,000	191,100,000
Space research and technology.....	82,000,000	92,100,000	82,000,000	86,300,000
Tracking and data acquisition.....	258,000,000	254,000,000	258,000,000	255,000,000
Technology utilization.....	7,900,000	8,400,000	8,100,000	8,100,000
Total.....	2,758,925,000	2,768,525,000	2,759,125,000	2,761,425,000
Construction of facilities.....	124,020,000	117,090,000	123,670,000	120,290,000
Research and program management.....	814,055,000	810,455,000	814,055,000	813,455,000
Grand total.....	3,697,000,000	3,696,070,000	3,696,850,000	3,695,170,000

The points in disagreement and the conference resolution of them are as follows:

1. The House authorized \$198,200,000 for the Space flight operations program, a reduction of \$7,000,000 in the NASA request, the net result of an \$8,000,000 reduction in the Development, Test and Mission Operations subprogram and a \$1,000,000 addition to the Advanced Programs subprogram activity.

The Senate authorized \$205,200,000, identical with the NASA request for this program.

The conference substitute authorizes \$202,700,000 for the Space flight operations program.

The conferees agree that NASA should apply \$500,000 additional to its planned effort for advanced programs to improve the structuring

and development of this activity in support of future space programs thereby increasing the total amount for fiscal year 1977 from \$18,000,000 to \$18,500,000.

2. NASA requested \$165,800,000 for the Physics and astronomy program. The house authorized \$169,800,000 increasing the request by \$3,000,000 to initiate the development program for the Space Telescope by \$1,000,000 for additional supporting research and technology effort.

The Senate authorized the NASA request.

The conference substitute authorizes \$166,300,000.

The committee of conference, recognizing the significance of the Space Telescope to ongoing research in astronomy, agrees that the initiation of this project has the highest priority in the space science program and, therefore, authorizes NASA to complete the competitive detailed design phase and to proceed with development activities, the latter subject to the availability of appropriations. The conferees further agree that an additional \$500,000 is to be applied to supporting research and technology activities to help assure the viability of future research in physics and astronomy.

3. The House authorized \$193,100,000 for the Lunar and planetary program increasing the NASA request for the Planetary Advanced Studies activity by \$2,000,000 to provide for definition studies for a Jupiter-Orbiter mission.

The Senate authorized \$191,100,000, the NASA request.

The conference substitute authorizes \$192,100,000.

The conferees agree that NASA should give particular attention to formulating and presenting new initiatives to reverse the "going out of business" trend apparent in this program and accordingly added \$1,000,000 to be applied to studies for this purpose.

4. NASA requested \$198,200,000 for the Space applications program.

The House authorized \$185,700,000 transferring the Landsat-C spacecraft project and the \$13,500,000 associated therewith to a new program entitled, "Earth Resources Operational Systems". The House also added \$1,000,000 to the severe storm research subprogram activity.

The Senate authorized the NASA request of \$198,200,000.

The conference substitute authorizes \$198,000,000 for the Space applications program.

The conferees agree that the Landsat-C spacecraft development program should be continued in the Space applications program as presented in the NASA budget request.

5. The House established a new program entitled, "Earth Resources Operational Systems" not included in the NASA request, and authorized \$13,500,000 for the program to include those activities associated with the Landsat-C development project.

The Senate did not have a comparable line item program in its amendment to the bill.

The conference substitute establishes a new research and development line item in the bill entitled, "Earth Resources Operational Systems" and authorizes \$200,000 therefor.

The conferees agree that the Landsat earth resources satellite technology project has reached a state of maturity wherein it is necessary to facilitate arrangements for an operational version of the Landsat

system and provide for early activities that would initiate transition to an operational mode. This new program is established for this purpose.

6. NASA requested \$189,100,000 for the Aeronautical research and technology program.

The House authorized \$192,100,000 increasing the request by \$3,000,000 to accelerate the Variable Cycle Engine Components Technology program.

The Senate authorized the NASA request for this program.

The conference substitute authorizes \$191,100,000 for the Aeronautical research and technology program.

7. The House authorized \$92,100,000 for the Space research and technology program, an increase of \$10,100,000 in the NASA request, of which \$1,600,000 was for increased rocket engine propulsion technology effort, \$3,500,000 was for energy technology identification and verification activity and \$5,000,000 was to significantly broaden the system definition effort on solar satellite power systems.

The Senate authorized \$82,000,000, identical with the NASA request.

The conference substitute authorizes \$86,300,000.

The conferees note that NASA has a significant capability which can and should be fully utilized in the Nation's program to achieve energy self-sufficiency. Tapping this capability requires a basic effort to identify and verify those initiatives that may have a potential contribution to this national need. This identification and verification activity, sometimes referred to as "seed money", is considered to be an appropriate and necessary function within NASA and the conferees direct NASA to continue this productive activity that it initiated in prior years. To this end the conferees agree that \$3,500,000 in the Space research and technology program is to be allocated to this activity. Furthermore, the conferees agree that \$800,000 of additional effort should be applied to advanced rocket engine propulsion technology.

8. The House authorized \$254,000,000 for the Tracking and data acquisition program, a reduction of \$4,000,000 in the NASA request.

The Senate authorized the NASA request of \$258,000,000.

The conference substitute authorizes \$255,000,000 for the Tracking and data acquisition program.

9. NASA requested \$7,900,000 for the Technology utilization program. The House added \$500,000 for greater emphasis on industrial and technology applications, authorizing a total of \$8,400,000 for the program.

The Senate authorized \$8,100,000 increasing the NASA request by \$200,000 to initiate one additional regional application center.

The committee of conference adopts the Senate position.

10. NASA requested \$2,800,000 for the construction of an addition to the Lunar Curatorial Facility at the Lyndon B. Johnson Space Center.

The House did not authorize this facility item in its bill.

The Senate authorized the facility at the requested amount of \$2,800,000.

The conference substitute authorizes \$2,200,000 for the construction of an addition to the Lunar Sample Curatorial Facility.

11. The House authorized \$17,855,000 for the third phase of modifications to Launch complex 39, John F. Kennedy Space Center, in support of the Space Shuttle program, a reduction of \$2,000,000 in the NASA request for this facility project.

The Senate authorized the NASA request of \$19,855,000 for Launch complex 39 modifications.

The conference substitute authorizes \$18,855,000.

12. NASA requested \$9,700,000 for the second phase of facilities for processing the solid rocket booster for the Space Shuttle program at the John F. Kennedy Space Center. The House authorized \$8,700,000, a reduction of \$1,000,000 in the NASA request.

The Senate authorized \$9,700,000 as requested by NASA.

The committee of conference adopts the House position authorizing \$8,700,000 for this facility item.

13. NASA requested \$780,000 for crew training facility for the Space Shuttle program at the Lyndon B. Johnson Space Center.

The House did not authorize this facility, believing that existing facilities at the Marshall Space Flight Center could be used during the design, development, test and engineering phase of the Shuttle program, and therefore that this facility item could be deferred.

The Senate authorized the construction of this facility item at the requested amount of \$780,000.

The conference substitute does not provide for the construction of this crew training facility.

The conferees agree that the location of such a crew training facility should be restudied giving greater consideration to locations of primary activities associated with a fully operational Shuttle program as anticipated in the early 1980's and beyond. Until a thorough review of this matter is made the conferees request that all action on the construction of or modifications for any such crew training capability be deferred.

14. NASA requested \$814,055,000 for the Research and Program Management appropriations category. The House authorized \$810,455,000, a reduction of \$3,600,000 in the request.

The Senate authorized \$814,055,000, identical with the NASA request.

The conference substitute authorizes \$813,455,000 for the Research and Program Management activity.

15. The House included, as Section 9 in its bill, a sense of the Congress statement emphasizing its concern for the need to expedite the completion of large aeronautical research facilities noting the importance of these facilities to U.S. dominance in the field of aeronautics.

This provision was not included in the NASA authorization request to the Congress.

The Senate did not include this provision in its amendment to the bill.

The conference substitute does not include this provision.

16. The House adopted a section 10 in its bill amending section 102 of the National Aeronautics and Space Act of 1958 enlarging its policy and purpose by declaring that the general welfare requires that the unique competence in science and engineering systems of NASA also should be directed toward ground propulsion research and development.

There was no comparable provision included in the NASA authorization request for fiscal year 1977.

The Senate did not include this provision in its amendment to the House bill.

The conference substitute adopts the Senate position.

17. The House bill included a section 11, complementary to its amendment to the National Aeronautics and Space Act of 1958 adopted in Section 10 of its bill, which defined the term "ground propulsion system".

The Senate did not include this provision in its amendment to the House bill.

The conference substitute does not have a comparable provision inasmuch as the basic amendment was not adopted and, therefore, this complementary amendment is not necessary.

FRANK E. MOSS,
JOHN C. STENNIS,
WENDELL H. FORD,
BARRY GOLDWATER,
PETE V. DOMENICI,

Managers on the Part of the Senate.

OLIN E. TEAGUE,
THOMAS N. DOWNING,
DON FUQUA,
JIM SYMINGTON,
ROBERT A. ROE,
DALE MILFORD,
JAMES SCHEUER,
C. A. MOSHER,
LARRY WINN, JR.,

Managers on the Part of the House.

○

Ninety-fourth Congress of the United States of America

AT THE SECOND SESSION

*Begun and held at the City of Washington on Monday, the nineteenth day of January,
one thousand nine hundred and seventy-six*

An Act

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.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby authorized to be appropriated to the National Aeronautics and Space Administration:

- (a) For "Research and development," for the following programs:
- (1) Space Shuttle, \$1,288,100,000;
 - (2) Space flight operations, \$202,700,000;
 - (3) Expendable launch vehicles, \$151,400,000;
 - (4) Physics and astronomy, \$166,300,000;
 - (5) Lunar and planetary exploration, \$192,100,000;
 - (6) Life sciences, \$22,125,000;
 - (7) Space applications, \$198,000,000;
 - (8) Earth resources operational systems, \$200,000;
 - (9) Aeronautical research and technology, \$191,100,000;
 - (10) Space research and technology, \$86,300,000;
 - (11) Tracking and data acquisition, \$255,000,000;
 - (12) Technology utilization, \$8,100,000.
- (b) For "Construction of facilities," including land acquisition, as follows:
- (1) Modification for high enthalpy entry facility, Ames Research Center, \$1,220,000;
 - (2) Modification of flight simulator for advanced aircraft, Ames Research Center, \$1,730,000;
 - (3) Construction of supply support facility, Ames Research Center, \$1,540,000;
 - (4) Construction of addition to flight control facility, Hugh L. Dryden Flight Research Center, \$750,000;
 - (5) Construction of addition to lunar sample curatorial facility, Lyndon B. Johnson Space Center, \$2,200,000;
 - (6) Construction of airlock to spin test facility, John F. Kennedy Space Center, \$360,000;
 - (7) Modifications for utility control system, John F. Kennedy Space Center, \$2,445,000;
 - (8) Construction of addition for aeroelastic model laboratory, Langley Research Center, \$730,000;
 - (9) Construction of data reduction center annex, Langley Research Center, \$2,970,000;
 - (10) Construction of refuse-fired steam generating facility, Langley Research Center, \$2,485,000;
 - (11) Modification of refrigeration system, electric propulsion laboratory, Lewis Research Center, \$680,000;
 - (12) Rehabilitation of combustion air drying system, engine research building, Lewis Research Center, \$1,490,000;
 - (13) Large aeronautical facility: construction of national transonic facility, Langley Research Center, \$25,000,000;

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

(A) Construction of Orbiter processing facility, John F. Kennedy Space Center, \$3,750,000;

(B) Modifications to launch complex 39, John F. Kennedy Space Center, \$18,855,000;

(C) Modification for solid rocket booster processing facilities, John F. Kennedy Space Center, \$8,700,000;

(D) Construction of Shuttle/Carrier aircraft mating facility, John F. Kennedy Space Center, \$1,700,000;

(E) Rehabilitation and modification of Shuttle facilities, at various locations, \$1,760,000;

(F) Modification of manufacturing and final assembly facilities for external tanks, Michoud Assembly Facility, \$1,930,000;

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

(A) Modifications to operations and checkout building for Spacelab, John F. Kennedy Space Center, \$3,570,000;

(B) Modifications and addition for Shuttle payload development, Goddard Space Flight Center, \$770,000;

(16) Rehabilitation and modification of facilities at various locations, not in excess of \$500,000 per project, \$17,875,000;

(17) Minor construction of new facilities and additions to existing facilities at various locations, not in excess of \$250,000 per project, \$5,125,000;

(18) Facility planning and design not otherwise provided for, \$12,655,000.

(c) For "Research and program management," \$813,455,000, and such additional or supplemental amounts as may be necessary for increases in salary, pay, retirement, or other employee benefits authorized by law.

(d) ~~Notwithstanding the provisions~~ of subsection 1(g), appropriations for "Research and development" 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" 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 \$250,000, unless the Administrator or his 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 Aeronautical and Space Sciences of the Senate of the nature, location, and estimated cost of such facility.

(e) When so specified in an appropriation Act, (1) any amount appropriated for "Research and development" 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.

(f) Appropriations made pursuant to subsection 1(c) may be used, but not to exceed \$35,000, for scientific consultations or extraordinary expenses upon the approval or authority of the Administrator and his determination shall be final and conclusive upon the accounting officers of the Government.

(g) Of the funds appropriated pursuant to subsections 1(a) and 1(c), not in excess of \$25,000 for each project, including collateral equipment, may be used for construction of new facilities and additions to existing facilities, and not in excess of \$50,000 for each project, including collateral equipment, may be used for rehabilitation or modification of facilities: *Provided*, That of the funds appropriated pursuant to subsection 1(a), not in excess of \$250,000 for each project, including collateral equipment, may be used for any of the foregoing for unforeseen programmatic needs.

SEC. 2. Authorization is hereby granted whereby any of the amounts prescribed in paragraphs (1) through (17), inclusive, of subsection 1(b)—

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

(2) 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 Aeronautical and Space Sciences 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. 3. Not to exceed one-half of 1 per centum of the funds appropriated pursuant to subsection 1(a) hereof may be transferred to the "Construction of facilities" appropriation, and, when so transferred, together with \$10,000,000 of the funds appropriated pursuant to subsection 1(b) hereof (other than funds appropriated pursuant to paragraph (18) of such subsection) shall be available for expenditure to construct, expand, or modify laboratories and other installations at any location (including locations specified in subsection 1(b)), 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) he 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) a period of thirty days has passed after the Administrator or his 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 Aeronautical and Space Sciences of the Senate a written report containing a full and complete statement concerning (1) the nature of such construction, expansion, or modification, (2) the cost thereof

including the cost of any real estate action pertaining thereto, and (3) the reason why such construction, expansion, or modification is necessary in the national interest, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 4. 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 Aeronautical and Space Sciences,

(2) no amounts appropriated pursuant to this Act may be used for any program in excess of the amount actually authorized for that particular program by sections 1(a) and 1(c), and

(3) no amount appropriated pursuant to this Act may be used for any program which has not been presented to or requested of either such committee,

unless (A) 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 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, or (B) each such committee before the expiration of such period has transmitted to the Administrator written notice to the effect that such committee has no objection to the proposed action.

SEC. 5. 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. 6. The National Aeronautics and Space Administration is authorized, when so provided in an appropriation Act, to enter into a contract for tracking and data relay satellite services. Such services shall be furnished to the National Aeronautics and Space Administration in accordance with applicable authorization and appropriations Acts. The Government shall incur no costs under such contract prior to the furnishing of such services except that the contract may provide for the payment for contingent liability of the Government which may accrue in the event the Government should decide for its convenience to terminate the contract before the end of the period of the contract. Facilities which may be required in the performance of the contract may be constructed on Government-owned lands if there is included in the contract a provision under which the Government may acquire a title to the facilities, under terms and conditions agreed upon in the contract, upon termination of the contract.

The Administrator shall in January of each year report to the Committee on Science and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Aeronautical and Space Sciences and the Committee on Appropriations of the Senate the projected aggregate contingent liability of the Government under termination provisions of any contract authorized in this section through the next fiscal year. The authority of the National Aeronautics and Space Administration to enter into and to maintain the contract authorized hereunder shall remain in effect as long as provision therefor is included in Acts authorizing appropriations to the National Aeronautics and Space Administration for subsequent fiscal years.

H. R. 12453—5

SEC. 7. Paragraph (15) of section 5316, title 5, United States Code, is amended by striking out "(6)" and inserting in lieu thereof "(7)".

SEC. 8. Section 6 of the National Aeronautics and Space Administration Authorization Act, 1968 (81 Stat. 170), is amended by striking out the words "the rate of \$100" and inserting in lieu thereof the words "a rate not to exceed the per diem rate equivalent to the rate for GS-18".

SEC. 9. This Act may be cited as the "National Aeronautics and Space Administration Authorization Act, 1977".

Speaker of the House of Representatives.

*Vice President of the United States and
President of the Senate.*

May 26, 1976

Dear Mr. Director:

The following bills were received at the White House on May 26th:

H.R. 8719
H.R. 12453 ✓

Please let the President have reports and recommendations as to the approval of these bills as soon as possible.

Sincerely,

Robert D. Linder
Chief Executive Clerk

The Honorable James T. Lynn
Director
Office of Management and Budget
Washington, D.C.