National Aeronautics and Space Administration

BUDGET ESTIMATES

FISCAL YEAR 1973

Volume III

RESEARCH AND PROGRAM MANAGEMENT

SPECIAL ANALYSES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

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RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

GENERAL STATEMENT

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:

Provide the civil service staff necessary for in-house research, and to plan, manage, and support the Research and Development programs.

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.

The following table summarizes the distribution of the Research and Program Management appropriation by installation:

SUMMARY OF OBLIGATIONS BY INSTALLATION

	1971	1972	1973
MANNED SPACE FLIGHT	$346,510,000	$345,157,000	$327,767,000
John F. Kennedy Space Center	98,338,000	92,022,000	89,253,000
Manned Spacecraft Center	111,132,000	110,056,000	106,891,000
Marshall Space Flight Center	137,040,000	143,079,000	131,623,000
SPACE SCIENCE	$103,354,000	$104,789,000	$102,507,000
Goddard Space Flight Center	93,088,000	93,954,000	92,056,000
Wallops Station	10,266,000	10,835,000	10,451,000
AERONAUTICS AND SPACE TECHNOLOGY	$207,353,000	$214,621,000	$210,409,000
Ames Research Center	40,632,000	42,206,000	41,139,000
Flight Research Center	11,080,000	11,326,000	10,824,000
Langley Research Center	75,281,000	77,927,000	76,279,000
Lewis Research Center	80,360,000	83,162,000	82,167,000
SUPPORTING OPERATIONS			
NASA Headquarters	$64,917,000	$61,820,000	$60,117,000
TOTAL	$722,134,000	$726,387,000	$700,800,000

Installations are under the management direction of the Associate Administrator having primary responsibility for the research and development programs conducted at the installation. The Associate Administrator for Manned Space Flight is responsible for the Kennedy Space Center, Manned Spacecraft Center, and Marshall Space Flight Center; the Associate Administrator for Space Science is responsible for the Goddard Space Flight Center and Wallops Station; and the Associate Administrator for Aeronautics and Space Technology is responsible for the Ames Research Center, Flight Research Center, Langley Research Center, and the Lewis Research Center. The Associate Administrator for Organization and Management acts as the institutional director for NASA Headquarters.

The Research and Program Management appropriation request may be categorized into five functional areas, as follows:

1. Personnel and Related Costs are comprised of salaries and benefits for civil service personnel, over 70% of whom are technical, and for personnel of other government agencies detailed to NASA. Costs in this category also include supporting personnel costs; i.e., the costs of moving expenses (as provided by law), recruiting and personnel investigation services provided by the Civil Service Commission, and personnel training. This functional category accounts for 78% of the Research and Program Management appropriation.

2. Travel includes the cost of transportation, per diem, and related expenses of travel required for direction, coordination, and management of research and development and construction of facilities program activities; for contract management and flight mission support; for overseas travel to launch and tracking sites; and for travel to meetings and technical seminars.

3. Facilities Services includes the cost of maintenance and related services, custodial services, minor rehabilitation and modification and construction, and facility operations.

4. Technical Services includes the cost of automatic data processing, institutional engineering services, the dissemination of scientific and technical information derived from the various R&D programs, and educational informational program activities.

5. Administrative Support includes the cost of communications; administrative printing; administrative supplies, general purpose materials and equipment; transportation support; and other support activities.

The following summary table indicates the distribution of the total appropriation requirements by functional category:

Functions	1971	1972	1973
Personnel.....	$544,193,000	$554,924,000	$543,587,000
Travel.....	16,211,000	16,134,000	15,741,000
Facilities services.....	76,334,000	76,446,000	67,714,000
Technical services.....	41,000,000	34,852,000	32,038,000
Administrative support.....	44,396,000	44,031,000	41,720,000
Total.....	$722,134,000	$726,387,000	$700,800,000

The amounts requested in each functional category are further subdivided as follows:

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$544,193,000	$554,924,000	$543,587,000	$-11,337,000

The estimate for Personnel and related costs includes the regular pay, overtime, holiday, Sunday, and nightwork differential pay of personnel in permanent, temporary, part-time, and intermittent positions, and the cost of personnel of other agencies detailed to NASA. It also includes the Government's contribution to the Civil Service Retirement Fund for permanent employees, and the Government's share of the cost of employees' life insurance and health benefits, incentive awards, and the cost of severance pay. The estimate provides for the cost of travel to initial duty station, and travel and shipment of household goods for transferred employees.

Fund Requirements by Subcategory:

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions..	$484,588,000	$492,797,000	$483,787,000
b. Nonpermanent positions.....	6,048,000	5,989,000	5,989,000
c. Reimbursable details.	2,953,000	2,641,000	2,552,000
d. Overtime and other compensation.....	4,767,000	5,260,000	5,188,000
Subtotal, Compensation	$498,356,000	$506,687,000	$497,516,000

	1971	1972	1973
2. Benefits.....	$42,670,000	$44,722,000	$42,702,000
Subtotal, Compensation and Benefits.....	$541,026,000	$551,409,000	$540,218,000
B. Supporting Costs:			
1. Transfer of personnel...	$653,000	$814,000	$752,000
2. Civil Service Commission services.....	116,000	110,000	97,000
3. Personnel training.....	2,398,000	2,591,000	2,520,000
Subtotal, Supporting Costs.....	$3,167,000	$3,515,000	$3,369,000
Total, Personnel and Related Costs.....	$544,193,000	$554,924,000	$543,587,000

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$16,211,000	$16,134,000	$15,741,000	-$393,000

The estimates include the cost of transportation, per diem, and incidental costs required for employee travel for the purpose of direction and coordination of Research and Development and Construction of Facilities program activities; travel for contract management and flight mission support; travel to launching sites and tracking stations; and for administrative travel. It also includes the cost of travel to NASA-sponsored meetings and conferences, as well as meetings sponsored outside NASA, when such travel is in the interest of the agency; of travel by non-NASA employees; and of travel by unpaid members of research advisory committees. Charter, contract, or lease of passenger aircraft and the cost of local transportation by taxi, bus, or private automobile for which the employee is reimbursed are included in the estimate. Costs for travel to initial duty station and for permanent change of station are excluded from these estimates and are included under the Personnel functional category.

Fund Requirements by Subcategory:

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$10,767,000	$10,403,000	$10,273,000
2. Flight mission support.....	1,032,000	1,411,000	1,252,000
3. Overseas travel to launch and tracking sites.....	589,000	489,000	487,000
Subtotal.....	$12,388,000	$12,303,000	$12,012,000
B. Meetings and Technical Seminars...			
1. Government-sponsored meetings.	$1,161,000	$1,158,000	$1,123,000
2. Other than government-sponsored meetings and technical seminars	1,220,000	1,021,000	1,035,000
Subtotal.....	$2,381,000	$2,179,000	$2,158,000
C. Administrative Travel.....	$1,442,000	$1,652,000	$1,571,000
Total, Travel.....	$16,211,000	$16,134,000	$15,741,000

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICE...	$76,334,000	$76,446,000	$67,714,000	$-8,732,000

Facilities Services includes the procurement of electricity, water, gas, and other utilities; maintenance of buildings and grounds; and minor rehabilitation and modification and construction, and facility rentals. It also includes custodial services consisting of security services, janitorial services, cleaning, exterminating, and refuse handling, laundry, and fire protection. Requirements for general purpose building materials, hardware, electronics supplies and materials, as well as mechanical, and shop equipment are also included in the estimate.

Fund Requirements by Subcategory:

	1971	1972	1973
A. Acquisition of Facilities			
1. Rental of real property.....	$872,000	$270,000	$282,000
2. Minor rehabilitation and modification, and construction.....	1,041,000	1,172,000	157,000
Subtotal.....	$1,913,000	$1,442,000	$439,000

	1971	1972	1973
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$26,515,000	$19,447,000	$19,702,000
2. Maintenance of equipment.....	2,205,000	1,786,000	1,784,000
3. Custodial services.....	17,792,000	17,815,000	17,693,000
Subtotal.....	$46,512,000	$39,048,000	$39,179,000
C. Operation of Facilities			
1. Utilities.....	$17,955,000	$19,888,000	$20,326,000
2. Supplies and equipment.....	8,000,000	8,022,000	7,770,000
Subtotal.....	$25,955,000	$27,910,000	$28,096,000
D. MTF Support.....	$1,954,000	$8,046,000	---
Total, Facilities Services.....	$76,334,000	$76,446,000	$67,714,000

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES...	$41,000,000	$34,852,000	$32,038,000	$-2,814,000

The estimates for Technical Services provide for the costs of (1) automatic data processing (ADP) support, (2) engineering services, and (3) scientific and technical and educational/informational programs. Funds included for ADP support provide for the acquisition of ADP equipment by lease or purchase, maintenance of NASA-owned equipment, and the procurement of programming and operation services. Both electronic data processing and ancillary electric accounting machine equipment are included. The overall requirement for ADP is divided by appropriation in accordance with the purpose served by the equipment. The Research and Program Management appropriation provides for the general purpose scientific and business data processing which support the overall installation operations and scientific and technical applications where it is impractical to distribute the funding to a directly supported program or project. The R&D appropriation provides for data processing systems and operations which are dedicated to specific programs or projects, or are integrated into larger systems. Funds for engineering services provide for engineering design and blueprint drafting services. The scientific and technical programs, which furnish up-to-date reporting of scientific and technical developments, provide for the support of technical libraries, and the acquisition and dissemination of scientific and technical literature, and for educational/informational programs.

Fund Requirements by Subcategory:

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$8,767,000	$5,045,000	$4,340,000
2. Purchase of equipment.....	1,928,000	1,737,000	770,000
3. Maintenance of equipment.....	1,001,000	1,720,000	1,461,000
Subtotal, equipment.....	$11,696,000	$8,502,000	$6,571,000
4. Programming and operations.....	$ 11,756,000	$10,500,000	$10,279,000
Subtotal.....	$23,452,000	$19,002,000	$16,850,000
B. Engineering Services.....	348,000	450,000	493,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$1,108,000	$943,000	$1,044,000
2. Educational/informational programs.....	4,161,000	3,953,000	3,684,000
3. Scientific and technical information.....	11,931,000	10,504,000	9,967,000
Subtotal.....	$17,200,000	$15,400,000	$14,695,000
Total, Technical Services.....	$41,000,000	$34,852,000	$32,038,000

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT..	$44,396,000	$44,031,000	$41,720,000	$-2,311,000

Included in the Administrative Support estimates are general services which support overall installation operations. The administrative expenses for communications, printing and reproduction, supplies, materials and equipment, transportation, and medical services, are provided for in this function.

Fund Requirements by Subcategory:

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$4,859,000	$4,836,000	$4,588,000
2. Local telephone service.....	5,160,000	5,634,000	5,514,000
3. Other communications.....	1,847,000	2,699,000	2,831,000
Subtotal.....	$11,866,000	$13,169,000	$12,933,000

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	1971	1972	1973
B. Administrative Printing and Reproduction.....	$2,671,000	$2,590,000	$2,806,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials.....	$5,327,000	$5,207,000	$4,547,000
2. Equipment.....	1,118,000	942,000	846,000
Subtotal.....	$6,445,000	$6,149,000	$5,[illegible]3,000
D. Transportation			
1. Center operations.....	$7,601,000	$7,860,000	$7,4[illegible],000
2. Common carrier.....	834,000	740,000	71[illegible]000
Subtotal.....	$8,435,000	$8,600,000	$8,141,000
E. Administrative Support Services			
1. Installation support services.....	$12,676,000	$11,034,000	$9,955,000
2. Medical services.....	2,303,000	2,489,000	2,492,000
Subtotal.....	$14,979,000	$13,523,000	$12,447,000
Total, Administrative Support..	$44,396,000	$44,031,000	$41,720,000

1972 OPERATING BUDGET

The NASA Operating Budget for 1972 is $726,387,000, a decrease of $4,294,000 from the final appropriation, but an increase of $29,037,000 from the 1972 request. The following table summarizes the changes from the request to the operating budget:

1972 Request.....		$697,350,000
Effect of Congressional action.....		+33,331,000
(Basic appropriation of $693,350,000 reflected a reduction.....	($-4,000,000)	
(Supplemental appropriation provided the cost of the January 1971 pay increase).....	($+29,285,000)	
(Availability of the unobligated portion of 1971 reappropriation for nonreimbursable support of other agencies at MTF).....	($+8,046,000)	
Subtotal, total 1972 appropriations.....		$730,681,000
Effect of other actions.....		-4,294,000
(Transfer to GSA for building rentals).....	($-131,000)	

1972 Operating Budget (Cont'd.)

Effect of other actions (Cont'd.)		
(Transfer to the Economic Stabilization Activities, PL 92-184).....	($-2,000,000)	
(Balance of $4,163,000 placed in reserve by OMB which represents savings related to manpower reductions, average GS grade escalation controls, and the effect of the 90-day wage-price freeze on the payment of within grade salary increases)	($-2,163,000)	
Total, 1972 Operating Budget.....		$726,387,000

For 1973, NASA is requesting $700.8 million, a decrease of $25.6 million from 1972. The reduction of $11.3 million in our personnel and related costs represents overall reductions in all costs related to personnel. These costs include compensation of permanent and temporary civil service employees and military and civilian personnel detailed to NASA; overtime and night differential pay costs; personnel benefits; and such costs as personnel training and transfer of personnel. Decreases in costs because of the lower number of permanent employees have greatly exceeded minor pay increases resulting from longevity and career development promotions. Temporary personnel costs have remained constant, although we have been able to provide for a larger number of disadvantaged trainees within the total. Overtime costs are less than 1% of permanent compensation, which continues to be the lowest rate of any major government agency.

NASA has continued to reduce costs of travel, although costs of transportation and per diem have been increasing perceptibly. The estimate of $15.7 million is equivalent to a reduction of one-third from the peak in travel cost in 1967 when the 1967 cost is adjusted for increases in per diem, travel costs, and taxes since that time.

The cost of facilities services is reduced by $8.7 million in 1973. This reduction is the net result of several actions, the largest of which, $8.0 million, is related to support services provided at MTF. In 1971, $10 million was reappropriated to provide, on a nonreimbursable basis, basic institutional and technical support to Federal agencies resident at MTF who are engaged in space and environmental missions. Because of the time required to implement this directive, and because R&PM is an annual appropriation, Congress continued the availability of these funds through September 30, 1971. The $8.0 million reduction in 1973 results from completion of work covered under the reappropriation. The 1973 budget does not provide for continuation of this support, since these costs will be financed fully on a reimbursable basis by benefitting agencies.

The balance of the reduction is accounted for by the transfer of costs of rehabilitation and modification projects in excess of $25,000, and minor construction projects in excess of $10,000, to the Construction of Facilities appropriation, partially offset by minor increases for higher utility rates and for the cost of maintenance of buildings and grounds.

Costs in the Technical Services area will be $2.8 million lower in 1973 than in 1972. The greatest portion of the reduction will be related to ADP where the estimated equipment and operating costs will be $2.2 million lower. This reduction is possible because of past purchases of equipment and the overall result from many small economies in operations. The balance of the reduction will be achieved in the informational programs area, where the cost reductions begun in 1971 and 1972 will be continued into 1973.

In the functional area Administrative Support each subcategory will be reduced, except for printing which shows a small increase related to recent legislation requiring greater use of non-NASA printing facilities. The reductions in all other subcategories reflect decreases in the numbers of people supported because of recent civil service employment reductions.

The 1973 R&PM budget request contains no provision to cover the cost of salary increases effective in January 1972, authorized pursuant to Section 3 of the Economic Stabilization Act Amendments of 1971, PL 92-210. The Office of Management and Budget has indicated that funds to cover these costs will be identified in a budget amendment planned for later transmittal by the President.

PERMANENT CIVIL SERVICE POSITIONS

The 1973 budget provides for a further reduction in the number of NASA's permanent positions to a new level of 26,850, a reduction of 1,500 from the number planned for in the 1972 budget request. This reduction will bring to 8,291 the total reductions in permanent positions from peak NASA employment, a reduction of 25% and the lowest level of personnel since 1962.

The first reduction of 5%, 1,500, was applied uniformly to each installation. This reduction was accomplished to the maximum extent possible through attrition, but involuntary separations through reduction-in-force procedures were required in 604 cases. These RIF's were completed October 2, 1971.

The second reduction in 1972 of 850 and a reduction of 650 in 1973 will also be uniformly applied to each installation in the absence of overriding program considerations. It is expected that both the end 1972 and end 1973 agencywide ceilings can be achieved through attrition in all or almost all cases. The following table shows the number of positions by Center and the reductions in 1972 and 1973:

Number of Personnel Positions

	1971	Reduction Planned in 1972 Budget	Government-wide Reduction	1972	1973 Planned Reduction	1973
Manned Space Flight	12,605	-619	-361	11,625	-275	11,350
Kennedy Space Center	2,681	-137	-77	2,467	-58	2,409
Manned Spacecraft Center	4,120	-185	-118	3,817	-90	3,727
Marshall Space Flight Center	5,804	-297	-166	5,341	-127	5,214
Space Science	4,900	-251	-140	4,509	-106	4,403
Goddard Space Flight Center	4,412	-225	-126	4,061	-95	3,966
Wallops Station	488	-26	-14	448	-11	437
Aeronautics and Space Technology	10,448	-533	-295	9,620	-228	9,392
Ames Research Center	1,922	-98	-55	1,769	-42	1,727
Flight Research Center	535	-27	-15	493	-12	481
Langley Research Center	3,790	-194	-108	3,488	-83	3,405
Lewis Research Center	4,201	-214	-117	3,870	-91	3,779
Supporting Operations	1,897	-97	-54	1,746	-41	1,705
NASA Headquarters	1,897	-97	-54	1,746	-41	1,705
Total, Permanent Positions	29,850	-1,500	-850	27,500	-650	26,850
Nonpermanent Positions	2,300	---	---	2,300	---	2,300
Total, Positions	32,150	-1,500	-850	29,800	-650	29,150

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

RESEARCH AND PROGRAM MANAGEMENT

For necessary expenses of research in Government laboratories, management of programs and other activities of the National Aeronautics and Space Administration, not otherwise provided for, including uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901–5902); [minor construction;] awards; hire, maintenance and operation of administrative aircraft; purchase (not to exceed [thirty-five] *twenty-seven* for replacement only) and hire of passenger motor vehicles; and maintenance[, repair, and alteration] *and repair* of real and personal property, *and not in excess of $10,000 per project for construction of new facilities and additions to existing facilities, and not in excess of $25,000 per project for rehabilitation and modification of facilities;* [$722,635,000] *$700,800,000*: *Provided*, That contracts may be entered into under this appropriation for maintenance and operation of facilities, and for other services, to be provided during the next fiscal year.

[The $10,000,000 provided under this head in the Independent Offices and Housing and Urban Development Appropriation Act, 1971, for basic institutional and technical services for Federal agencies resident at the Mississippi Test Facility/Slidell Computer Complex and other NASA facilities in pursuit of space and environmental missions shall be available for equipment and alteration and modification of existing buildings, to whatever extent may be required to furnish such services, and for the construction of a flow basin and flood plain simulation facility; and shall remain available until September 30, 1971.] *(42 U.S.C. 2451, et seq.; Department of Housing and Urban Development; Space, Science, Veterans, and Certain Other Independent Agencies Appropriation Act, 1972; additional authorizing legislation to be proposed; Second Supplemental Appropriation Act, 1971.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Research and Program Management

Program and Financing (in thousands of dollars)

Identification code 27-00-0103-0-1-250	Budget plan			Costs and obligations		
	1971 actual	1972 estimate	1973 estimate	1971 actual	1972 estimate	1973 estimate
Program by activities:						
Direct program:						
1. Manned space flight	350,637	335,653	320,600	345,198	338,100	320,600
2. Scientific investigations in space	91,415	98,150	94,200	91,125	98,300	94,200
3. Space applications	34,773	47,400	44,900	34,672	43,300	44,900
4. Space and nuclear research and technology	98,790	87,500	84,300	98,454	87,500	84,300
5. Aeronautical research and technology	107,883	118,850	118,900	107,517	118,800	118,900
6. Supporting activities	38,636	38,834	37,900	38,647	39,000	37,900
Total direct program costs, funded	722,134	726,387	700,800	715,613	725,000	700,800
Reimbursable program:						
1. Manned space flight	1,414	2,525	2,500	1,398	2,502	2,500
3. Space applications	932	1,400	5,100	954	1,442	5,100
4. Space and nuclear research and technology	623	800	800	624	755	800
6. Supporting activities	186	400	300	132	426	300
Total reimbursable program costs	3,155	5,125	8,700	3,108	5,125	8,700
Total program costs, funded	725,289	731,512	709,500	718,721	730,125	709,500
Change in selected resources [1]	----------	----------	----------	6,568	1,387	----------
10 Total	725,289	731,512	709,500	725,289	731,512	709,500
Financing:						
Receipts and reimbursements from:						
11 Federal funds				-2,756	-4,422	-8,105
14 Non-Federal sources [2]				-399	-703	-595
17 Recovery of prior year obligations				-1,100	----------	----------
21 Unobligated balance available start of year				----------	-8,046	----------
23 Unobligated balance transferred to other accounts				1,100	----------	----------
24 Unobligated balance available, end of year [3]				8,046	----------	----------
25 Unobligated balance lapsing				218	2,163	----------
Budget authority				**730,398**	**720,504**	**700,800**
Budget authority:						
40 Appropriation				722,669	722,635	700,800
41 Transferred to other accounts				-146	-2,131	----------
42 Transferred from other accounts				7,875	----------	----------
43 **Appropriation (adjusted)**				**730,398**	**720,504**	**700,800**
Relation of obligations to outlays:						
71 Obligations incurred, net				721,034	726,387	700,800
72 Obligated balance, start of year				68,131	81,180	80,567
74 Obligated balance, end of year				-81,180	-80,567	-74,967
77 Adjustments in expired accounts				-200	----------	----------
90 Outlays				707,785	727,000	706,400

[1] Selected resources as of June 30 are as follows:

	1970	*1971 adjustments*	*1971*	*1972*	*1973*
Unpaid undelivered orders	22,849	-1,385	28,038	29,425	29,425
Advances outstanding	22	-------	16	16	16
Total selected resources	22,871	-1,385	28,054	29,441	29,441

[2] Reimbursements from non-Federal sources are receipts for services performed on Communications Satellite Corporation projects (42 U.S.C. 2473) and for personal property sold for replacement purposes (40 U.S.C. 481).

[3] Available until September 30, 1971, pursuant to provisions in the Second Supplemental Appropriations Act, 1971, Public Law 92-18 (85 Stat. 44).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF OBLIGATIONS BY INSTALLATION

INSTITUTIONAL DIRECTOR AND INSTALLATION	Fiscal Year 1971	Fiscal Year 1972	Fiscal Year 1973
MANNED SPACE FLIGHT.....	$346,510,000	$345,157,000	$327,767,000
John F. Kennedy Space Center, NASA.....	98,338,000	92,022,000	89,253,000
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Ames Research Center.....	40,632,000	42,206,000	41,139,000
Flight Research Center.....	11,080,000	11,326,000	10,824,000
Langley Research Center.....	75,281,000	77,927,000	76,279,000
Lewis Research Center.....	80,360,000	83,162,000	82,167,000
NASA HEADQUARTERS.....	$64,917,000	$61,820,000	$60,117,000
TOTAL.....	$722,134,000	$726,387,000	$700,800,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF OBLIGATIONS BY FUNCTION
BY INSTALLATION
(Thousands of dollars)

FUNCTION	Total NASA	Subtotal OMSF	J. F. Kennedy Space Center, NASA	Manned Spacecraft Center	Marshall Space Flight Center	Subtotal OSS	Goddard Space Flight Center	Wallops Station	Subtotal OAST	Ames Research Center	Flight Research Center	Langley Research Center	Lewis Research Center	Headquarters
Personnel														
1971	544,193	239,334	49,025	81,395	108,914	84,012	76,924	7,088	177,121	33,991	9,144	63,714	70,272	43,726
1972	554,924	241,666	49,811	82,219	109,636	86,483	79,118	7,365	183,859	35,091	9,344	66,024	73,400	42,916
1973	543,587	235,463	48,587	80,086	106,790	85,280	78,072	7,208	181,349	34,543	9,064	64,844	72,898	41,495
Travel														
1971	16,211	7,273	788	3,800	2,685	2,547	2,362	185	3,839	905	226	1,415	1,293	2,552
1972	16,134	7,124	772	3,721	2,631	2,420	2,237	183	3,924	868	214	1,624	1,218	2,666
1973	15,741	6,941	742	3,621	2,578	2,414	2,237	177	3,829	858	214	1,594	1,163	2,557
Facilities Services														
1971	76,334	49,396	28,121	10,668	10,607	6,404	4,365	2,039	19,438	4,238	1,343	6,062	7,795	1,096
1972	76,446	49,647	24,717	9,264	15,666	6,860	4,576	2,284	19,622	4,376	1,415	6,277	7,554	317
1973	67,714	42,361	24,208	9,471	8,682	6,778	4,723	2,055	18,201	4,022	1,232	5,833	7,114	374
Technical Services														
1971	41,000	22,749	8,459	7,341	6,949	5,854	5,697	157	972	327	70	397	178	11,425
1972	34,852	19,800	5,955	6,429	7,416	4,211	4,066	145	999	408	85	355	151	9,842
1973	32,038	18,645	5,533	6,033	7,079	2,919	2,770	149	865	298	45	371	151	9,609
Administrative Support														
1971	44,396	27,758	11,945	7,928	7,885	4,537	3,740	797	5,983	1,171	297	3,693	822	6,118
1972	44,031	26,920	10,767	8,423	7,730	4,815	3,957	858	6,217	1,463	268	3,647	839	6,079
1973	41,720	24,357	10,183	7,680	6,494	5,116	4,254	862	6,165	1,418	269	3,637	841	6,082
Total														
1971	722,134	346,510	98,338	111,132	137,040	103,354	93,088	10,266	207,353	40,632	11,080	75,281	80,360	64,917
1972	726,387	345,157	92,022	110,056	143,079	104,789	93,954	10,835	214,621	42,206	11,326	77,927	83,162	61,820
1973	700,800	327,767	89,253	106,891	131,623	102,507	92,056	10,451	210,409	41,139	10,824	76,279	82,167	60,117

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF OBLIGATIONS BY OBJECT CLASSIFICATION
BY FUNCTION

(Thousands of Dollars)

Object Classification	Total NASA	Personnel	Travel	Facilities Services	Technical Services	Administrative Support
Fiscal Year 1971						
Personnel compensation	498,356	498,356	---	---	---	---
Personnel benefits	41,379	41,379	---	---	---	---
Benefits for former personnel	1,457	1,457	---	---	---	---
Travel & transportation of persons	17,906	132	16,211	---	---	1,563
Transportation of things	3,209	344	---	---	54	2,811
Rent, communications and utilities	40,574	---	---	18,606	8,782	13,186
Printing and reproduction	5,468	---	---	---	3,138	2,330
Other services	94,426	2,525	---	48,265	26,205	17,431
Supplies and materials	13,616	---	---	7,279	683	5,654
Equipment	4,556	---	---	1,144	2,138	1,274
Lands and structures	1,040	---	---	1,040	---	---
Grants, subsidies and contributions	59	---	---	---	---	59
Insurance claims and indemnities	88	---	---	---	---	88
Totals	722,134	544,193	16,211	76,334	41,000	44,396
Fiscal Year 1972						
Personnel compensation	506,687	506,687	---	---	---	---
Personnel benefits	43,313	43,313	---	---	---	---
Benefits for former personnel	1,659	1,659	---	---	---	---
Travel & transportation of persons	17,941	165	16,134	---	---	1,642
Transportation of things	3,552	389	---	---	59	3,104
Rent, communications, and utilities	39,064	---	---	20,089	5,068	13,907
Printing and reproduction	5,078	---	---	---	2,738	2,340
Other services	90,537	2,711	---	46,918	24,541	16,367
Supplies and materials	13,319	---	---	7,080	626	5,613
Equipment	3,979	---	---	1,187	1,820	972
Lands and structures	1,172	---	---	1,172	---	---
Grants, subsidies and contributions	51	---	---	---	---	51
Insurance claims and indemnities	35	---	---	---	---	35
Totals	726,387	554,924	16,134	76,446	34,852	44,031
Fiscal Year 1973						
Personnel compensation	497,516	497,516	---	---	---	---
Personnel benefits	42,724	42,724	---	---	---	---
Benefits for former personnel	185	185	---	---	---	---
Travel & transportation of persons	17,545	165	15,741	---	---	1,639
Transportation of things	3,527	368	---	---	7	3,152
Rent, communications, and utilities	39,219	---	---	20,541	4,345	14,333
Printing and reproduction	4,838	---	---	---	2,475	2,363
Other services	79,752	2,629	---	38,992	23,761	14,370
Supplies and materials	12,577	---	---	7,025	594	4,958
Equipment	2,675	---	---	999	856	820
Lands and structures	157	---	---	157	---	---
Grants, subsidies and contributions	51	---	---	---	---	51
Insurance claims and indemnities	34	---	---	---	---	34
Totals	700,800	543,587	15,741	67,714	32,038	41,720

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF OBLIGATIONS BY OBJECT CLASSIFICATION
BY INSTALLATION

(Thousands of dollars)

Classification	Total NASA	Subtotal OMSF	J. F. Kennedy Space Center, NASA	Manned Spacecraft Center	Marshall Space Flight Center	Subtotal OSS	Goddard Space Flight Center	Wallops Station	Subtotal OAST	Ames Research Center	Flight Research Center	Langley Research Center	Lewis Research Center	HDQTRS.
AL YEAR 1971														
mpensation	498,356	219,622	44,964	74,733	99,925	77,176	70,689	6,487	163,065	31,346	8,429	58,577	64,713	38,493
nefits	41,379	17,864	3,642	5,999	8,223	6,304	5,752	552	13,389	2,565	682	4,799	5,343	3,822
former personnel	1,457	664	164	249	251	---	---	---	100	11	---	25	64	693
nsportation of	17,906	8,593	1,786	4,031	2,776	2,659	2,390	269	4,082	933	226	1,627	1,296	2,572
on of things	3,209	1,470	1,077	307	86	1,156	1,089	67	426	88	15	255	68	157
lications, and	40,574	19,432	7,181	7,351	4,900	7,857	7,421	436	9,672	3,030	204	2,757	3,681	3,613
reproduction	5,468	3,896	2,683	819	394	176	125	51	288	10	2	202	74	1,108
es	94,426	64,430	32,042	14,710	17,678	5,197	3,861	1,336	11,358	2,196	1,177	4,238	3,747	13,441
materials	13,616	7,383	2,967	2,092	2,324	2,045	1,099	946	3,697	361	240	2,306	790	491
	4,556	2,471	1,600	473	398	610	509	101	1,063	76	81	327	579	412
uctures	1,040	673	227	363	83	163	142	21	204	14	24	166	---	---
dies & contributions	59	---	---	---	---	10	10	---	1	---	---	1	---	48
ims and indemnities	88	12	5	5	2	1	1	---	8	2	---	1	5	67
	722,134	346,510	98,338	111,132	137,040	103,354	93,088	10,266	207,353	40,632	11,080	75,281	80,360	64,917
L YEAR 1972														
pensation	506,687	221,089	45,613	75,363	100,113	79,158	72,438	6,720	168,265	32,150	8,579	60,412	67,124	38,175
nefits	43,313	18,348	3,778	6,154	8,416	6,635	6,047	588	14,371	2,731	725	5,195	5,720	3,959
former personnel	1,659	896	30	255	611	94	94	---	597	145	---	70	382	72
ansportation of	17,941	8,530	1,872	3,943	2,715	2,543	2,276	267	4,167	900	214	1,822	1,231	2,701
on of things	3,552	1,606	1,126	340	140	1,395	1,332	63	398	85	10	230	73	153

›ensation	506,687	221,089	45,613	75,363	100,113	79,158	72,438	6,720	168,205	[illegible]				
:fits	43,313	18,348	3,778	6,154	8,416	6,635	6,047	588	14,371	2,731	725	5,195	5,720	3,959
:ormer personnel	1,659	896	30	255	611	94	94	---	597	145	---	70	382	72
ınsportation of	17,941	8,530	1,872	3,943	2,715	2,543	2,276	267	4,167	900	214	1,822	1,231	2,701
ı of things	3,552	1,606	1,126	340	140	1,395	1,332	63	398	85	10	230	73	153
cations, and	39,064	18,098	6,652	6,148	5,298	6,288	5,854	434	10,541	3,448	218	3,175	3,700	4,137
reproduction	5,078	3,667	2,457	820	390	165	111	54	344	45	4	215	80	902
s	90,537	62,750	26,296	13,217	23,237	5,275	3,965	1,310	11,442	2,210	1,299	4,286	3,647	11,070
materials	13,319	7,655	3,320	2,459	1,876	1,908	1,013	895	3,358	375	158	2,025	800	398
	3,979	2,047	662	1,204	181	891	661	230	846	92	99	255	400	195
·uctures	1,172	450	200	150	100	437	163	274	285	25	20	240	---	---
.dies & contributions	51	---	---	---	---	---	---	---	1	---	---	1	---	50
ıims and indemnities	35	21	16	3	2	---	---	---	6	---	---	1	5	8
	726,387	345,157	92,022	110,056	143,079	104,789	93,954	10,835	214,621	42,206	11,326	77,927	83,162	61,820
AL YEAR 1973														
mpensation	497,516	216,137	44,552	73,637	97,948	78,058	71,480	6,578	166,479	31,831	8,335	59,339	66,974	36,842
nefits	42,724	17,919	3,680	5,987	8,252	6,614	6,039	575	14,138	2,644	694	5,100	5,700	4,053
former personnel	185	109	---	15	94	5	5	---	63	3	---	---	60	8
nsportation of	17,545	8,341	1,832	3,847	2,662	2,540	2,276	264	4,072	890	214	1,792	1,176	2,592
.on of things	3,527	1,575	1,094	341	140	1,462	1,399	63	388	85	10	230	63	102
ıications, and	39,219	18,406	6,410	6,149	5,847	5,419	4,942	477	10,711	3,448	218	3,345	3,700	4,683
l reproduction	4,838	3,415	2,165	860	390	174	116	58	469	45	4	340	80	780
:es	79,752	53,068	25,782	13,065	14,221	5,869	4,314	1,555	10,280	1,771	1,149	4,051	3,309	10,535
l materials	12,577	7,209	3,274	2,059	1,876	1,892	1,103	789	3,200	375	150	1,875	800	276
	2,675	1,528	428	919	181	357	290	67	602	47	50	205	300	188
tructures	157	40	20	10	10	117	92	25	---	---	---	---	---	---
sidies & contributions	51	---	---	---	---	---	---	---	1	---	---	1	---	50
laims and indemnities	34	20	16	2	2	---	---	---	6	---	---	1	5	8
	700,800	327,767	89,253	106,891	131,623	102,507	92,056	10,451	210,409	41,139	10,824	76,279	82,167	60,117

Personnel benefits	43,313	18,348	3,778	[illegible]	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]			
Benefits for former personnel	1,659	896	30	255	611	94	94	---	597	145	---	70	38
Travel and transportation of persons	17,941	8,530	1,872	3,943	2,715	2,543	2,276	267	4,167	900	214	1,822	1,23
Transportation of things	3,552	1,606	1,126	340	140	1,395	1,332	63	398	85	10	230	7
Rent, communications, and utilities	39,064	18,098	6,652	6,148	5,298	6,288	5,854	434	10,541	3,448	218	3,175	3,70
Printing and reproduction	5,078	3,667	2,457	820	390	165	111	54	344	45	4	215	8
Other services	90,537	62,750	26,296	13,217	23,237	5,275	3,965	1,310	11,442	2,210	1,299	4,286	3,64
Supplies and materials	13,319	7,655	3,320	2,459	1,876	1,908	1,013	895	3,358	375	158	2,025	80
Equipment	3,979	2,047	662	1,204	181	891	661	230	846	92	99	255	40
Lands and structures	1,172	450	200	150	100	437	163	274	285	25	20	240	--
Grants, subsidies & contributions	51	---	---	---	---	---	---	---	1	---	---	1	--
Insurance claims and indemnities	35	21	16	3	2	---	---	---	6	---	---	1	
Totals	726,387	345,157	92,022	110,056	143,079	104,789	93,954	10,835	214,621	42,206	11,326	77,927	83,16
FISCAL YEAR 1973													
Personnel compensation	497,516	216,137	44,552	73,637	97,948	78,058	71,480	6,578	166,479	31,831	8,335	59,339	66,97
Personnel benefits	42,724	17,919	3,680	5,987	8,252	6,614	6,039	575	14,138	2,644	694	5,100	5,70
Benefits for former personnel	185	109	---	15	94	5	5	---	63	3	---	---	6
Travel & transportation of persons	17,545	8,341	1,832	3,847	2,662	2,540	2,276	264	4,072	890	214	1,792	1,17
Transportation of things	3,527	1,575	1,094	341	140	1,462	1,399	63	388	85	10	230	6
Rent, communications, and utilities	39,219	18,406	6,410	6,149	5,847	5,419	4,942	477	10,711	3,448	218	3,345	3,70
Printing and reproduction	4,838	3,415	2,165	860	390	174	116	58	469	45	4	340	8
Other services	79,752	53,068	25,782	13,065	14,221	5,869	4,314	1,555	10,280	1,771	1,149	4,051	3,30
Supplies and materials	12,577	7,209	3,274	2,059	1,876	1,892	1,103	789	3,200	375	150	1,875	80
Equipment	2,675	1,528	428	919	181	357	290	67	602	47	50	205	30
Lands and structures	157	40	20	10	10	117	92	25	---	---	---	---	--
Grants, subsidies & contributions	51	---	---	---	---	---	---	---	1	---	---	1	--
Insurance claims and indemnities	34	20	16	2	2	---	---	---	6	---	---	1	
Totals	700,800	327,767	89,253	106,891	131,623	102,507	92,056	10,451	210,409	41,139	10,824	76,279	82,1

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF OBLIGATIONS BY OBJECT CLASSIFICATION
BY INSTALLATION

(Thousands of dollars)

Object Classification	Total NASA	Subtotal OMSF	J. F. Kennedy Space Center, NASA	Manned Spacecraft Center	Marshall Space Flight Center	Subtotal OSS	Goddard Space Flight Center	Wallops Station	Subtotal OAST	Ames Research Center	Flight Research Center	Langley Research Center	Lewis Research Center
FISCAL YEAR 1971													
Personnel compensation	498,356	219,622	44,964	74,733	99,925	77,176	70,689	6,487	163,065	31,346	8,429	58,577	64,713
Personnel benefits	41,379	17,864	3,642	5,999	8,223	6,304	5,752	552	13,389	2,565	682	4,799	5,343
Benefits for former personnel	1,457	664	164	249	251	---	---	---	100	11	---	25	64
Travel & transportation of persons	17,906	8,593	1,786	4,031	2,776	2,659	2,390	269	4,082	933	226	1,627	1,296
Transportation of things	3,209	1,470	1,077	307	86	1,156	1,089	67	426	88	15	255	68
Rent, communications, and utilities	40,574	19,432	7,181	7,351	4,900	7,857	7,421	436	9,672	3,030	204	2,757	3,681
Printing and reproduction	5,468	3,896	2,683	819	394	176	125	51	288	10	2	202	74
Other services	94,426	64,430	32,042	14,710	17,678	5,197	3,861	1,336	11,358	2,196	1,177	4,238	3,747
Supplies and materials	13,616	7,383	2,967	2,092	2,324	2,045	1,099	946	3,697	361	240	2,306	790
Equipment	4,556	2,471	1,600	473	398	610	509	101	1,063	76	81	327	579
Lands and structures	1,040	673	227	363	83	163	142	21	204	14	24	166	---
Grants, subsidies & contributions	59	---	---	---	---	10	10	---	1	---	---	1	---
Insurance claims and indemnities	88	12	5	5	2	1	1	---	8	2	---	1	5
Totals	722,134	346,510	98,338	111,132	137,040	103,354	93,088	10,266	207,353	40,632	11,080	75,281	80,360
FISCAL YEAR 1972													
Personnel compensation	506,687	221,089	45,613	75,363	100,113	79,158	72,438	6,720	168,265	32,150	8,579	60,412	67,124
Personnel benefits	43,313	18,348	3,778	6,154	8,416	6,635	6,047	588	14,371	2,731	725	5,195	5,720
Benefits for former personnel	1,659	896	30	255	611	94	94	---	597	145	---	70	382
						2,543	2,276	267	4,167	900	214	1,822	1,231

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

SUMMARY OF PERMANENT POSITIONS BY INSTALLATION

INSTITUTIONAL DIRECTOR AND INSTALLATION	Fiscal Year 1971	Fiscal Year 1972	Fiscal Year 1973
MANNED SPACE FLIGHT.....	12,605	11,625	11,350
John F. Kennedy Space Center, NASA.....	2,681	2,467	2,409
Manned Spacecraft Center.....	4,120	3,817	3,727
Marshall Space Flight Center...	5,804	5,341	5,214
SPACE SCIENCE.....	4,900	4,509	4,403
Goddard Space Flight Center....	4,412	4,061	3,966
Wallops Station.....	488	448	437
AERONAUTICS AND SPACE TECHNOLOGY.	10,448	9,620	9,392
Ames Research Center.....	1,922	1,769	1,727
Flight Research Center.....	535	493	481
Langley Research Center.....	3,790	3,488	3,405
Lewis Research Center.....	4,201	3,870	3,779
NASA HEADQUARTERS.....	1,897	1,746	1,705
TOTAL.....	29,850	27,500	26,850

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

DISTRIBUTION OF PERMANENT POSITIONS BY PROGRAM

INSTITUTIONAL DIRECTOR AND PROGRAM	Fiscal Year 1971	Fiscal Year 1972	Fiscal Year 1973
MANNED SPACE FLIGHT.....	9,190	8,238	7,865
Apollo.....	4,288	3,072	469
Space flight operations.....	4,696	5,018	7,249
Advanced Missions.....	206	148	147
SPACE SCIENCE.....	2,917	2,974	2,923
Physics and astronomy.....	1,730	1,741	1,693
Lunar and planetary.....	566	704	714
Bioscience.....	70	---	---
Launch vehicle procurement.....	551	529	516
SPACE APPLICATIONS.....	974	1,125	1,237
AERONAUTICS AND SPACE TECHNOLOGY...	6,904	6,174	6,034
Aeronautical research & technology	3,521	3,590	3,650
Space research & technology.....	2,495	1,784	1,705
Nuclear power & propulsion.....	888	800	679
TRACKING & DATA ACQUISITION.....	1,052	1,051	1,045
TECHNOLOGY UTILIZATION.....	46	43	43
Subtotal, Direct Positions.....	21,083	19,605	19,147
Indirect Positions.....	8,767	7,895	7,703
TOTAL, PERMANENT POSITIONS.....	29,850	27,500	26,850

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

JOHN F. KENNEDY SPACE CENTER

MISSION

The Kennedy Space Center was established at Cape Kennedy, Florida, as a separate Center within NASA in July 1962. It serves as the primary Center within NASA for the test, checkout, and launch of space vehicles. This presently includes launch of manned and unmanned vehicles at the Kennedy Space Center, the Air Force Eastern Test Range, and the Air Force Western Test Range. The Center is now concentrating on Apollo manned launches, preparations for Skylab launches, Space Shuttle launch facilities, as well as research and operational unmanned launches. The Kennedy Space Center is specifically responsible for:

1. Launch vehicle checkout and preparation.

2. Spacecraft and payload checkout and preparation.

3. Launch facility design, construction, maintenance, and operations, including advanced planning and studies leading to development of new launch operation concepts and techniques.

4. Final integration and integrated checkout of vehicle, spacecraft and launch facilities, and the conduct of actual launch operations.

5. Operation and coordination of supporting facilities, ground support equipment, and tracking and data acquisition and logistics support required for operation of all NASA activities at the Eastern and Western Test Ranges.

6. Technical and administrative support services for all NASA elements located in the area.

DESCRIPTION

Operations of the John F. Kennedy Space Center are conducted at two primary locations:

1. The Kennedy Space Center is situated approximately 50 miles east of Orlando, Florida, in northeast Brevard County. The total land and water area occupied by the installation is 140,393 acres. Breakdown of this acreage is as follows:

NASA Owned	84,021
Easement, Banana River Causeway	271
Easement, Indian River Causeway	296
Deed of Dedication, Florida Owned, Submerged Lands	55,805
Total	140,393

In addition, the Kennedy Space Center is responsible for the operation and maintenance of certain facilities within the national Eastern Test Range launch area.

2. The Western Test Range is located at Vandenberg Air Force Base, in Santa Barbara County, and is six miles west of Lompoc, California and 160 miles north of Los Angeles, California. Unmanned launch operations are accomplished through a host-tenant agreement with the Air Force, which owns the real property occupied by NASA.

The total capital investment at the Kennedy Space Center, and the Western Test Range including fixed assets in progress and contractor-held facilities at various locations as of June 30, 1971, was $1,256,925,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel	$49,025,000	$49,811,000	$48,587,000
Travel	788,000	772,000	742,000
Facilities services	28,121,000	24,717,000	24,208,000
Technical services	8,459,000	5,955,000	5,533,000
Administrative support	11,945,000	10,767,000	10,183,000
Total, fund requirements	$98,338,000	$92,022,000	$89,253,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$49,025,000	$49,811,000	$48,587,000	$-1,224,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions.....	$43,788,000	$44,331,000	$43,320,000
b. Nonpermanent positions...	587,000	585,000	585,000
c. Reimbursable details.....	41,000	---	---
d. Overtime and other compensation.....	548,000	697,000	647,000
Subtotal, Compensation...	$44,964,000	$45,613,000	$44,552,000
2. Benefits.....	$3,805,000	$3,808,000	$3,680,000
Subtotal, Compensation and Benefits.....	$48,769,000	$49,421,000	$48,232,000
B. Supporting Costs:			
1. Transfer of personnel.....	$11,000	$40,000	$20,000
2. Personnel training.....	245,000	350,000	335,000
Subtotal, Supporting Costs.	$256,000	$390,000	$355,000
Total, Personnel and Related Costs.....	$49,025,000	$49,811,000	$48,587,000
1. Compensation.....	$44,964,000	$45,613,000	$44,552,000
a. Permanent Positions.....	$43,788,000	$44,331,000	$43,320,000

The cost of compensation for permanent positions is the largest part of personnel and related costs. The funds shown above will support 2,467 permanent positions in 1972 and 2,409 positions in 1973. This represents a reduction of 272 positions from 1971.

	1971	1972	1973
Permanent Positions by Program:			
Manned Space Flight			
Apollo.....	1,495	1,329	---
Space flight operations.....	289	327	1,616
Advanced missions.....	21	21	21

	1971	1972	1973
Space Science			
Launch vehicle procurement.....	143	139	136
Subtotal, positions by program..	1,948	1,816	1,773
Indirect Positions:			
Director and staff.....	107	105	100
Administrative support.....	571	491	481
Research and development support	55	55	55
Subtotal, indirect positions..	733	651	636
Total, permanent positions.....	2,681	2,467	2,409
Other than permanent positions.....	250	250	250
Total.....	2,931	2,717	2,659

The above table illustrates the use to which positions are put. The distribution by occupation of these positions illustrates a significant characteristic of the Kennedy Space Center workforce. Professional engineers and scientists comprise approximately 50% of the Center workforce. Technicians and technically oriented wage board employees, working in direct support of the professional technical staff make up another 15% of the complement. The following table summarizes by occupational group the Center's workforce.

	1971		1972		1973	
Occupational Group	Number	Percent	Number	Percent	Number	Percent
Professional scientists and engineers.....	1,335	49.8	1,281	51.9	1,263	52.4
Technicians.....	389	14.5	370	15.0	366	15.2
Wage Board.....	3	.1	3	.1	3	.1
Professional Administrative.....	540	20.1	484	19.6	471	19.6
Clerical.....	414	15.5	329	13.4	306	12.7
Total.....	2,681	100.0	2,467	100.0	2,409	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973 the cost of permanent positions will be $43,320,000, a reduction of $1,011,000 from 1972. This reduction results as follows:

Cost of Permanent Positions in 1972.....		$44,331,000
Cost Increases in 1973.....		+914,000
Within grade advances and career development:		
Full Year Effect of 1972 Actions.....	+357,000	
Partial Year Effect of 1973 Actions.....	+557,000	
Cost Decreases in 1973.....		-1,925,000
Abolished Positions:		
Full Year Effect of 1972 Actions.....	-560,000	
Partial Year Effect of 1973 Actions.....	-793,000	
Turnover Savings.....	-229,000	
Decrease in Days Paid in 1973.....	-343,000	
Cost of Permanent Positions in 1973.....		$43,320,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Positions.....	$587,000	$585,000	$585,000

The 1973 plan includes 250 positions which is the same as 1972. These positions will be used to support the following programs at approximately the levels indicated:

Program	Positions
College Cooperative Training	50
Summer Employment	114
Youth Opportunity	60
Temporary Clerical	26

The College Cooperative Training Program provides alternating work and study periods providing the student with practical experience and academic training. This program permits many students to attend college who could otherwise not afford to by providing them an income during their work period. This program has been a principal source of recruitment for young and experienced professional personnel.

The Summer Employment Program at KSC employs high school and college students and faculty members and in consonance with the Federal Government policies and objectives provides them an insight into Government operations. The Center benefits from the useful and productive work performed by these highly motivated individuals.

The Youth Opportunity Campaign Program is conducted within the National policy which enables disadvanted youths to work at unskilled jobs both during the summer and throughout the regular school year.

The Temporary Clerical Program is necessary to provide short-term support in positions occupied by permanent employees who are absent from work because of illness, vacation, maternity, or training.

	1971	1972	1973
c. Reimbursable Details.....	$41,000	---	---
d. Overtime and Other Compensation.....	$548,000	$697,000	$647,000

The bulk of the Center overtime requirement is in direct support of test, integration and checkout of vehicle subsystems and systems and in preparation of the total vehicle including spacecraft for launch. Thus, the amount of overtime required in each fiscal year is substantially a function of the launch rate activity at the Cape. Because of improved management procedures, a reduction of $50,000 in overtime and other compensation is planned for 1973. KSC has continued its emphasis on reducing costs in this category to the lowest level consistent with mission and legal requirements.

2. Benefits.....	$3,805,000	$3,808,000	$3,680,000

In addition to compensation, KSC makes an employer's contribution to personnel benefits as authorized and required by law. The reduction in benefits costs of $128,000 in 1973 is related to the reductions in civil service personnel in 1972 and 1973. The following table indicates the costs of personnel benefits by the major categories.

Category of Cost	1971	1972	1973
Contribution to the Civil Service Retirement Fund.....	$3,096,000	$3,129,000	$3,047,000
Contribution for employee life insurance.....	167,000	168,000	164,000
Contribution for employee health insurance.....	340,000	446,000	434,000
Contribution to FICA.....	17,000	14,000	14,000
Incentive awards.....	12,000	16,000	16,000
Other personnel benefits.....	9,000	5,000	5,000
Severance pay.....	164,000	30,000	---
Total.....	$3,805,000	$3,808,000	$3,680,000

	1971	1972	1973
B. Supporting Costs.....	$256,000	$390,000	$355,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment and for training to maintain and expand the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel.....	$11,000	$40,000	$20,000

The 1966 legislation provided that the government would pay for certain relocation costs, such as the expenses of selling and buying a home, the cost of one trip to the new duty station to secure housing, and the cost of family relocation allowances. The estimated cost in 1973 is based on the number and historical average cost of relocations for this Center.

2. Personnel training.....	$245,000	$350,000	$335,000

The maintenance and expansion of the skills of personnel is essential in carrying out the agency's many complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training consists of courses offered by other government agencies, usually for a fee. The remainder of the training is provided through training at colleges, universities, technical institutes and related institutions; and for the cost of seminars and workshops in which groups of NASA employees receive training in subjects of agency-wide interests. The estimate is based on a continuation of current training programs and the growing requirements to reorient skills of employees into channels related to familiarization with Skylab flight hardware and associated ground support equipment. Therefore the level of training in 1973 will not be appreciably less than that of 1972.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$788,000	$772,000	$742,000	$-30,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$541,000	$546,000	$552,000

	1971	1972	1973
2. Flight mission support.....	$62,000	$59,000	$59,000
Subtotal.....	$603,000	$605,000	$611,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings	$16,000	$14,000	$11,000
2. Other than government-sponsored meetings and technical seminars.....	3,000	2,000	1,000
Subtotal.....	$19,000	$16,000	$12,000
C. Administrative Travel.....	$166,000	$151,000	$119,000
Total, Travel.....	$788,000	$772,000	$742,000
A. Program Related Travel.....	$603,000	$605,000	$611,000

Program related travel is the travel most directly related to the KSC mission. It is the largest part of the travel function and accounts for approximately 83% of the travel requirements for 1973.

1. Direction, coordination and management of programs.....	$541,000	$546,000	$552,000

The largest individual part of program related travel is for direction, coordination, and management of Research and Development program activities. Because of the complexity of the programs and the distribution of other NASA centers and contractor and subcontractor effort throughout the entire United States, coordination and management of activities require frequent review by personnel responsible for the program. For example: As a "one of a kind" program, Skylab requires an extensive program of subsystem and system reviews, checkout and test. The initial launch is an "all up" launch and every reasonable effort must be made to insure the success of that launch. Since there are no developmental launches prior to the launch of the mission, it is essential that detailed tests and reviews be conducted throughout the development and pre-launch period to provide the necessary confidence for launching of the mission. The philosophy which has been applied in Skylab is that available facilities located at other government or contractor installations are utilized rather than construction of similar facilities by NASA. This is the most economical approach in total program costs. It results, however, in increased travel requirements since it is necessary for KSC personnel to be present at these facilities during testing.

	1971	1972	1973
2. Flight mission support	$62,000	$59,000	$59,000

As projects reach the flight stage, support is required for pre-launch and post-launch activities. The amount of travel required for this purpose is directly related to both the number and complexity of the launches. The estimate for 1973 is in consonance with the planned launch schedule.

B. Meetings and Technical Seminars.	$19,000	$16,000	$12,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside KSC, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the types described is granted only after assurance that attendance will be in the best interest of NASA.

C. Administrative Travel.....	$166,000	$151,000	$119,000

Administrative travel includes travel for the direction and coordination of general management matters. It includes travel by managers in such areas as personnel, financial management and procurement activities. Travel of Center officials is provided in this category for trips to NASA Headquarters, other NASA Centers and to off-site locations and contractor plants.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES..	$28,121,000	$24,717,000	$24,208,000	$-509,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Rental of real property....	$6,000	$5,000	$5,000
2. Minor rehabilitation and modification, and construction.....	227,000	200,000	20,000
Subtotal.....	$233,000	$205,000	$25,000
B. Maintenance and Related Services			
1. Maintenance of building and grounds.....	$14,758,000	$10,467,000	$10,312,000
2. Maintenance of equipment...	399,000	400,000	396,000
3. Custodial services.....	7,071,000	7,129,000	6,903,000
Subtotal.....	$22,228,000	$17,996,000	$17,611,000
C. Operation of Facilities			
1. Utilities.....	$3,389,000	$3,761,000	$3,817,000
2. Supplies and equipment.....	2,271,000	2,755,000	2,755,000
Subtotal.....	$5,660,000	$6,516,000	$6,572,000
Total, Facilities Services....	$28,121,000	$24,717,000	$24,208,000

Funding requirements in this category cover the cost of operating and maintaining the non-program oriented facilities of the Kennedy Space Center. Included are facilities on the Kennedy Space Center, NASA facilities on the Eastern Test Range and NASA facilities at the Air Force Western Test Range, Vandenberg AFB, California. Although the requirements of operating and maintaining facilities are basically oriented to non-launch facilities, the launch activity has a significant influence on the demand for services under this item. As an example, the entire cost of security is funded from this category. The processing of launch vehicles levies special requirements upon the security force which are outside the normal security function involved in the protection of an installation covering an area in excess of 130 square miles and containing 273 miles of roadways and 18 miles of waterways.

The size of the facility to be maintained and the uniqueness of many of our operations place an extremely heavy demand for services to be provided. As indicated above, this Center covers a large area. Its facilities

include an area covering 4.7 million square feet requiring 25,000 tons of air conditioning, 17 heating plants, and an electrical distribution system of lines in excess of 200 miles requiring 149 substations. Included in the roadway/waterway systems are 3 bridges, 2 of which are over the intercoastal waterway.

In addition to the physical size of the plant, it is also unique in that contractors, who are involved in preparation and launch of the vehicles, are housed on-site. All normal base support to these contractor personnel are provided in the same manner as for civil servants. This places heavy demands in many areas such as building and grounds services, non-programmatic equipment services, custodial services, and many other varied services not normally associated with an activity consisting of civil service personnel only.

Since the major portion of this requirement is accomplished through the services of support contractor personnel, KSC is faced with the ever present cost escalation factor. The impact of this on our fund requirements is minimized by the continual review of operations to assure that only those services necessary to operate and maintain the facility to the degree necessary to support the program are provided. The 1973 requirement again reflects a downward cost trend of this continued effort.

	1971	1972	1973
A. Acquisition of Facilities.....	$233,000	$205,000	$25,000
1. Rental of real property.....	$6,000	$5,000	$5,000

Rental of real property is required to provide special short-use office space during launch activities.

2. Minor rehabilitation and modification, and construction	$227,000	$200,000	$20,000

This activity provides for minor rehabilitation and modification and construction of KSC facilities, within statutory limitations. The estimate for 1973 reflects the decision to move projects in excess of $10,000 to the CoF appropriation. The 1973 requirement includes several small projects needed to maintain facilities at acceptable levels of employee health, safety, and welfare.

B. Maintenance and Related Services.	$22,228,000	$17,996,000	$17,611,000
1. Maintenance of buildings and grounds.....	$14,758,000	$10,467,000	$10,312,000

Requirements in this category are generated by the aging of institutional facilities. Ninety-five percent of this requirement covers services by major support service contractors, who maintain and repair all KSC institutional

facilities and grounds. Support contractors provide a broad range of maintenance skills, such as air conditioning, plumbing, electrical, carpentry, and painting. Cost estimates are based on numerous facility usage and population factors. The balance of the estimate in this category covers work which is outside the scope of major support service contractors. It is individually contracted for through various minor contracts, with the expense related to the size of the facility to be maintained. Some specific items which are accomplished from this category are painting of the bridges and other surface structures, and special roadway work. Expenditures in this category have been restricted to the absolute minimum required. The point has been reached in the aging of the facility that makes it necessary to expend effort beyond that experienced in the past. This is necessary to preserve the facility from excessive deterioration, with a resulting major expenditure to rehabilitate.

	1971	1972	1973
2. Maintenance of equipment....	$399,000	$400,000	$396,000

The primary requirement in this category is associated with the maintenance and repair of office type equipment. This equipment is utilized by civil service and contractor personnel. It includes approximately 3,800 individual pieces of equipment, such as calculators, printing machines, recording machines, typewriters, varitypers, sorting machines and many other types of office equipment. The maintenance and repair is accomplished by some 30 different sources. 90% of these services are ordered on a Federal Supply Schedule. The forecast for 1973 is based on equipment aging to the point where more frequent maintenance is required. More major repairs, within economical limits, will occur as the life of much of this equipment is extended. However, this will defer the purchase of replacement equipment, thereby providing adequate service at a minimum cost.

3. Custodial services.....	$7,071,000	$7,129,000	$6,903,000

Services included in this category are security at KSC and CKAFS, fire protection at KSC, janitorial services for NASA facilities at CKAFS and WTR, and minor contracts for refuse handling and laundry services. Security, fire protection, and janitorial services are provided by major support service contractors. For janitorial, requirements are based on square feet serviced; for fire protection and security, staffing required to meet safety and security standards for all areas, both institutional and operational. The major portion of this requirement covers the cost of security and fire protection. 1973 estimate reflects minor adjustments in staffing levels.

C. Operation of Facilities.....	$5,660,000	$6,516,000	$6,572,000
1. Utilities.....	$3,389,000	$3,761,000	$3,817,000

Funding requirement in this category covers the cost of electricity, water, sewage and other utilities, including locally generated electricity at CKAFS. Estimates reflect the total utilities for all areas, both institutional and

operational and are based on various consumption factors for facilities known or anticipated to be in service. 1973 estimate reflects a minor increase based on anticipated anti-pollution efforts.

	1971	1972	1973
2. Supplies and equipment.....	$2,271,000	$2,755,000	$2,755,000

The supplies, materials, and equipment used in the maintenance and operation of the KSC facilities are budgeted in this category. This includes those consumed by the support contractors in performance of their maintenance and operations responsibilities. The type of items are generally those used by tradesmen in the maintenance activity; e.g., lumber, metals, pipes, valves, fittings, paint, wire, switches, lighting fixtures, and many others. In addition, it covers the cost of fuels used in the boiler plants and other fuels, lubricants and chemicals used in a variety of operations and in special purpose vehicles. The 1973 estimate is expected to remain at the same level as 1972.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES..	$8,459,000	$5,955,000	$5,533,000	$-422,000

Basis of Fund Requirement

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$864,000	---	---
2. Purchase of equipment.....	1,411,000	$251,000	$15,000
3. Maintenance of equipment....	---	100,000	100,000
Subtotal, equipment.....	$2,275,000	$351,000	$115,000
4. Programming and operation services.....	2,164,000	2,408,000	2,424,000
Subtotal.....	$4,439,000	$2,759,000	$2,539,000
B. Scientific and Technical Information & Educational Programs			
1. Operation of NASA technical libraries.....	$367,000	$202,000	$205,000

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	1971	1972	1973
2. Educational/information programs.....	$91,000	$67,000	$70,000
3. Scientific and technical information.....	3,562,000	2,927,000	2,719,000
Subtotal.....	$4,020,000	$3,196,000	$2,994,000
Total, Technical Services.....	$8,459,000	$5,955,000	$5,533,000
A. Automatic Data Processing.....	$4,439,000	$2,759,000	$2,539,000

This subcategory provides for the lease, purchase, and maintenance of general purpose data processing equipment which supports overall Center operations. Programming and operations support is provided by contract.

Business type applications include payroll, labor distribution and cost records, personnel data and a data management system. All the business-type data processing is performed on an IBM 360 System that was purchased in 1971. In 1972, most of the punch card equipment was purchased, thereby eliminating leased costs. The lower budget for ADP in 1973 results from non-recurrence of purchase costs, offset by a slight increase in programming and operations support. No increase in manning levels is proposed in 1973.

B. Scientific and Technical Information & Educational Programs.	$4,020,000	$3,196,000	$2,994,000

Included in these programs are the costs of the technical libraries, educational/informational programs, and the scientific and technical information services. The costs are summarized as follows:

1. Operation of technical libraries.....	$367,000	$202,000	$205,000

The technical library was established to serve employees and authorized contractor personnel with their information needs for books, periodicals, technical reports, and other documentation. The slight increase in 1973 is attributed to cost escalation.

2. Educational/informational programs.....	$91,000	$67,000	$70,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news worthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material. The level of

activity at KSC in 1973 is expected to remain at about the same level as in 1972.

	1971	1972	1973
3. Scientific & technical information.....	$3,562,000	$2,927,000	$2,719,000

Scientific and technical information activities include documentation, publication, photographic and translation services. This support includes the providing of test and checkout procedures, launch countdowns, microfilmed engineering drawings and telemetry data and other related technical material. The decrease in 1973 is related to the reduction in personnel and a lower level of activity requiring services included in this subcategory.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT	$11,945,000	$10,767,000	$10,183,000	$-584,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$1,202,000	$1,041,000	$914,000
2. Local telephone service.....	1,246,000	1,373,000	1,233,000
3. Other communications.....	134,000	147,000	125,000
Subtotal.....	$2,582,000	$2,561,000	$2,272,000
B. Administrative Printing.....	$236,000	$236,000	$233,000
C. Supplies, Materials and Equipment			
1. Supplies and materials....	$784,000	$844,000	$819,000
2. Equipment.....	101,000	132,000	113,000
Subtotal.....	$885,000	$976,000	$932,000
D. Transportation			
1. Center support.....	$1,978,000	$2,098,000	$2,068,000
2. Common carrier.....	118,000	139,000	127,000
Subtotal.....	$2,096,000	$2,237,000	$2,195,000

	1971	1972	1973
E. Administrative Support Services			
1. Installation support services.....	$5,378,000	$3,978,000	$3,723,000
2. Medical services.....	768,000	779,000	828,000
Subtotal.....	$6,146,000	$4,757,000	$4,551,000
Total, Administrative Support...	$11,945,000	$10,767,000	$10,183,000
A. Communications.....	$2,582,000	$2,561,000	$2,272,000

The funds requested will support all NASA personnel, contractor and civil service, located on the Kennedy Space Center, the Eastern Test Range and the Western Test Range. It covers all communication services required to conduct official business within NASA, industry, and institutions located throughout the country. The costs of the local telephone service, Federal Telecommunications System (FTS), long distance tolls, and teletype services for the total complement are budgeted in this subcategory. A significant reduction is forecast in the 1973 requirement. This is associated with reductions in personnel related services; particularly FTS and administrative telephones.

B. Administrative Printing.....	$236,000	$236,000	$233,000

Estimates for administrative printing include funds for minor efforts such as the KSC house organ and miscellaneous special requirements for duplicating, photostating, blueprinting, microfilming, and other photographic reproductions. Services are performed by other government agencies or by commercial printing firms.

C. Supplies, Materials and Equipment	$885,000	$976,000	$932,000

The requirements in this subcategory cover a wide range of administrative supplies used by civil servants and contractor personnel. A major item procured is paper used to perform computer operations on management-type programs, such as those related to personnel management, financial management, supply and transportation operations and procurement activity. Another large item is printing supplies required to perform the printing function for the entire Center. Office-type equipment is also budgeted in this subcategory. This item, however, has been held to an absolute minimum through extending the life of in-use items by repair within economical limits. By close surveillance of this category, a decrease in the level for 1973 is forecast. This reduction has been offset by price increases being experienced and anticipated in the future.

D. Transportation.....	$2,096,000	$2,237,000	$2,195,000

The major item budgeted in this subcategory is the local motor pool operation

and associated services provided by the General Services Administration (GSA). This operation involves the furnishing of 1,000 vehicles including trucks, sedans, station wagons, buses and ambulances. These vehicles are utilized by all personnel at the Center including all contractors. The cost of aircraft operations and services, as well as the movement of all supplies, materials, equipment, and related items by common carrier is included. By continuous emphasis on vehicle and mileage reduction, a slight decrease is forecast in the 1973 requirement. As is the case in most service related items, cost escalation continues to offset a significant part of savings achieved.

	1971	1972	1973
E. Administrative Support Services....	$6,146,000	$4,757,000	$4,551,000

Installation support services are those support services not described elsewhere which have wide application throughout the Center, including logistics services at KSC and NASA facilities at CKAFS, mail and distribution services, and installation support services at the WTR. Logistics services are provided by a support contractor at KSC and by the ETR at CKAFS. Services include receipt, storage, and issue of supplies and equipment as well as maintaining various management systems, such as repair, modification, and ordnance. Mail and distribution services are provided by a support contractor and include distribution of inter-office mail, expedite service, classified document control and operation of the KSC branch post office. Other services provided in this category are rental of office copiers and payment of minor claims for property damage. Medical services are also included and provide both occupational medicine and environmental health for all civil service and contractor personnel. The decrease in 1973 is related to the reduction in personnel and a lower level of activity requiring services included in this subcategory.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION & STAFFING CHART
JOHN F. KENNEDY SPACE CENTER

STAFFING SUMMARY

	FY 72	FY 73
Excepted	27	27
GS-16	12	11
GS-15	123	123
GS-14	221	221
All Other GS	2021	1964
WB	3	3
Total Perm.	2407	2409

DIRECTOR

	FY 72	FY 73
Excepted	3	3
GS-16	--	--
GS-15	2	2
GS-14	1	1
All Other GS	2	2
WB	--	--
Total Perm.	8	8

PUBLIC AFFAIRS OFFICE

	FY 72	FY 73
Excepted	--	--
GS-16	--	--
GS-15	2	2
GS-14	3	3
All Other GS	20	19
WB	--	--
Total Perm.	25	24

EXECUTIVE STAFF

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	1	1
GS-14	1	1
All Other GS	7	7
WB	--	--
Total Perm.	10	10

DIRECTOR QUALITY ASSURANCE

	FY 72	FY 73
Excepted	--	--
GS-16	--	--
GS-15	1	1
GS-14	2	2
All Other GS	13	13
WB	--	--
Total Perm.	16	16

CHIEF COUNSEL

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	1	1
GS-14	1	1
All Other GS	7	7
WB	--	--
Total Perm.	10	10

RANGE SAFETY OFFICE

	FY 72	FY 73
Excepted	--	--
GS-16	1	1
GS-15	--	--
GS-14	1	1
All Other GS	2	2
WB	--	--
Total Perm.	4	4

SAFETY OFFICE

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	1	1
GS-14	1	1
All Other GS	24	23
WB	--	--
Total Perm.	27	26

DIRECTOR CENTER PLANNING & FUTURE PROGRAMS

	FY 72	FY 73
Excepted	2	2
GS-16	1	1
GS-15	6	6
GS-14	10	10
All Other GS	10	9
WB	--	--
Total Perm.	29	28

MANAGER APOLLO-SKYLAB PROGRAMS

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	7	7
GS-14	15	15
All Other GS	57	55
WB	--	--
Total Perm.	80	78

DIRECTOR OF ADMINISTRATION

	FY 72	FY 73
Excepted	3	3
GS-16	--	--
GS-15	10	10
GS-14	25	25
All Other GS	294	286
WB	--	--
Total Perm.	332	324

MANAGER SCIENCES & APPLICATIONS OFFICE

	FY 72	FY 73
Excepted	--	--
GS-16	--	--
GS-15	--	--
GS-14	--	--
All Other GS	--	--
WB	--	--
Total Perm.	--	--

DIRECTOR OF LAUNCH OPERATIONS

	FY 72	FY 73
Excepted	2	2
GS-16	--	--
GS-15	3	3
GS-14	1	1
All Other GS	10	10
WB	--	--
Total Perm	16	16

DIRECTOR OF DESIGN ENGINEERING

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	1	1
GS-14	--	--
All Other GS	7	7
WB	--	--
Total Perm.	9	9

DIRECTOR OF TECHNICAL SUPPORT

	FY 72	FY 73
Excepted	2	2
GS-16	--	--
GS-15	2	2
GS-14	8	8
All Other GS	25	24
WB	--	--
Total Perm.	37	36

DIRECTOR OF INSTALLATION SUPPORT

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	8	8
GS-14	11	11
All Other GS	198	193
WB	3	3
Total Perm.	221	216

ASSOCIATE DIRECTOR FOR OPERATIONS

	FY 72	FY 73
Excepted	1	1
GS-16	1	1
GS-15	5	5
GS-14	9	9
All Other GS	12	11
WB	--	--
Total Perm.	28	27

DIRECTOR LAUNCH VEHICLE OPERATIONS

	FY 72	FY 73
Excepted	1	1
GS-16	1	1
GS-15	23	23
GS-14	36	36
All Other GS	317	293
WB	--	--
Total Perm.	378	354

DIRECTOR UNMANNED LAUNCH OPERATIONS

	FY 72	FY 73
Excepted	1	1
GS-16	--	--
GS-15	8	8
GS-14	19	19
All Other GS	99	96
WB	--	--
Total Perm.	127	124

ASSOCIATE DIRECTOR FOR FACILITIES & SYS. MGT.

	FY 72	FY 73
Excepted	1	1
GS-16	1	1
GS-15	4	4
GS-14	11	11
All Other GS	47	45
WB	--	--
Total Perm.	64	62

ASSOCIATE DIRECTOR FOR DESIGN

	FY 72	FY 73
Excepted	1	1
GS-16	3	2
GS-15	12	12
GS-14	31	31
All Other GS	168	213
WB	--	--
Total Perm.	215	259

DIRECTOR INFORMATION SYSTEMS

	FY 72	FY 73
Excepted	1	1
GS-16	2	2
GS-15	11	11
GS-14	34	34
All Other GS	221	203
WB	--	--
Total Perm.	269	251

DIRECTOR SUPPORT OPERATIONS

	FY 72	FY 73
Excepted	--	--
GS-16	2	2
GS-15	7	7
GS-14	19	19
All Other GS	166	154
WB	--	--
Total Perm.	194	182

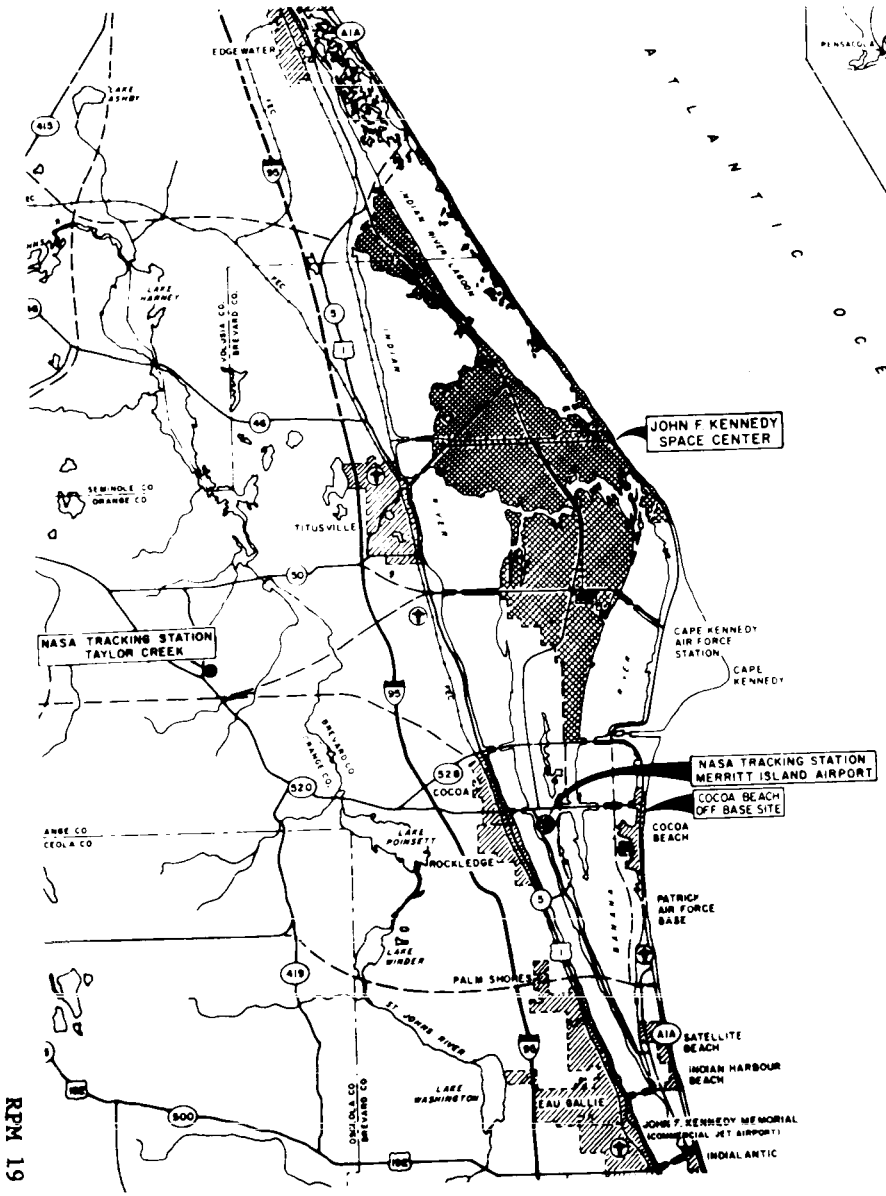
DIRECTOR SPACECRAFT OPERATIONS

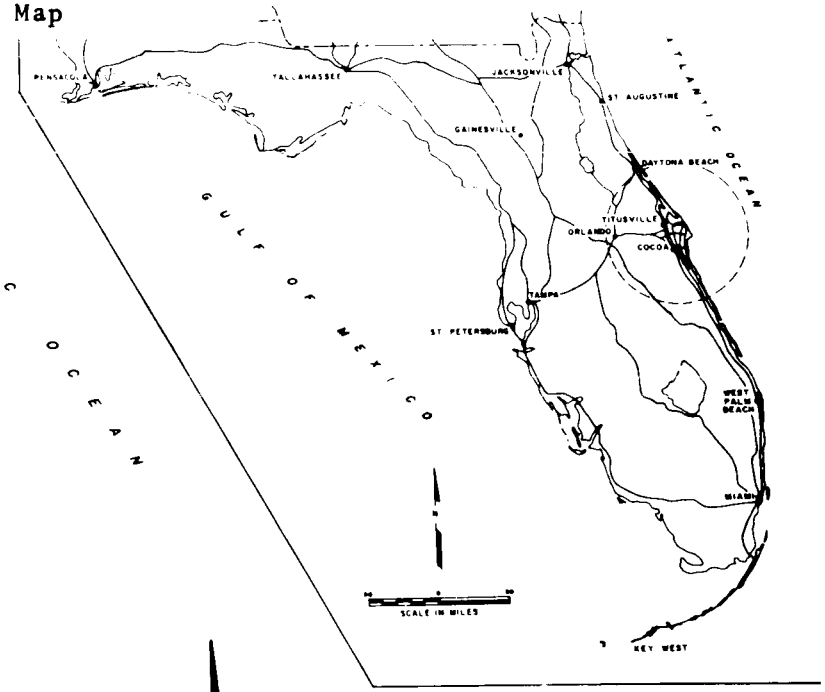
	FY 72	FY 73
Excepted	3	3
GS-16	--	--
GS-15	8	8
GS-14	42	42
All Other GS	315	292
WB	--	--
Total Perm.	368	345

JOHN F. KENNEDY SPACE CENTER, NASA

Fiscal Year 1973 Estimates

Area Map

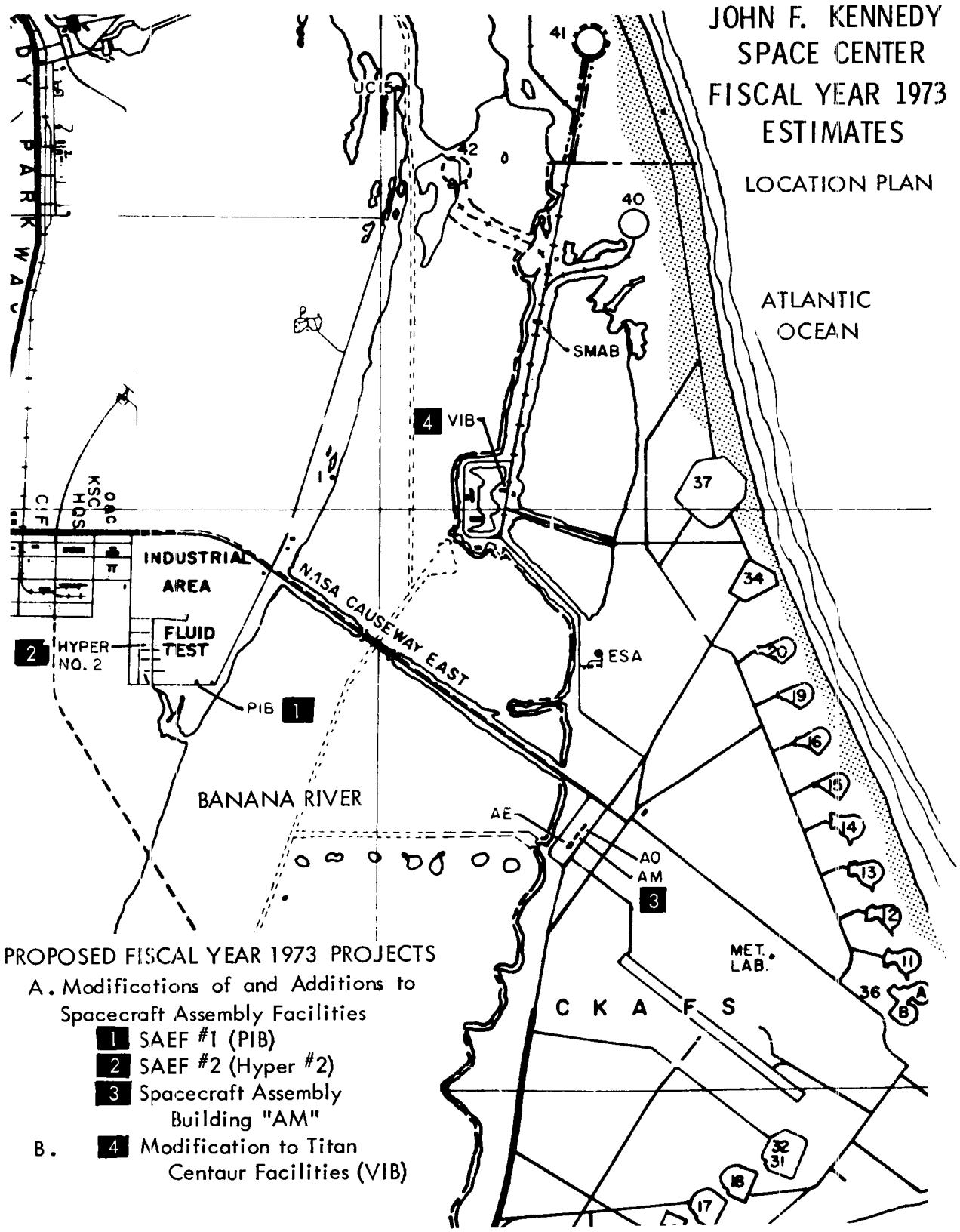




N

LEGEND

- U.S. HIGHWAY
- INTERSTATE HIGHWAY
- STATE HIGHWAY
- HIGHWAY PROPOSED OR UNDER CONSTRUCTION
- AIRPORT


JOHN F. KENNEDY
SPACE CENTER
FISCAL YEAR 1973
ESTIMATES
LOCATION PLAN
ATLANTIC
OCEAN
DY PARKWAY
UC15
41
42
40
SMAB
4 VIB
37
34
INDUSTRIAL
AREA
NASA CAUSEWAY EAST
FLUID
TEST
2 HYPER
NO. 2
PIB 1
ESA
20
19
16
15
14
13
12
11
36
A
B
BANANA RIVER
AE
AO
AM
3
MET.
LAB.
C K A F S
32
31
18
17
PROPOSED FISCAL YEAR 1973 PROJECTS
A. Modifications of and Additions to
Spacecraft Assembly Facilities
1 SAEF #1 (PIB)
2 SAEF #2 (Hyper #2)
3 Spacecraft Assembly
Building "AM"
B. 4 Modification to Titan
Centaur Facilities (VIB)

Cape Kennedy Air Force Station Industrial Area with Complex 41 in Foreground

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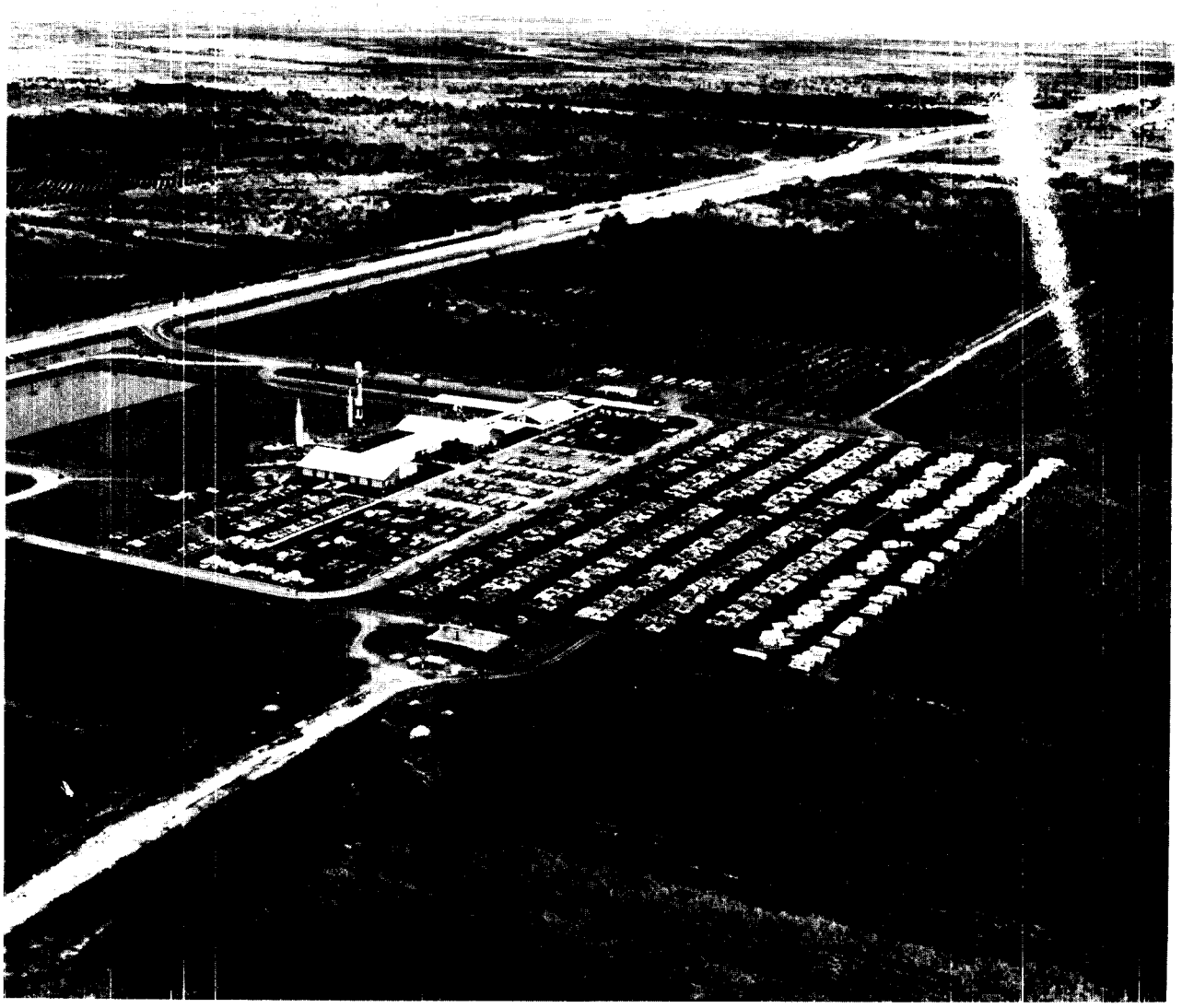
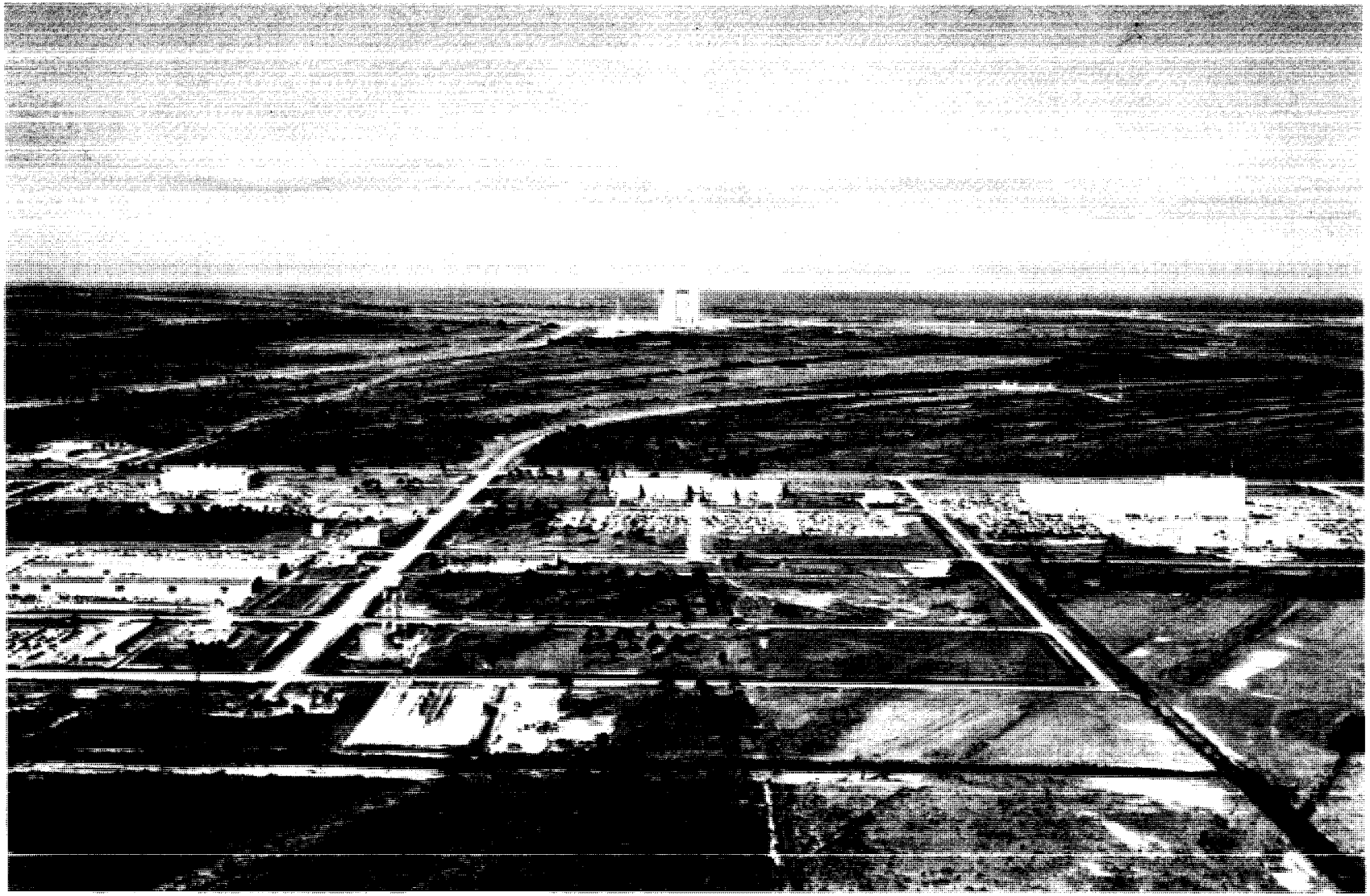


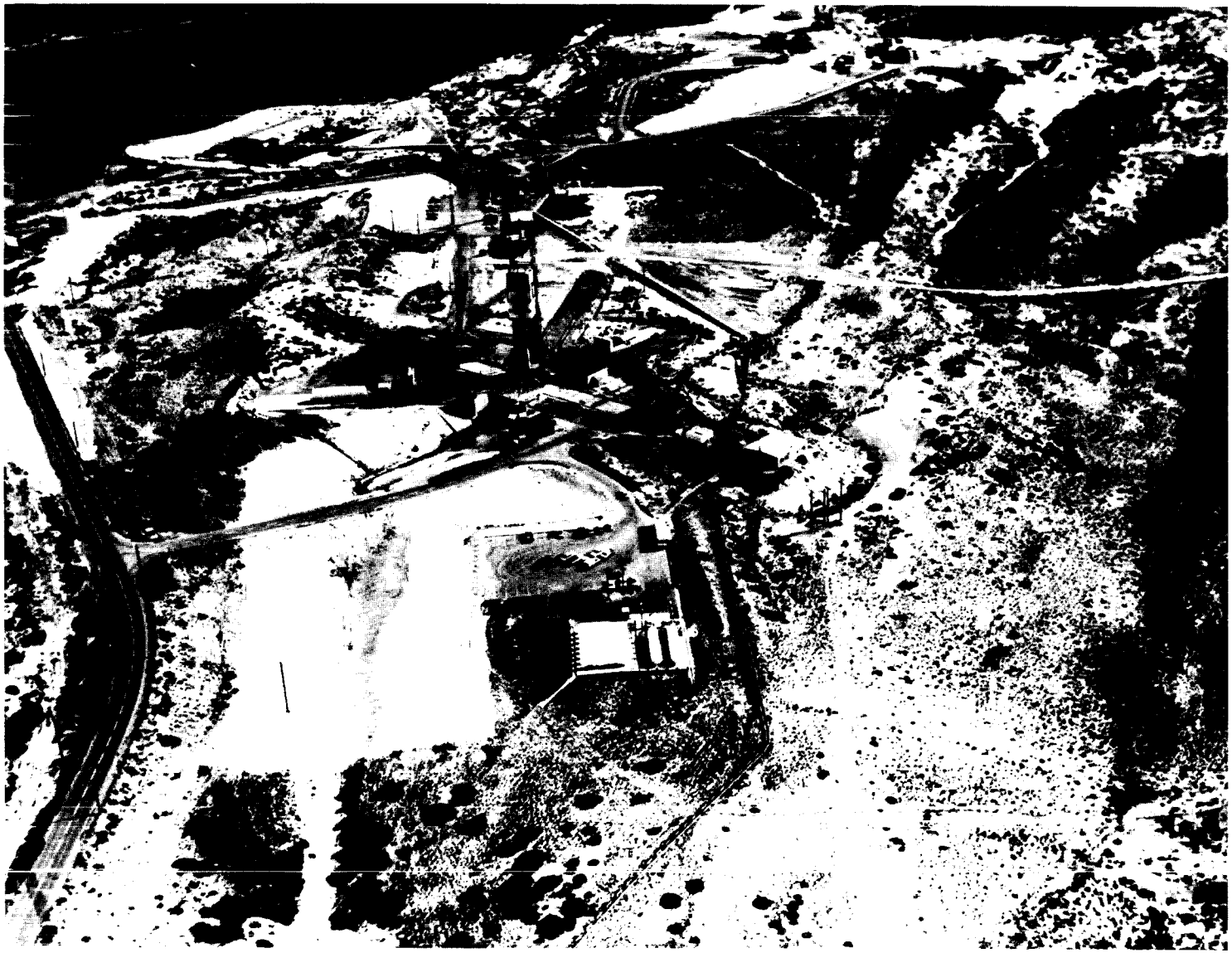
Activity at Visitors Information Center RPM 22

John F. Kennedy Space Center, NASA

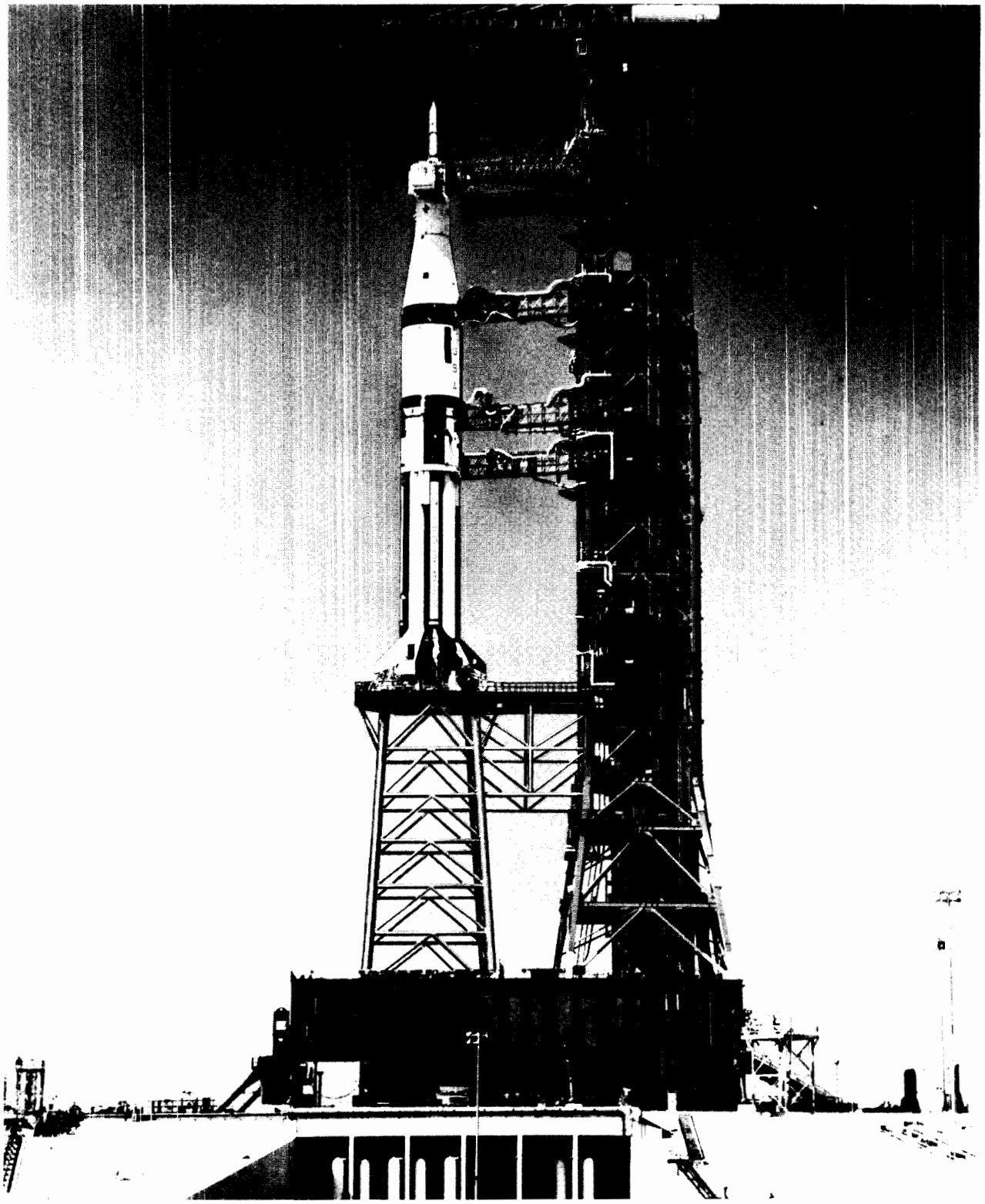


Industrial Area with Vehicle Assembly Bldg.
in Background

John F. Kennedy Space Center, NASA



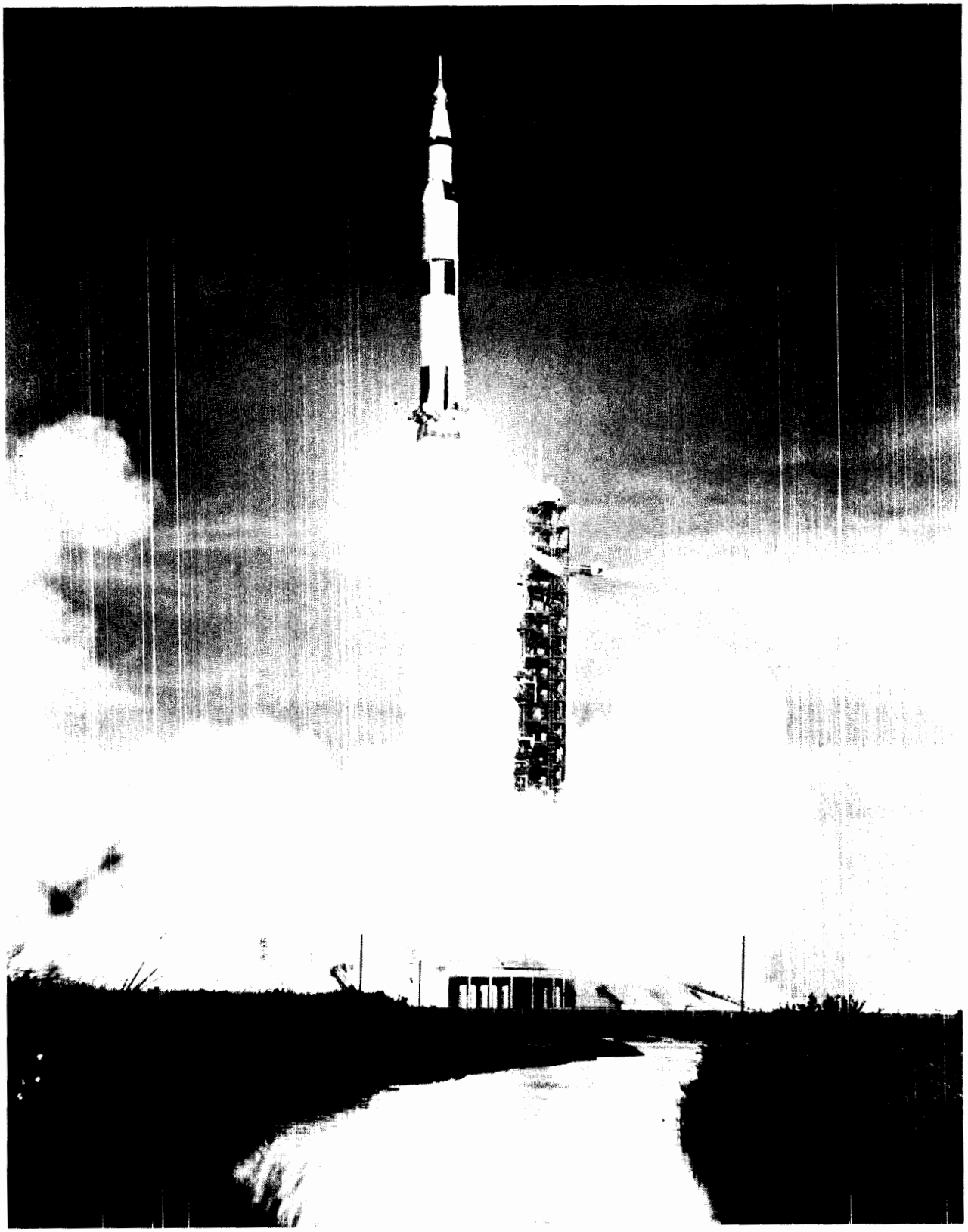
Western Test Range Industrial Area



Skylab Saturn IB on Mobile Launcher
(Composite Photograph)

RPM 25

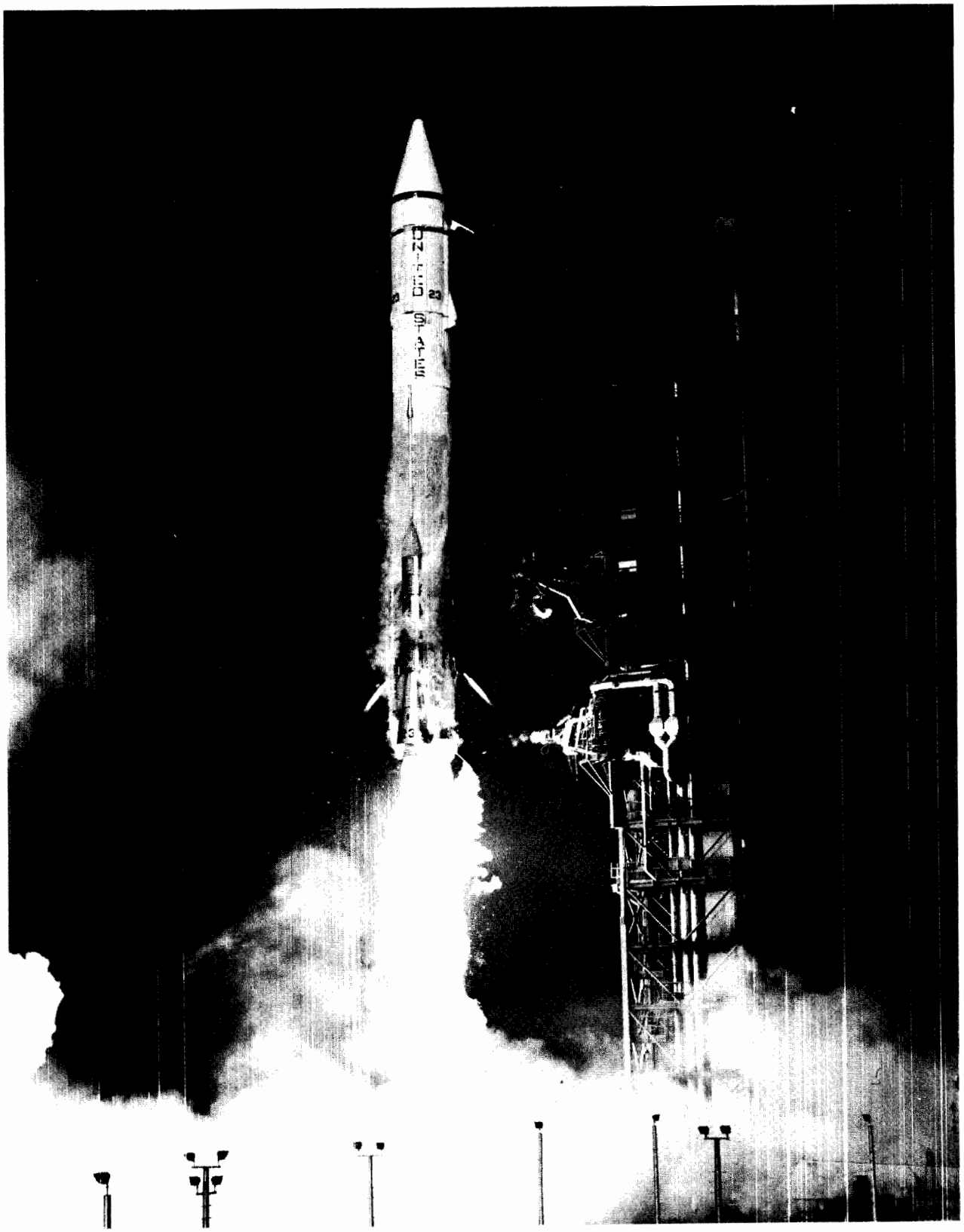
John F. Kennedy Space Center, NASA



Apollo 15 Liftoff, July 26, 1971

RPM 26

John F. Kennedy Space Center, NASA



Liftoff of Atlas Centaur with Mariner 9 RPM 27

Liftoff of Delta from Western Test Range

RPM 28

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

MANNED SPACECRAFT CENTER

MISSION

The Manned Spacecraft Center (MSC) was established in November 1961, in Houston, Texas, as NASA's primary Center for the design, development, and manufacture of manned spacecraft, and for selection and training of astronaut crews and the conduct of space flight missions. The MSC mission further embraces an engineering, development, and operations capability to support and to generate the knowledge required to advance the technology of manned space flight. Engineering and development efforts focus on: systems definition, development, evaluation and test support for spacecraft development programs; and on applied research, technology development and advanced studies for future spacecraft systems, payloads and programs. Space science efforts are devoted to experiments in flights, scientific lunar exploration, research on returned lunar material, space environment studies, and development of a capability for surveying earth resources from space. The medical capabilities include experiments in flight, flight crew monitoring, and development of physiological requirements for spacecraft systems.

MSC is now engaged in Apollo Lunar Exploration and is proceeding with necessary spacecraft modifications for limited extension of exploration capabilities. Spacecraft are also being modified to support the requirements of the Skylab program. The Center's mission in the Earth Observations Program also includes the activities of the Earth Resources Laboratory located at the Mississippi Test Facility. MSC is responsible for:

1. The design, development, and fabrication of the manned spacecraft including the command and service modules, and the lunar module.

2. Overall program management and control of the spacecraft including module integration, testing, and qualification.

3. Conduct of a program of spacecraft environmental testing.

4. Selection and training of astronauts and preparation of primary and backup crews for each mission.

5. Operation of the Mission Control Center and control of the space flight missions from lift-off to recovery.

6. Development of scientific and medical experiments to be flown on manned space flight missions.

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7. Operation of the Lunar Receiving Laboratory, which provides a central complex where samples of materials brought to earth by lunar exploration teams are received, quarantined, processed, undergo limited experiments, and are distributed to the scientific community for further analysis.

8. Development and exploitation of aeronautical and aerospace photographic and remote sensor systems to provide and interpret scientific data on the physical sciences with emphasis on geography, geology, oceanography and hydrology.

9. Conduct of research investigations in the Mississippi-Louisiana-Gulf area in the application of remotely sensed data obtained from aircraft and satellites, and dissemination of this knowledge to potential users or agencies charged with specific responsibilities for operational activities.

10. **MSC is the lead Center for the Space Shuttle activities. The booster and main engine project managers located at MSFC, the Launch/Landing Project Manager located at KSC and the Orbiter Project Manager located at MSC will all report on program matters to the Space Shuttle Program Manager located at MSC.**

DESCRIPTION

The Manned Spacecraft Center is located two miles east of the town of Webster, Texas. The site is approximately 20 miles southeast of downtown Houston and 25 miles northwest of Galveston, Texas. Total NASA-owned land at Houston consists of 1,620 acres. The Center also occupies an additional 54,080 acres at the White Sands Test Facility, Las Cruces, New Mexico. The total capital investment of the Manned Spacecraft Center, including fixed assets in progress and contractor-held facilities at various locations, and the White Sands Test Facility as of June 30, 1971, was $821,435,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel	$81,395,000	$82,219,000	$80,086,000
Travel	3,800,000	3,721,000	3,621,000
Facilities services	10,668,000	9,264,000	9,471,000
Technical services	7,341,000	6,429,000	6,033,000
Administrative support	7,928,000	8,423,000	7,680,000
Total fund requirements	$111,132,000	$110,056,000	$106,891,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$81,395,000	$82,219,000	$80,086,000	-$2,133,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent Positions.....	$70,799,000	$71,546,000	$69,972,000
b. Nonpermanent Positions....	1,046,000	1,086,000	1,086,000
c. Reimbursable Details.....	1,915,000	1,580,000	1,450,000
d. Overtime and Other Compensation.....	973,000	1,151,000	1,129,000
Subtotal, Compensation....	$74,733,000	$75,363,000	$73,637,000
2. Benefits.....	6,248,000	6,409,000	6,002,000
Subtotal, Compensation and Benefits.....	$80,981,000	$81,772,000	$79,639,000
B. Supporting Costs:			
1. Transfer of Personnel.....	$88,000	$120,000	$120,000
2. Personnel Training.....	326,000	327,000	327,000
Subtotal, Supporting Costs..	$414,000	$447,000	$447,000
Total, Personnel and Related Costs	$81,395,000	$82,219,000	$80,086,000
1. Compensation.....	$74,733,000	$75,363,000	$73,637,000
a. Permanent Positions.....	$70,799,000	$71,546,000	$69,972,000

The cost of compensation for permanent positions is the largest part of Personnel and related costs. The funds shown above will support 3,817 permanent positions in 1972 and 3,727 positions in FY 1973. This represents a reduction of 393 positions from 1971.

Permanent Positions by Program:	1971	1972	1973
Manned Space Flight			
Apollo	1,639	1,080	329
Space flight operations	1,160	1,463	2,083
Advanced missions	30	27	28
Space Science			
Physics and astronomy	12	11	7
Lunar and planetary exploration	9	7	6
Space Applications	110	164	239
Aeronautics and Space Technology			
Space research and technology	19	28	24
Subtotal, positions by program	2,979	2,780	2,716
Indirect Positions			
Director and staff	67	63	63
Administrative support	494	458	447
Research and development support	580	516	501
Subtotal, indirect positions	1,141	1,037	1,011
Total, permanent positions	4,120	3,817	3,727
Other Than Permanent Positions	350	350	350
Total	4,470	4,167	4,077

The above table illustrates the use of civil service positions. The distribution by occupation of these positions illustrates a significant characteristic of the Manned Spacecraft Center workforce. Professional engineers and scientists comprise approximately 60% of the Center workforce. Technicians and technically oriented wage board employees, working in direct support of the professional technical staff make up another 12% of the complement. The following table summarizes by occupational group the Center's workforce.

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	2,376	57.6	2,255	59.0	2,221	59.5
Technicians.....	493	12.0	429	11.2	411	11.1
Wage board.....	41	1.0	36	1.0	34	.9
Professional administrative.....	565	13.7	517	13.6	501	13.5
Clerical.....	645	15.7	580	15.2	560	15.0
Total.....	4,120	100.0	3,817	100.0	3,727	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the beginning of the year as modified by the various actions that take place within the year. These actions are normal progression, (i.e. within grade, career development, recognition of outstanding performance or contributions, etc.), and abolishment of existing positions. After these modifications have been estimated, the year-end position structure is established. The cost effect for the year is calculated based on the estimated period these modifications are in effect.

In 1973 the cost of permanent positions will be $69,972,000. This is a decrease of $1,574,000 from 1972. This decrease results from the following:

Cost of permanent positions in 1972.....		$71,546,000
Cost of increases in 1973.....		1,174,000
Within grade advances and career development:		
Full year effect of 1972.....	+$629,000	
Partial year effect of 1973 actions.....	+545,000	
Cost decreases in 1973.....		-2,748,000
Abolished positions:		
Full year effect of 1972 actions.....	-1,428,000	
Partial year effect of 1973 actions.....	-637,000	
Decrease in days paid in 1973.....	-545,000	
Turnover savings.....	-138,000	
Cost of permanent positions in 1973.....		$69,972,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Positions.....	$1,046,000	$1,086,000	$1,086,000

The 1973 plan includes 350 positions which is the same as 1972. These positions will be used to support the following programs at approximately the levels indicated:

Program	Positions
College Cooperative Training	35
Summer Employment	180
Youth Opportunity	75
Temporary Clerical	60

The College Cooperative Training Program provides alternating work and study periods providing the student with practical experience and academic training. This program permits many students to attend college who could otherwise not afford to by providing them an income during their work period. This program has been a principal source of recruitment for young and experienced professional personnel.

The Summer Employment Program at MSC employs high school and college students and faculty members and in consonance with the Federal Government policies and objectives provides them an insight into Government operations. The Center benefits from the useful and productive work performed by these highly motivated individuals.

The Youth Opportunity Campaign Program is conducted within the National policy, which enables disadvantaged youths to work at unskilled jobs both during the summer and throughout the regular school year.

The Temporary Clerical Program is necessary to provide short-term support in positions occupied by permanent employees who are absent from work because of illness, vacation, maternity, or training.

c. Reimbursable Details	$1,915,000	$1,580,000	$1,450,000

The military personnel detailed to the Manned Spacecraft Center on a reimbursable basis are personnel experienced in manned flight or related fields. Each individual performs an essential and critical function to the current and future programs.

From the inception of the Manned Spacecraft Center it was recognized that the experience and knowledge of individuals with a "flight" background would be essential to the manned space flight programs. The individuals most readily available within the Government ranks were in the military. The requirement for keeping the military current on the manned space flight

technology was also essential, even though the participation would be limited to a relative few. This was the basis for utilizing reimbursable detailees in addition to the astronauts.

Some civilian employees are also detailed, on a reimbursable basis, to the Manned Spacecraft Center. These are individuals whose experience in a specific field is essential.

There are some individuals of other Government agencies both civilian and military, who are detailed to the Manned Spacecraft Center but not on a reimbursable basis. These individuals are to observe and keep abreast of the technical progress of manned space flights in their respective areas.

The reimbursable detailees are categorized as follows:

Category	1972	1973
Military		
Astronauts.....	28	26
Others.....	72	56
Civilians.....	3	3
Total.....	103	85

The reimbursable detailee costs in 1973 are estimated to be $1,450,000 or 8.2% less than 1972.

	1971	1972	1973
d. Overtime and Other Compensation	$973,000	$1,151,000	$1,129,000

The major portion (approximately 81%) of overtime and holiday pay is used in direct support of manned missions, long duration chamber tests and preparation and operation of astronaut training simulators. Specific examples are the Skylab Medical Experiment Altitude Tests (SMEAT), Skylab chamber tests, training preparation and transition of Skylab training. In addition there is the direct support required for priority printing of training and missions operations manuals, hand tools, etc. There is also the lunar samples processing and analysis and other post flight related activities. The Earth Observation Program in such areas as ecological studies and weather observations requires some continuous effort beyond the normal work period.

The remaining portion (approximately 19%) of overtime and holiday pay is used in peak work load periods. Some specific examples are preparation of the fiscal year end close out, a reduction in force, inquiry mail before and after a mission, large RFP preparations, statements of work and SEB criteria, and unforeseen "crash" type exercises.

2. Benefits.....	$6,248,000	$6,409,000	$6,002,000

In addition to the compensation paid employees MSC makes an employer's contribution to personnel benefits as authorized and required by law. The cost of benefits is $407,000 less in 1973 than in 1972 because of the civil service personnel reductions.

Following are the amounts of contribution by category:

Category	1971	1972	1973
Civil Service Retirement.....	$4,952,000	$5,048,000	$4,967,000
Employees life insurance.....	253,000	263,000	258,000
Employees health insurance.....	557,000	581,000	535,000
FICA.....	42,000	30,000	30,000
Incentive awards.....	67,000	82,000	75,000
Other personnel benefits.....	128,000	150,000	122,000
Severance pay.....	249,000	255,000	15,000
Total.....	$6,248,000	$6,409,000	$6,002,000
B. Supporting Costs.....	$414,000	$447,000	$447,000

Supporting personnel costs provide for the expenses of moving reassigned personnel and for maintaining and expanding the skills of the employees.

1. Transfer of personnel.....	$88,000	$120,000	$120,000

This category includes the reimbursement to employees of movement of household goods to the employees' new duty station and other relocation expenses. The estimated costs are based on historical average costs and the planned number of moves.

2. Personnel training.....	$326,000	$327,000	$327,000

The Personnel training costs for 1973 is based on continuation of current training programs and the need to reorient skills of employees into areas compatible with the direction of the space program in the 1970's and MSC's role in the program. A prime objective is career development to permit employees to advance to more responsible positions and to provide the Center with highly motivated and experienced personnel not readily available in the labor market. The maintenance and expansion of the skills of personnel is essential in carrying out the Center's many complex technical and management responsibilities. The costs cover tuition, fees and related costs for training at colleges, universities, technical and management institutes; and for the cost of seminars and workshops related to MSC's role in the space program. The personnel level will be less in 1973 but the need to retrain or update skills has increased as well as the costs of training; therefore, the plan is to hold to the 1972 level.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$3,800,000	$3,721,000	$3,621,000	-$100,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$3,042,000	$2,922,000	$2,993,000
2. Flight mission support.....	306,000	350,000	200,000
3. Overseas travel to launch and tracking sites.....	140,000	105,000	105,000
Subtotal.....	$3,488,000	$3,377,000	$3,298,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings...	$55,000	$50,000	$50,000
2. Other than government-sponsored meetings and technical seminars	110,000	110,000	100,000
Subtotal.....	$165,000	$160,000	$150,000
C. Administrative Travel.....	$147,000	$184,000	$173,000
Total, Travel.....	$3,800,000	$3,721,000	$3,621,000
A. Program Related Travel.....	$3,488,000	$3,377,000	$3,298,000

Program related travel is the travel most directly related to the Mission of the Manned Spacecraft Center. It is the largest part of the travel function and accounts for approximately 88% of the Center's total travel requirements for 1973.

1. Direction, coordination, and management of programs.....	$3,042,000	$2,922,000	$2,993,000

The largest individual part of program related travel is for direction, coordination and management of Research and Development program activities.

Because of the complexity of the Research and Development programs and the distribution of contractor effort throughout the entire United States, coordination and management of activities and contract monitoring require

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frequent examination by personnel responsible for the programs. In 1973 the Apollo program will be phasing downward. Contracts will be closing out and disposition must be made of government-owned property and equipment. At the same time the Skylab program will be reaching the heights of its complexity, requiring hardware and other requirements reviews, close configuration and contract monitoring and, in some instances, creating an overlap in personnel responsibilities. Also, the Shuttle program will be getting underway, requiring the attendance of many personnel in configuration conferences and preliminary requirements reviews.

	1971	1972	1973
2. Flight mission support.....	$306,000	$350,000	[illegible]0,000

Support is required for pre-launch and post-launch activities and the amount of travel required for this purpose is directly related to the flight [illegible]hedules for 1973 and pre-launch activities in support of 1974 schedules. The Apollo program has but one flight scheduled for 1973 which results in a significant saving in comparison with 1972. The Skylab program has two flights scheduled for 1973, offsetting a portion of the savings.

3. Overseas travel to launch and tracking sites.....	$140,000	$105,000	$105,000

Overseas travel to launch and tracking sites is required for inspection, instrumentation and testing of the sites prior to launch and operation of sites during flight.

B. Meetings and Technical Seminars...	$165,000	$160,000	$150,000

Travel to meetings and technical seminars permits employees engaged in Research and Development activities to participate at government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the scientific community. Activities centered around the Lunar Samples and the Earth Observations programs constitute the majority of this cost area. Many of these meetings are made up of working panels convened to solve certain problems for the benefit of the people of the world and the United States government. Authorization to attend meetings of this nature is granted only after assurance that attendance will be in the best interest of NASA.

C. Administrative Travel.....	$147,000	$184,000	$173,000

Travel in this area includes direction and coordination of general management matters. Also, included in this area, for the first time in 1972 and 1973, is the cost of public appearances by astronauts within the United States and overseas, which results in the increases over 1971. This fund area includes travel by functional managers in such areas as personnel, budget and program management, financial management and procurement. Stringent management policies keep administrative travel costs down to approximately 6% of the Center's total travel program. Initial duty station and permanent change of station costs are excluded from this category and are reflected in Personnel and Related Costs.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES	$10,668,000	$9,264,000	$9,471,000	+$207,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Minor rehabilitation and modification, and construction.....	$363,000	$150,000	$10,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$5,357,000	$4,213,000	$4,635,000
2. Maintenance of equipment.....	238,000	249,000	270,000
3. Custodial Services.....	2,732,000	2,034,000	2,398,000
Subtotal.....	$8,327,000	$6,496,000	$7,303,000
C. Operation of Facilities			
1. Utilities.....	$1,547,000	$2,130,000	$1,662,000
2. Supplies and equipment.....	431,000	488,000	496,000
Subtotal.....	$1,978,000	$2,618,000	$2,158,000
Total, Facilities Services.....	$10,668,000	$9,264,000	$9,471,000
A. Acquisition of Facilities.....	$363,000	$150,000	$10,000
1. Minor rehabilitation and modification and construction.....	$363,000	$150,000	$10,000

The decrease in 1973 is attributed to the limitation in 1973 of minor construction activity to projects equal to or less than $10,000. All other projects, which were previously budgeted in this category, will be included in the CoF appropriation.

	1971	1972	1973
B. Maintenance and Related Services....	$8,327,000	$6,496,000	$7,303,000
1. Maintenance of buildings and grounds.....	$5,357,000	$4,213,000	$4,635,000

This activity provides for maintenance of buildings, grounds, and utility systems at the Manned Spacecraft Center and the White Sands Test Facility. This service provides only cyclic maintenance and minor breakdown repair. Approximately 265 man-years of effort are required to maintain: 201 buildings, that have an average age of 8 years, containing 2,904,233 square feet of space; 868 acres of improved ground and 216 acres of surfaced areas; 117,490 LF of water line; 223,680 LF of sewage and drainage lines; 274,428 LF of electrical distribution lines and 18,673 LF of utility tunnels.

The increase of $422,000 in 1973 is attributed to visual and sampling inspections which reflect the deterioration resulting in ever increasing deferred maintenance. In addition functional requirements of buildings are continually changing at MSC. Modifications are made to the maximum extent possible to avoid obsolescence and new construction requirements.

2. Maintenance of equipment.....	$238,000	$249,000	$270,000

Maintenance of equipment consists of work necessary to keep all equipment operational at MSC. This equipment includes office typewriters, adding machines, calculators, copiers, etc. The majority of these items were purchased in the 1962-1965 time period and require maintenance and repair far in excess of quarterly maintenance agreements. The Manned Spacecraft Center maintains approximately 4,477 items of equipment. The slight increase of $21,000 in 1973 is attributed to the increased costs being charged for this maintenance effort.

3. Custodial services.....	$2,732,000	$2,034,000	$2,398,000

Custodial services include security, janitorial and laundry activities. Security is provided by a support service contractor which provides two-shift service at five entrances, three-shift service at one entrance and patrolling of all buildings. The security service also includes badging of personnel and visitors, and policing of traffic involving approximately 13,088 vehicles daily. This support service contractor also provides 24-hour fire fighting and ambulance service to MSC.

The janitorial service is also provided by a support service contractor and includes building custodians as well as custodians required for clean rooms, environmental control facilities and specialized technical facilities. Approximately 3,155,000 square feet of surface area are maintained. The increase in 1973 of $364,000 is related to increased manyear cost rates associated with the current support service contracts.

	1971	1972	1973
C. Operation of Facilities.....	$1,978,000	$2,618,000	$2,158,000
1. Utilities.....	$1,547,000	$2,130,000	$1,662,000

This activity includes only purchased electricity and natural gas, plus a one time charge in 1972 for the Clear Lake City Sewage Disposal agreement. The rates for electricity and natural gas are the current approved rates for the areas concerned. Yearly consumption of electricity is 102,571,000 KWH and natural gas is 842,820 M cu. feet. Although utility costs and consumption charges increased in 1973, these increases were more than offset by the 1972 one-time hook-up charge for sewage disposal.

2. Supplies and equipment.....	$431,000	$488,000	$496,000

The supplies, materials and equipment used in the operation of the MSC facilities are included in this category. The slight increase in 1973 of $8,000 is attributed to price escalation for supplies and materials.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES....	$7,341,000	$6,429,000	$6,033,000	-$396,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$3,304,000	$2,059,000	$2,004,000
2. Purchase of equipment.....	354,000	1,041,000	745,000
3. Maintenance of equipment.....	457,000	613,000	372,000
Subtotal, equipment.....	$4,115,000	$3,713,000	$3,121,000
4. Programming and operation services.....	$845,000	$900,000	$900,000
Subtotal.....	$4,960,000	$4,613,000	$4,021,000
B. Engineering Services.....	$89,000	$148,000	$180,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$84,000	$85,000	$90,000
2. Educational/information programs	228,000	360,000	385,000
3. Scientific and technical information.....	1,980,000	1,223,000	1,357,000
Subtotal.....	$2,292,000	$1,668,000	$1,832,000
Total, Technical Services.....	$7,341,000	$6,429,000	$6,033,000

	1971	1972	1973
A. Automatic Data Processing.....	$4,960,000	$4,613,000	$4,021,000

This activity includes all ADP and EAM functions applicable to administration and logistics. This activity is accomplished by a support service contractor who performs programming, key punch, data storage and listings for managerial, financial, and other administrative requirements in addition to supporting mission programs. Some of the requirements include data for reports on personnel, property inventory, financial status reports, budgetary history, contractor performance and costs, etc. The equipment utilized is both NASA owned and leased with purchase options. Equipment includes 10 main frames owned, two main frames leased, 203 items of peripheral equipment owned, and 193 items of peripheral equipment leased. The decrease in 1973 is primarily due to a reduction in purchase cost and maintenance costs that will result from an equipment change in the 1972-1973 period.

B. Engineering Services.....	$89,000	$148,000	$180,000

This activity includes engineering services for all minor construction projects and engineering analysis of utility systems. The slight increase in 1973 is associated with the engineering services required after the Clear Lake sewage disposal hook-up.

C. Scientific and Technical Information and Educational Programs.....	$2,292,000	$1,668,000	$1,832,000

Included in these programs are the costs of the technical library, photo processing services, technical documentation, graphics, exhibit preparation, and educational programs. The costs are summarized below:

1. Operation of technical library..	$84,000	$85,000	$90,000

The technical library was established to serve the needs of employees and authorized contractor personnel for books, periodicals, technical reports, and other documentation. The technical library acquires approximately 13,000 units a year. The 1973 increase of $5,000 in the operation of the technical library is due to anticipated higher labor costs for the support service contract in this area.

2. Educational/informational programs.....	$228,000	$360,000	$385,000

This activity includes the Public Affairs function. Included in this area are the unescorted tours of the Manned Spacecraft Center by the general public. In calendar year 1971, over one million visitors toured MSC. Also included in this activity are the maintenance of exhibits, press conferences, news coverage of flights, distribution of exhibits, press conferences, news coverage of flights, distribution of film and press releases. These activities accounted for 28,000 inquiries from news media; 900 press interviews;

400 industrial releases; 140 news releases; 67,000 information requests; 800,000 publications furnished; 70,000 tours; 300 exhibits in the adjacent eight state area; 420 speeches; and 1,400 spacemobile presentations. The increase in 1973 of $25,000 is associated with anticipated higher labor costs for the support service contract in this area.

	1971	1972	1973
3. Scientific and technical information.....	$1,980,000	$1,223,000	$1,357,000

Scientific and technical information activities include documentation, publication, photographic, and translation services. General and scientific and technical graphic materials are prepared for presentations and publications in addition to operating a visual presentation system. Approximately 45,000 graphic units are prepared annually. Photography support is also included in this activity. This support includes operation of a still and motion picture processes laboratory; operation of a precision slide laboratory that supports mission control during flight for visual display of trajectories, times, etc.; operation of chemical mixing and quality control processes; and operation and maintenance of the film repository. The increase in 1973 of $134,000 is associated with the anticipated higher labor costs for the support service contracts in this area.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT	$7,928,000	$8,423,000	$7,680,000	-$743,000

Basis of Fund Requirements

Summary of Administrative Support Services

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$1,015,000	$1,037,000	$928,000
2. Local telephone service.....	931,000	901,000	904,000
3. Other communications.....	143,000	140,000	142,000
Subtotal.....	$2,089,000	$2,078,000	$1,974,000
B. Administrative Printing.....	$819,000	$820,000	$860,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials.....	$1,674,000	$1,997,000	$1,597,000
2. Equipment.....	106,000	137,000	140,000
Subtotal.....	$1,780,000	$2,134,000	$1,737,000

	1971	1972	1973
D. Transportation			
1. Center operations.....	$663,000	$677,000	$661,000
2. Common carrier.....	---	---	---
Subtotal.....	$663,000	$677,000	$661,000
E. Installation Support Services			
1. Installation support services...	$2,150,000	$2,142,000	$1,949,000
2. Medical services.....	427,000	572,000	499,000
Subtotal.....	$2,577,000	$2,714,000	$2,448,000
Total, Administrative Support Services.....	$7,928,000	$8,423,000	$7,680,000
A. Communications.....	$2,089,000	$2,078,000	$1,974,000

Included in this estimate are the costs of leased lines, long distance tolls, local telephone exchange services, and other communications, such as Western Union transmission charges and on-site two-way radio systems for mobile security, fire fighting and medical requirements. The Manned Spacecraft Center and White Sands Test Facility utilize 7,039 telephone instruments, and 3,905 on-site lines for an on-site population of approximately 8,000 people. Annually, MSC and WSTF communication systems accommodate approximately 840,000 calls and 228,000 teletype messages. The decrease of $104,000 is due primarily to a reduction in FTS charges at MSC and White Sands Test Facility.

B. Administrative Printing.....	$819,000	$820,000	$860,000

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations, as well as on-site program related work. The MSC printing facility has been authorized as a Government Printing Plant to support priority mission requirements. The administrative type printing that does not have a mission related priority is the work that is contracted for with private firms as well as the overflow of mission related work. The 1973 increase is due to increased workload requirements in support of the Skylab program. A decrease in support of the Apollo program is not expected until after 1973.

C. Supplies, Materials and Equipment...	$1,780,000	$2,134,000	$1,737,000

Administrative supplies, materials, and equipment include those items of a general nature which service the entire installation, both civil service and contractor personnel. Approximately 128,238 items are issued a year from a stockage of 7,068 line items. The decrease in 1973 of $397,000 is attributed to a significant reduction in film purchases, as well as reduced personnel levels and reductions in services performed.

	1971	1972	1973
D. Transportation.....	$663,000	$677,000	$661,000

Transportation services include motor pool operations and associated services, administrative aircraft operations and services, as well as the movement of supplies, materials equipment, and related items by common carrier. Vehicles utilized are 133 passenger carrying vehicles; 274 trucks; 45 fork lifts; eight mobile cranes; four specialized trucks; and 50 trailers. Vehicles are utilized at MSC, WSTF, Bethpage, N. Y.; Downey, California and MTF. The decrease in 1973 is the result of a one-time charge in 1972 for updating avionics on the administrative aircraft to meet new FAA standards. A similar charge is not anticipated in 1973.

E. Installation Support Services.....	$2,577,000	$2,714,000	$2,448,000

Installation support services include those services which support the installation generally. These services include equipment rental; storage and issue functions; forms and publications; moving and hauling; DOD support for MSC activities at Ellington Air Force Base; patent applications; and tort claims. Equipment rental provides for the lease of 18 Xerox copiers and produce an average of 19,440,000 units a year. Storage and issue functions handle approximately 180,000 units a year. DOD support at Ellington Air Force Base is primarily related to aircraft and related support (i.e. hangars, security, utilities, fire fighting, etc.). Approximately 680,000 items are processed each year in the requisition, receipt and stockage of forms and publications.

In addition, a contractor provides occupational medicine, industrial hygiene and environmental health services; operation of the dispensary for emergency medical treatment and employee physicals handling approximately 20,000 patients a year; and recognition, measurement and control of hazardous or potentially hazardous working and environmental conditions. The decrease in 1973 of $266,000 is due primarily to reductions in services provided.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

JANUARY 8, 1972

STAFFING SUMMARY

	72	73
EXCEPTED	35	35
GS-16	27	26
GS-15	325	325
GS-14	480	443
ALL OTHER GS	2914	2864
WAGE GRADE	36	34
TOTAL PERMANENT	3817	3727

ASSOCIATE DIRECTOR

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	1	1
GS 14	0	0
ALL OTHER GS	4	4
WAGE GRADE	0	0
TOTAL PERMANENT	6	6

DIRECTOR DEPUTY DIRECTOR

	72	73
EXCEPTED	2	2
GS 16	0	0
GS 15	0	0
GS 14	0	0
ALL OTHER GS	6	6
WAGE GRADE	0	0
TOTAL PERMANENT	8	8

SPECIAL ASSISTANTS

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	1	1
GS 14	1	1
ALL OTHER GS	2	2
WAGE GRADE	0	0
TOTAL PERMANENT	5	5

PATENT COUNSEL

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	1	1
GS 14	2	2
ALL OTHER GS	4	4
WAGE GRADE	0	0
TOTAL PERMANENT	7	7

LEGAL OFFICE

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	2	2
GS 14	1	1
ALL OTHER GS	7	7
WAGE GRADE	0	0
TOTAL PERMANENT	11	11

PUBLIC AFFAIRS OFFICE

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	1	1
GS 14	4	4
ALL OTHER GS	21	21
WAGE GRADE	0	0
TOTAL PERMANENT	26	26

SAFETY, RELIABILITY AND QUALITY ASSURANCE OFFICE

	72	73
EXCEPTED	2	2
GS 16	0	0
GS 15	19	19
GS 14	22	19
ALL OTHER GS	154	146
WAGE GRADE	0	0
TOTAL PERMANENT	197	186

STAFF OFFICES
NASA AUDIT
NASA INSPECTOR

	72	73
EXCEPTED	0	0
GS-16	0	0
GS-15	0	0
GS-14	0	0
ALL OTHER GS	0	0
WAGE GRADE	0	0
TOTAL PERMANENT	0	0

DIRECTOR OF ADMINISTRATION AND PROGRAM SUPPORT

	72	73
EXCEPTED	2	2
GS 16	1	1
GS 15	30	30
GS 14	46	43
ALL OTHER GS	379	371
WAGE GRADE	0	0
TOTAL PERMANENT	458	447

DIRECTOR OF CENTER OPERATIONS

	72	73
EXCEPTED	1	1
GS 16	1	1
GS 15	11	11
GS 14	15	14
ALL OTHER GS	425	413
WAGE GRADE	35	33
TOTAL PERMANENT	488	473

APOLLO SPACECRAFT PROGRAM OFFICE

	72	73
EXCEPTED	2	0
GS 16	1	0
GS 15	18	2
GS 14	48	2
ALL OTHER GS	102	6
WAGE GRADE	0	0
TOTAL PERMANENT	171	10

SKYLAB PROGRAM OFFICE

	72	73
EXCEPTED	2	3
GS 16	1	2
GS 15	15	21
GS 14	23	36
ALL OTHER GS	41	78
WAGE GRADE	0	0
TOTAL PERMANENT	82	140

SPACE SHUTTLE PROGRAM OFFICE

	72	73
EXCEPTED	2	3
GS 16	2	2
GS 15	13	22
GS 14	9	32
ALL OTHER GS	15	74
WAGE GRADE	0	0
TOTAL PERMANENT	41	133

DIRECTOR OF ENGINEERING AND DEVELOPMENT

	72	73
EXCEPTED	1	1
GS-16	2	2
GS-15	12	12
GS-14	1	1
ALL OTHER GS	12	12
WAGE GRADE	0	0
TOTAL PERMANENT	28	28

ASSISTANT DIRECTOR FOR CHEMICAL AND MECH SYSTEMS

	72	73
EXCEPTED	1	1
GS-16	0	0
GS-15	1	1
GS-14	0	0
ALL OTHER GS	2	2
WAGE GRADE	0	0
TOTAL PERMANENT	4	4

CREW SYSTEMS DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	1
GS-15	12	12
GS-14	14	12
ALL OTHER GS	92	92
WAGE GRADE	1	1
TOTAL PERMANENT	120	118

PROPULSION AND POWER DIVISION

	72	73
EXCEPTED	1	1
GS-16	0	0
GS-15	5	5
GS-14	15	14
ALL OTHER GS	88	86
WAGE GRADE	0	0
TOTAL PERMANENT	109	106

STRUCTURES AND MECHANICS DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	0
GS-15	8	8
GS-14	25	32
ALL OTHER GS	88	88
WAGE GRADE	0	0
TOTAL PERMANENT	122	118

SPACE ENVIRONMENT TEST DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	1
GS-15	3	3
GS-14	7	7
ALL OTHER GS	33	33
WAGE GRADE	0	0
TOTAL PERMANENT	44	44

ASSISTANT DIRECTOR FOR ADVANCED PLANNING AND DESIGN

	72	73
EXCEPTED	1	1
GS-16	0	0
GS-15	1	1
GS-14	0	0
ALL OTHER GS	1	1
WAGE GRADE	0	0
TOTAL PERMANENT	3	3

SPACECRAFT DESIGN DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	1
GS-15	7	7
GS-14	8	8
ALL OTHER GS	28	28
WAGE GRADE	0	0
TOTAL PERMANENT	44	44

ENGINEERING ANALYSIS DIVISION

	72	73
EXCEPTED	0	0
GS-16	0	0
GS-15	2	2
GS-14	4	4
ALL OTHER GS	29	28
WAGE GRADE	0	0
TOTAL PERMANENT	35	34

FUTURE PROGRAMS DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	1
GS-15	7	7
GS-14	7	6
ALL OTHER GS	10	10
WAGE GRADE	0	0
TOTAL PERMANENT	25	24

ASSISTANT DIRECTOR FOR ELECTRONIC SYSTEMS

	72	73
EXCEPTED	1	1
GS-16	0	0
GS-15	6	6
GS-14	13	13
ALL OTHER GS	24	23
WAGE GRADE	0	0
TOTAL PERMANENT	44	43

INFORMATION SYSTEMS DIVISION

	72	73
EXCEPTED	0	0
GS-16	2	2
GS-15	5	5
GS-14	19	18
ALL OTHER GS	84	82
WAGE GRADE	0	0
TOTAL PERMANENT	110	107

GUIDANCE AND CONTROL DIVISION

	72	73
EXCEPTED	0	0
GS-16	2	2
GS-15	14	14
GS-14	19	18
ALL OTHER GS	61	60
WAGE GRADE	0	0
TOTAL PERMANENT	96	94

TELEMETRY AND COMMUNICATIONS SYSTEMS DIVISION

	72	73
EXCEPTED	0	0
GS-16	2	2
GS-15	7	7
GS-14	22	21
ALL OTHER GS	85	83
WAGE GRADE	0	0
TOTAL PERMANENT	116	113

DIRECTOR OF SCIENCE AND APPLICATIONS

	72	73
EXCEPTED	2	2
GS 16	1	1
GS 15	4	4
GS 14	2	2
ALL OTHER GS	8	8
WAGE GRADE	0	0
TOTAL PERMANENT	17	17

EARTH OBSERVATIONS DIVISION

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	11	11
GS 14	4	4
ALL OTHER GS	52	52
WAGE GRADE	0	0
TOTAL PERMANENT	68	68

SCIENCE MISSIONS SUPPORT DIVISION

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	2	2
GS 14	6	5
ALL OTHER GS	27	28
WAGE GRADE	0	0
TOTAL PERMANENT	35	35

EARTH OBSERVATIONS AIRCRAFT PROGRAM OFFICE

	72	73
EXCEPTED	0	0
GS-16	0	0
GS-15	2	2
GS-14	5	5
ALL OTHER GS	17	17
WAGE GRADE	0	0
TOTAL PERMANENT	24	24

PLANETARY AND EARTH SCIENCES DIVISION

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	5	5
GS 14	5	5
ALL OTHER GS	37	36
WAGE GRADE	0	0
TOTAL PERMANENT	48	47

LUNAR RECEIVING LABORATORY

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	2	2
GS 14	2	2
ALL OTHER GS	17	17
WAGE GRADE	0	0
TOTAL PERMANENT	21	21

WHITE SANDS TEST FACILITY

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	3	3
GS 14	6	6
ALL OTHER GS	29	28
WAGE GRADE	0	0
TOTAL PERMANENT	38	37

EARTH RESOURCES LABORATORY (AT MTF)

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	1	1
GS 14	3	2
ALL OTHER GS	19	21
WAGE GRADE	0	0
TOTAL PERMANENT	24	25

DIRECTOR OF MEDICAL RESEARCH AND OPERATIONS

	72	73
EXCEPTED	2	2
GS 16	0	0
GS 15	2	2
GS 14	0	0
ALL OTHER GS	5	5
WAGE GRADE	0	0
TOTAL PERMANENT	9	9

PREVENTIVE MEDICINE DIVISION

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	3	3
GS 14	4	4
ALL OTHER GS	18	18
WAGE GRADE	0	0
TOTAL PERMANENT	25	25

PROJECT SUPPORT DIVISION

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	4	4
GS 14	7	7
ALL OTHER GS	19	19
WAGE GRADE	0	0
TOTAL PERMANENT	30	30

MEDICAL OPERATIONS DIVISION

	72	73
EXCEPTED	0	0
GS 16	1	1
GS 15	6	6
GS 14	3	3
ALL OTHER GS	9	9
WAGE GRADE	0	0
TOTAL PERMANENT	19	19

BIOMEDICAL LABORATORIES DIVISION

	72	73
EXCEPTED	0	0
GS-16	0	0
GS-15	5	6
GS-14	2	2
ALL OTHER GS	14	13
WAGE GRADE	0	0
TOTAL PERMANENT	21	21

DIRECTOR OF FLIGHT CREW OPERATIONS

	72	73
EXCEPTED	3	3
GS 16	0	0
GS 15	2	2
GS 14	1	1
ALL OTHER GS	10	10
WAGE GRADE	0	0
TOTAL PERMANENT	16	16

ASTRONAUT OFFICE

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	8	8
GS 14	5	5
ALL OTHER GS	26	26
WAGE GRADE	0	0
TOTAL PERMANENT	39	39

AIRCRAFT OPERATIONS OFFICE

	72	73
EXCEPTED	0	0
GS 16	1	1
GS 15	2	2
GS 14	4	4
ALL OTHER GS	53	49
WAGE GRADE	0	0
TOTAL PERMANENT	60	56

FLIGHT CREW INTEGRATION DIVISION

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	5	5
GS 14	5	5
ALL OTHER GS	47	45
WAGE GRADE	0	0
TOTAL PERMANENT	57	55

CREW TRAINING AND SIMULATION DIVISION

	72	73
EXCEPTED	0	0
GS 16	1	1
GS 15	4	4
GS 14	9	8
ALL OTHER GS	68	66
WAGE GRADE	0	0
TOTAL PERMANENT	82	79

CREW PROCEDURES DIVISION

	72	73
EXCEPTED	0	0
GS 16	1	1
GS 15	3	3
GS 14	9	7
ALL OTHER GS	56	56
WAGE GRADE	0	0
TOTAL PERMANENT	69	67

DIRECTOR OF FLIGHT OPERATIONS

	72	73
EXCEPTED	2	2
GS-16	0	0
GS-15	4	4
GS-14	1	1
ALL OTHER GS	3	3
WAGE GRADE	0	0
TOTAL PERMANENT	10	10

ASSISTANT DIRECTOR FOR COMPUTATION AND FLIGHT SUPPORT

	72	73
EXCEPTED	1	1
GS 16	0	0
GS 15	1	1
GS 14	0	0
ALL OTHER GS	3	3
WAGE GRADE	0	0
TOTAL PERMANENT	5	5

FLIGHT SUPPORT DIVISION

	72	73
EXCEPTED	0	0
GS 16	1	1
GS 15	9	9
GS 14	23	20
ALL OTHER GS	162	163
WAGE GRADE	0	0
TOTAL PERMANENT	195	193

COMPUTATION AND ANALYSIS DIVISION

	72	73
EXCEPTED	0	0
GS 16	0	0
GS 15	8	8
GS 14	11	10
ALL OTHER GS	89	87
WAGE GRADE	0	0
TOTAL PERMANENT	108	105

MISSION PLANNING AND ANALYSIS DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	11	11
GS 14	22	21
ALL OTHER GS	155	154
WAGE GRADE	0	0
TOTAL PERMANENT	190	188

FLIGHT CONTROL DIVISION

	72	73
EXCEPTED	0	0
GS-16	1	1
GS-15	16	16
GS-14	16	16
ALL OTHER GS	174	171
WAGE GRADE	0	0
TOTAL PERMANENT	207	204

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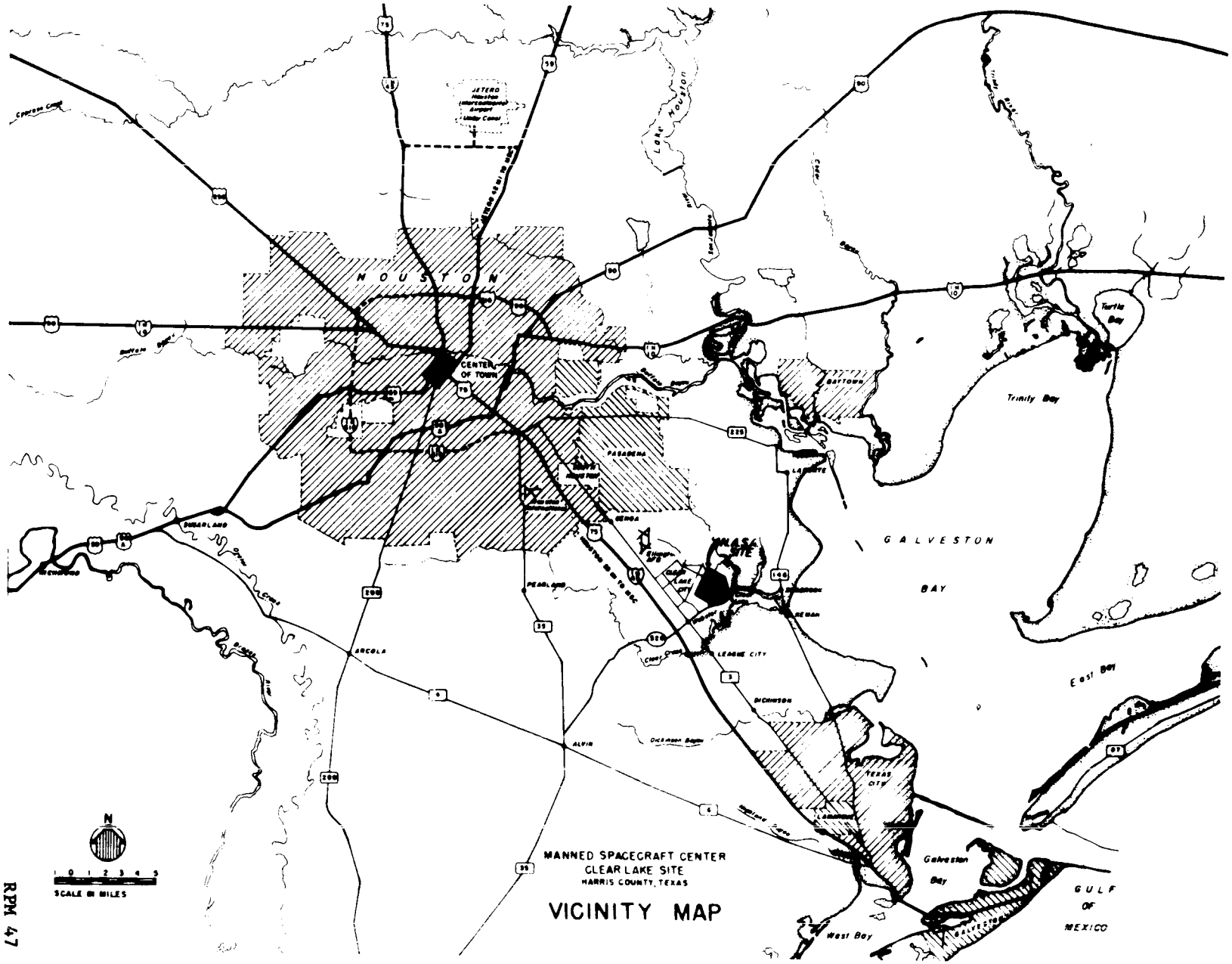
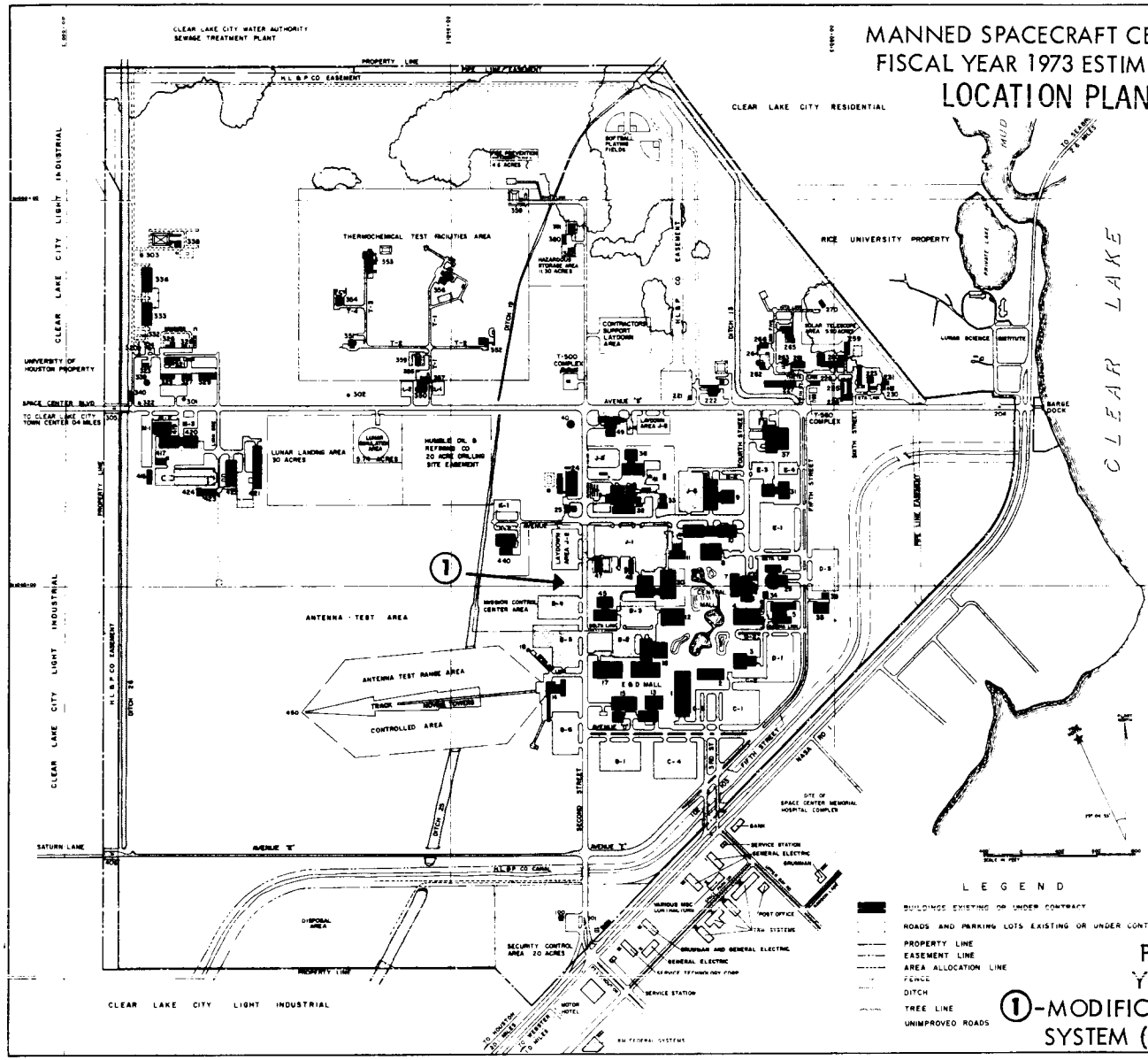

HOUSTON
CENTER OF TOWN
Lake Houston
PASADENA
BAYTOWN
SUGARLAND
ARCOLA
ALVIN
PEARLAND
DICKINSON
LEAGUE CITY
TEXAS CITY
GALVESTON
GALVESTON BAY
Trinity Bay
Turtle Bay
East Bay
Galveston Bay
West Bay
GULF OF MEXICO
N
SCALE IN MILES
MANNED SPACECRAFT CENTER
CLEAR LAKE SITE
HARRIS COUNTY, TEXAS
VICINITY MAP

RPM 47

MANNED SPACECRAFT CENTER
FISCAL YEAR 1973 ESTIMATES
LOCATION PLAN



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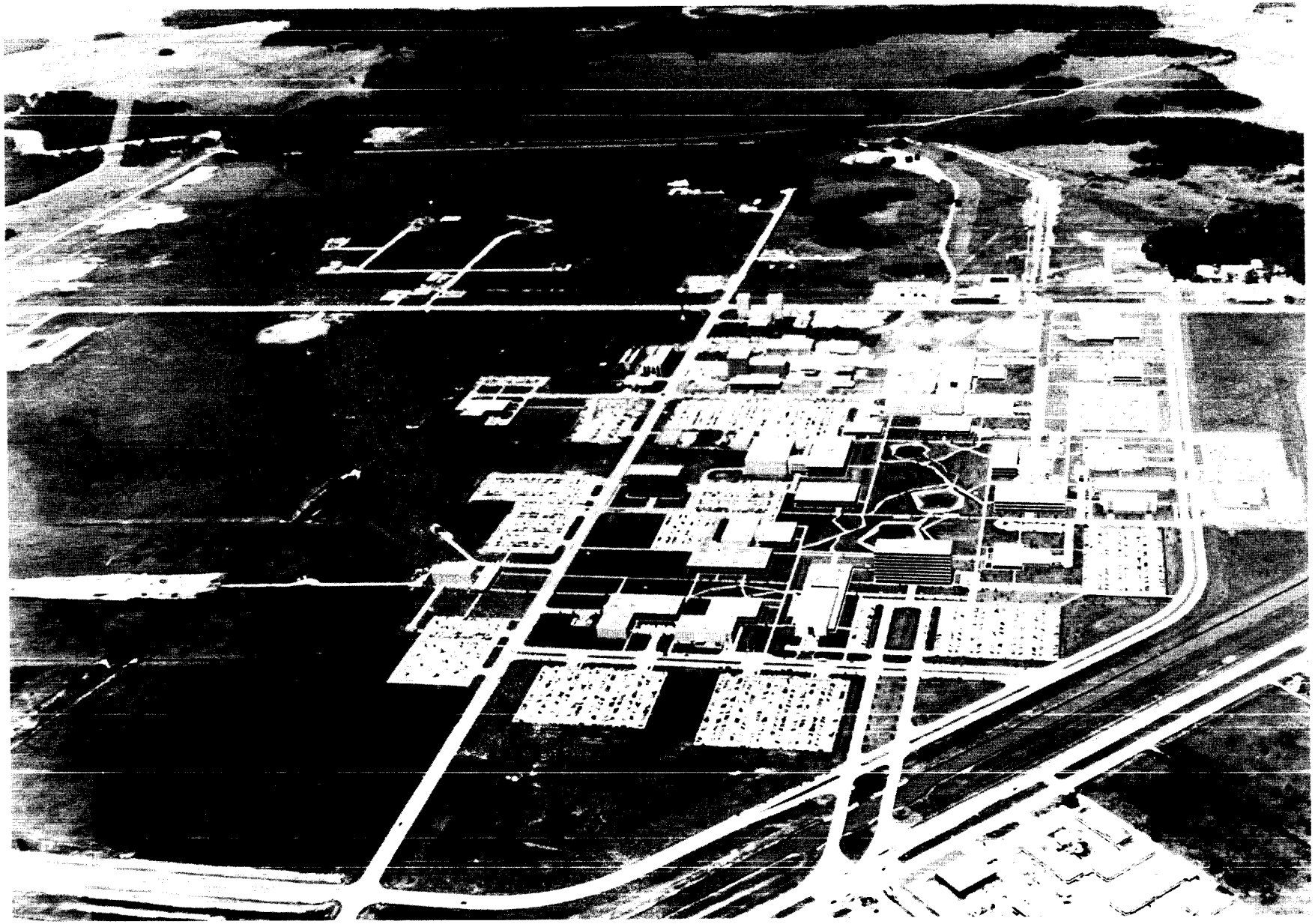
PROPOSED FISCAL YEAR 1973 PROJECT

(1)-MODIFICATION OF FIRE PROTECTION SYSTEM (VARIOUS FACILITIES)

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS



RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

MARSHALL SPACE FLIGHT CENTER

MISSION

The Marshall Space Flight Center (MSFC) at Huntsville, Alabama, became a part of NASA in July 1960. Marshall serves as one of NASA's primary centers for the design, development and testing of space transportation systems, including large launch vehicles and engines for programs such as Apollo and the Space Shuttle. The Center also has a lead role in space flight payload planning, integration and management for programs such as Skylab; and complete design, development and management of scientific projects such as the High Energy Astronomy Observatory. A recently assigned additional category of roles and missions includes responsibility for an area of environmental resources and applications.

In addition to on-site activities at Huntsville, MSFC manages the Michoud Assembly Facility (MAF) at New Orleans, Louisiana; the Slidell Computer Complex at Slidell, Louisiana; and the Mississippi Test Facility (MTF) at Bay St. Louis, Mississippi. Also, resident offices are maintained at or adjacent to industrial sites at various locations throughout the nation.

The Center is currently involved in the direction and management of the following on-going programs:

1. The Saturn Program, which provides the nation's launch vehicle for manned lunar landing missions and very large payloads, such as the Skylab.

2. The Lunar Roving Vehicle, which provides surface mobility for lunar exploration.

3. The Skylab Program, including development of ground support equipment and cluster modules such as the Orbital Workshop, Apollo Telescope Mount, Airlock Module, and Multiple Docking Adapter, management of selected experiments, and overall systems engineering and integration of the total Skylab cluster.

4. The Space Shuttle main engine, a high thrust, throttleable liquid hydrogen, liquid oxygen fueled rocket engine capable of many reuses.

5. The Space Shuttle Booster which, together with the Shuttle orbiter, is designed for transporting scientific and applications payloads and technical and scientific personnel to and from space. The Shuttle will also have a retrieval and repair capability.

6. The High Energy Astronomy Observatory, including technical and program management of an orbital scientific program designed to obtain high quality, high resolution data on cosmic ray, gamma ray and X-ray sources.

The Center is also deeply involved in activities related to payload planning for future space missions. These activities range from overall mission analyses of initial Shuttle missions to specific definition studies in the scientific and applications disciplines. Definition studies include the Large Space Telescope, presently in the study phase as an orbiting high resolution optical telescope system; the Large Solar Observatory; Materials Science and Manufacturing in Space; Communications and Navigation Laboratory; Life Sciences Laboratory; Earth Observations Facility and Space Physics Facilities.

The Center continues to pursue a vigorous and broad based research and technology program within the technical disciplines. The MSFC role in the area of astronomy is typical. As a forerunner to the development of advanced orbiting telescopes, the ongoing Stratoscope II program utilizes a balloon-borne, unmanned astronomical telescope to obtain high resolution photographs of planetary and faint stellar objects. The current Skylab ground based astronomy program is being managed by MSFC and conducted by the astronomical community to obtain solar data concurrently with the Apollo Telescope Mount mission.

Marshall is also participating in the NASA Earth Resources Survey Program, to include environmental applications at Huntsville and environmental activities at the Mississippi Test Facility. These activities are directed generally toward the application of space technology and associated managerial and technical disciplines to solve environmental problems. At both locations, interfaces and working relationships are being established with federal, state and local agencies to determine ways of utilizing NASA Earth Survey data and techniques for potential benefits at the user level. These efforts are of particular significance at MTF, where other government agencies are locating selected environmental research and earth resources activities. In addition to providing a support base for other agency operations, MTF has a primary role to provide for an active interchange of information and technology

among the various activities located at the site. This interchange will offer opportunities for interdisciplinary spinoffs, as well as providing a feedback of payload and experimental ideas for future NASA programs.

In addition to environmental efforts, certain other federal agency activities are being located at the MTF and MAF facilities, in order to achieve full utilization of their capacity and for the benefit of better cost effectiveness to the government.

DESCRIPTION

Operations at the Marshall Space Flight Center are conducted at three primary locations:

The main Marshall Space Flight Center site is near Huntsville, Alabama, on Army property at the Redstone Arsenal. The Center occupies 1,797 acres under a nonrevocable use permit from the Army. The capital investment as of June 30, 1971, was approximately $391,964,000. Certain facilities such as the Redstone Arsenal Air Field and some utilities are used jointly by NASA and the Army. The Huntsville location has deepwater access via the Tennessee, Ohio, and Mississippi Rivers.

The Michoud Assembly Facility is located 15 miles east of New Orleans, Louisiana. The main facility occupies 891 acres. The Slidell Central Computer Facility, a satellite facility 20 miles to the northeast, occupies 14 additional acres bringing the total acreage to 905. The capital investment as of June 30, 1971, was approximately $179,622,000.

The Michoud Facility provides 3,559,256 square feet of space, including the main assembly plant, covering an area of 43 acres under one roof. The Facility is located on the Gulf Intra-Coastal Waterway and has deepwater access via the Mississippi River.

The Mississippi Test Facility is located in southwest Mississippi, approximately 50 miles northeast of New Orleans, Louisiana. Total land area is 138,800 acres of which 13,428 acres make up the actual test area owned by NASA. The remaining 125,372 acres are held as a buffer zone. In the buffer area, 7,488 acres are owned by NASA, and 117,884 acres are under restrictive easements. Capital investment for the Mississippi Test Facility as of June 30, 1971, was approximately $308,833,000. Test stands include a dual-position stand for testing the Saturn V first stage (S-IC), and two stands for testing the 1,000,000 pound thrust Saturn V second stage (S-II). The site has deep-water access via the Pearl River and the Intra-Coastal Waterway. The Mississippi Test Facility is also being utilized as a host site for space and environmental activities by other government agencies.

The total capital investment of the Marshall Space Flight Center and its installations at Mississippi and Louisiana, including fixed assets in progress and contractor-held facilities at various locations as of June 30, 1971, was $1,127,448,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel	$108,914,000	$109,636,000	$106,790,000
Travel	2,685,000	2,631,000	2,578,000
Facilities services	10,607,000	15,666,000	8,682,000
Technical services	6,949,000	7,416,000	7,079,000
Administrative support	7,885,000	7,730,000	6,494,000
Total, fund requirements	$137,040,000	$143,079,000	$131,623,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$108,914,000	$109,636,000	$106,790,000	$-2,846,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions.	$97,110,000	$97,651,000	$95,486,000
b. Nonpermanent positions.....	1,748,000	1,381,000	1,381,000
c. Reimbursable details	181,000	200,000	200,000
d. Overtime and other compensation.....	886,000	881,000	881,000
Subtotal, Compensation.....	$99,925,000	$100,113,000	$97,948,000
2. Benefits.....	$8,474,000	$9,027,000	$8,346,000
Subtotal, Compensation and Benefits.....	$108,399,000	$109,140,000	$106,294,000
B. Supporting Costs:			
1. Transfer of personnel...	$103,000	$100,000	$100,000
2. Personnel training.....	412,000	396,000	396,000
Subtotal, Supporting Costs.....	$515,000	$496,000	$496,000
Total, Personnel and Related Costs.....	$108,914,000	$109,636,000	$106,790,000
1. Compensation	$99,925,000	$100,113,000	$97,948,000
a. Permanent Positions.....	$97,110,000	$97,651,000	$95,486,000

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The cost of compensation for permanent positions is the largest part of personnel and related costs. The funds shown above will support 5,341 permanent positions in 1972 and 5,214 positions in 1973. This represents a reduction of 590 positions from 1971.

	1971	1972	1973
Permanent Positions by Program:			
Manned Space Flight			
Apollo	1,009	574	103
Space flight operations	2,817	2,805	3,095
Advanced missions	102	60	60
Space Science			
Physics and astronomy	206	309	388
Lunar and planetary exploration	7	18	19
Bioscience	8	---	---
Launch vehicle procurement	6	10	11
Space Applications	20	23	23
Aeronautics and Space Technology			
Aeronautical research and technology	52	51	52
Space research and technology	227	223	223
Nuclear power and propulsion	9	10	12
Tracking and Data Acquisition	10	8	7
Technology Utilization	14	11	11
Subtotal, Positions by program	4,487	4,102	4,004
Indirect Positions:			
Director and staff	79	74	74
Administrative support	1,100	1,031	1,010
Research and development support	138	134	126
Subtotal, Indirect positions	1,317	1,239	1,210
Total, permanent positions	5,804	5,341	5,214
Other than permanent positions	350	350	350
Total Positions	6,154	5,691	5,564

The above table illustrates the use to which positions are put. The distribution by occupation of these positions illustrates a significant characteristic of the Marshall Space Flight Center workforce. Professional engineers and scientists comprise approximately 44% of the Center workforce. Technicians and technically oriented wage board employees, working in direct support of the professional technical staff make up another 24% of the complement. The following table summarizes by occupational group the Center's workforce.

	1971		1972		1973	
Occupational Group	Number	Percent	Number	Percent	Number	Percent
Professional scientists and engineers.....	2,555	44.0	2,381	44.0	2,352	45.0
Technicians.....	1,358	23.0	1,213	23.0	1,196	23.0
Wage board.....	51	1.0	39	1.0	39	1.0
Professional administrative.....	990	17.0	911	17.0	886	17.0
Clerical.....	850	15.0	797	15.0	741	14.0
Total.....	5,804	100.0	5,341	100.0	5,214	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973 the cost of permanent positions will be $95,486,000, a reduction of $2,165,000 from 1972. This reduction results as follows:

Cost of permanent positions in 1972.....		$97,651,000
Cost increases in 1973.....		1,594,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$379,000	
Partial year effect of 1973 actions.....	1,215,000	
Cost decreases in 1973.....		-3,759,000
Abolished positions:		
Full year effect of 1972 actions.....	-2,527,000	
Partial year effect of 1973 actions....	-233,000	
Decrease in days paid in 1973.....	-746,000	
Turnover savings.....	-253,000	
Cost of permanent positions in 1973.....		$95,486,000

	1971	1972	1973
b. Nonpermanent Positions.....	$1,748,000	$1,381,000	$1,381,000

The 1973 plan includes 350 positions which is the same as 1972. These positions will be used to support the following programs at approximately the levels indicated:

Program	Positions
College Cooperative Training	160
Summer Employment	120
Youth Opportunity	40
Temporary Clerical	30

The College Cooperative Training Program provides alternating work and study periods providing the student with practical experience and academic training. This program permits many students to attend college who could otherwise not afford to by providing them an income during their work period. This program has been a principal source of recruitment for young and experienced professional personnel.

The Summer Employment Program at MSFC employs high school and college students and faculty members and in consonance with the Federal Government policies and objectives provides them an insight into Government operations. The Center benefits from the useful and productive work performed by these highly motivated individuals.

The Youth Opportunity Campaign Program is conducted within the National policy which enables disadvantaged youth to work and learn on the job and provide an income which assists them to continue their secondary education.

The Temporary Clerical Program is necessary to provide short-term support in positions occupied by permanent employees who are absent from work because of illness, vacation, maternity, or training.

c. Reimbursable Details.....	$181,000	$200,000	$200,000

It is planned to maintain the same level of reimbursable detailees in 1973 as 1972. At MSFC about 20 individuals mostly from Department of Defense are employed. Ten of these detailees are employed on the Skylab program doing research and training flight crews in the area of zero gravity. The other ten are employed in program management, special engineering or scientific areas. This effort provides mutual benefits to NASA and DOD by providing NASA with special talent and by keeping DOD personnel current on the Manned Space Flight management and technology.

	1971	1972	1973
d. Overtime and Other Compensation.....	$886,000	$881,000	$881,000

The 1973 level will remain at the 1972 level. This low level represents less than 1% of the Personnel Compensation. This represents the minimum overtime that can be achieved and provide for the in-house effort necessary to solve unanticipated technical problems and meet the difficult program milestones. Many employees particularly at the higher levels work overtime voluntarily on a nonreimbursable basis. Also maximum use of compensatory time is used to meet the peak work load periods. Other compensation provides for holiday, Sunday and night work differential pay to employees performing maintenance functions.

2. Benefits.....	$8,474,000	$9,027,000	$8,346,000

In addition to compensation, MSFC makes an employer's contribution to personnel benefits as authorized and required by law. The cost of benefits is $681,000 lower in 1973 than in 1972 because of the reductions in civil service personnel and in the estimated cost of severance pay in 1973. The following table indicates the costs of personnel benefits by the major categories:

Category of Cost			
Contribution to the Civil Service Retirement Fund.....	$6,799,000	$6,831,000	$6,695,000
Contribution for Employee Life Insurance.....	374,000	355,000	348,000
Contribution for Employee Health Insurance.....	803,000	1,050,000	1,007,000
Contribution to FICA.....	41,000	35,000	30,000
Incentive Awards.....	79,000	62,000	50,000
Other Personnel Benefits.....	127,000	83,000	122,000
Severance Pay.....	251,000	611,000	94,000
Total.....	$8,474,000	$9,027,000	$8,346,000

B. Supporting Costs.....	$515,000	$496,000	$496,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignments, and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

	1971	1972	1973
1. Transfer of Personnel.....	$103,000	$100,000	$100,000

The estimated cost in 1973 is based on the number and historical average cost of relocations. Provides for certain relocation costs, such as the expenses of selling and buying a home, the cost of one trip to the new duty station to secure housing, and the cost of family relocation allowances.

2. Personnel Training.....	$412,000	$396,000	$396,000

The Personnel Training cost for 1973 is based on the continuation of current training programs and the need to reorient skills of employees into areas compatible with the direction of the space program in the 1970's and MSFC's role in the program. A prime objective is career development to permit employees to advance to more responsible positions and to provide the Center with highly motivated and experienced personnel not readily available in the labor market. The maintenance and expansion of the skills of personnel is essential in carrying out the Center's many complex technical and management responsibilities. The costs cover tuition, fees and related costs for training at colleges, universities, technical and management institutes; and for the cost of seminars and workshops related to MSFC's role in the space program. The personnel level will be less in 1973 but the need to retrain or update skills has increased as well as the costs of training; therefore, the plan is to hold to the 1972 level. The costs in 1973 represent training for approximately 3,750 employees.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$2,685,000	$2,631,000	$2,578,000	$-53,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$2,419,000	$2,355,000	$2,302,000
2. Flight mission support.....	36,000	16,000	16,000
3. Overseas travel to launch and tracking sites.....	1,000	1,000	1,000
Subtotal.....	$2,456,000	$2,372,000	$2,319,000

	1971	1972	1973
B. Meetings and Technical Seminars			
1. Government-sponsored meetings..	$8,000	$8,000	$8,000
2. Other than government-sponsored meetings and technical seminars.....	33,000	27,000	27,000
Subtotal.....	$41,000	$35,000	$35,000
C. Administrative Travel.....	$188,000	$224,000	$224,000
Total, Travel.....	$2,685,000	$2,631,000	$2,578,000
A. Program Related Travel.....	$2,456,000	$2,372,000	$2,319,000

Program related travel represents about 90% of Marshall's travel requirements for 1973 and is incurred in connection with direction and management of on-going and future programs.

1. Direction, coordination, and management of programs.....	$2,419,000	$2,355,000	$2,302,000

In previous years Marshall's primary activity was in Apollo, which involved technical and management support and review of six major prime contractors and two other field centers. Such involvement will continue through the final Apollo flight in 1973. The Skylab and the HEAO programs generate a drastic increase in the amount of technical and management support and review. On Skylab there are three additional prime contractor interfaces, forty-two principal investigators for Skylab experiments and interfaces with six centers. Similarly, HEAO involves one major prime contractor, seven principal investigators, and three other NASA Centers.

The nature of Marshall's responsibilities on Skylab also gives rise to travel needs. Marshall is responsible for the overall integration of the total system. This includes the systems engineering and integration of the major payload components (Orbital Workshop, Apollo Telescope Mount, Multiple Docking Adaptor, Airlock, Payload Shroud) as well as the integration of fifty-six experiments into the payload modules. Consequently, as previously mentioned, the magnitude of interfaces on Skylab is far greater than was the case for Apollo.

The volume of separate items which must be accepted by Marshall and integrated into payload modules is also a significant influence which is different from prior programs. This acceptance requires direct civil service participation in the preparation of test plans and procedures, acceptance tests, test evaluation and final acceptance.

In the field of Science and Applications, MSFC is deeply involved in the High Energy Astronomical Observatory which requires direction, coordination, and management encompassing a prime contractor, seven principal investigators, and three other NASA Centers.

Activity on the Shuttle program will require more travel to accomplish the Center's responsibilities particularly on the shuttle engine and the booster.

	1971	1972	1973
2. Flight mission support.....	$36,000	$16,000	$16,000

Marshall serves as the prime contractor on the Apollo Telescope Mount (ATM) and therefore it will be necessary for Marshall personnel to perform the ATM pre-launch and launch functions at KSC.

3. Overseas travel to launch and tracking sites.....	$1,000	$1,000	$1,000

MSFC overseas travel to launch and tracking sites is rather limited and is normally accomplished at the request and in support of MSC.

B. Meetings and Technical Seminars...	$41,000	$35,000	$35,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the type described is granted only after assurance that attendance will be in the best interest of NASA.

	1971	1972	1973
C. Administrative Travel.....	$188,000	$224,000	$224,000

Administrative travel includes travel for the direction and coordination of general management matters. It includes travel by managers in such areas as personnel, financial management, and procurement to assure that policies and procedures are being implemented properly. The travel of Center officials to NASA Headquarters, other NASA Centers, and to off-site locations is provided for in this category.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES..	$10,607,000	$15,666,000	$8,682,000	$-6,984,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Minor rehabilitation and modification, and construction.....	$83,000	$100,000	$10,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$1,544,000	$557,000	$1,194,000
2. Maintenance of equipment.....	648,000	327,000	313,000
3. Custodial services.....	2,055,000	2,368,000	2,257,000
Subtotal.....	$4,247,000	$3,252,000	$3,764,000
C. Operation of Facilities			
1. Utilities.....	$3,231,000	$3,460,000	$4,005,000
2. Supplies and equipment.....	1,092,000	808,000	903,000
Subtotal.....	$4,323,000	$4,268,000	$4,908,000
D. MTF Support.....	$1,954,000	$8,046,000	---
Total, Facilities Services.....	$10,607,000	$15,666,000	$8,682,000

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	1971	1972	1973
A. Acquisition of Facilities.....	$83,000	$100,000	$10,000
1. Minor rehabilitation and modification, and construction.....	$83,000	$100,000	$10,000

The decrease in 1973 is attributed to the limitation in 1973 of minor construction activity of projects equal to or less than $10,000 per project. All other projects, which were previously budgeted for in this category are included in the CoF appropriation.

B. Maintenance and Related Services....	$4,247,000	$3,252,000	$3,764,000
1. Maintenance of buildings and grounds.....	$1,544,000	$557,000	$1,194,000

The amount required for maintenance of buildings, grounds and utility systems is $637,000 greater than in 1972. Because of austere funding levels, a decision to drastically defer maintenance was made. The 1973 estimates reinstate the normal schedule of cyclic maintenance and upkeep.

These services are performed by the U.S. Army Missile Command (AMC) on a reimbursable basis and by MSFC support contractor personnel. The buildings range in age from World War II vintage to those completed in recent years. Over four million square feet of space are involved, of which approximately 15% are Army buildings used on a cooperative basis with MSFC. The grounds cover 1,583 acres of improved area and 214 acres of surfaced area. AMC billing is based on $9 per square foot of floor space occupied. Maintenance under the MSI contract is performed by miscellaneous crafts, a mix of some forty skilled trades. Labor cost runs approximately 77% of maintenance cost. Equipment, materials, supplies, tools, G&A, and overhead are the remaining cost in this function. The 1973 estimates reinstate the normal schedule of cyclic maintenance and upkeep.

2. Maintenance of equipment.....	$648,000	$327,000	$313,000

Maintenance of equipment consists of preventative maintenance and repair of all equipment used in the administration of the Center. This includes office equipment which is maintained by vendors under service agreements included in the Federal Supply Schedules. At MSFC, the motor pool is operated by a support service contractor and the cost of automotive repair is also included in this account. This subcategory includes maintenance of mobile, mechanical, and shop equipment consisting of some 1,200 items which is made up of forklifts, portable generators, bulldozers, cranes, and electrical powered equipment. The maintenance for

the most part is performed by support contract personnel. The cost includes labor, associate payroll taxes, overtime, G&A, fees, cost of materials, parts, and supplies. The decrease in 1973 is related to reduced bus and taxi fleet service.

	1971	1972	1973
3. Custodial services.....	$2,055,000	$2,368,000	$2,257,000

Custodial services include janitorial, laundry, security, fire protection, and refuse handling. The security service includes badging of employees and visitors, maintaining security patrol, and policing traffic, estimated at 15,000 vehicles daily. Building custodians and other service personnel maintain four million square feet of area in 107 different buildings. The major portion of this service is performed by the RCA/Hayes support contracts. In 1973, the level of effort will be slightly lower and, added to a lower pay scale for some contractor employees, will result in a lower funding level.

C. Operations of Facilities.....	$4,323,000	$4,268,000	$4,908,000
1. Utilities.....	$3,231,000	$3,460,000	$4,005,000

The cost of utilities, electricity, gas, water, etc., is paid from R&PM funds. The level of cost is related to the types of facilities operated the time they are operated, and the unit cost rates for each utility consumed. The U.S. Army Missile Command furnishes utilities to the Center on a reimbursable basis. The increase in 1973 over 1972 is attributable to rate increases. Since February 1971, there has been an 18.2% increase in KWH costs and a 35.6% increase in steam costs due to increased rates being charged the Army by TVA.

2. Supplies and equipment.....	$1,092,000	$808,000	$903,000

The supplies, materials, and equipment used in the operation of the MSFC facilities is budgeted for in this subcategory. The amount required is based on the number of personnel supported, the number of facilities operated, and the level of equipment replacement. The increase of $95,000 is to provide minimal implementation of the Center's equipment replacement program, and is associated with modification of facilities projects such as relocation of partitions and updating physical plant facilities. These supplies and materials are required to preclude substandard facilities and to accommodate existing needs.

	1971	1972	1973
D. Mississippi Test Facility Support.....	$1,954,000	$8,046,000	---

The $10,000,000 in the 1971 Appropriation Act provided for basic institutional and technical services for federal and state agencies resident at the Mississippi Test Facility/Slidell Computer Complex and other NASA installations in pursuit of space and environmental activities. The funds were utilized for equipment procurements, alteration and modification of existing facilities and construction of facilities required by the various tenants in performance of their missions. The above was furnished on a nonreimbursable basis. Because of the time required to implement the Congressional intent and because R&PM is an annual appropriation, Congress continued the availability of these funds until September 30, 1971. The distribution above for 1971 and 1972 is based on how the funds were utilized by fiscal year. The 1973 budget is based on the assumption that support to other federal and state agencies will be provided completely on a reimbursable basis. Some of the tenants at MTF are: Environmental Protection Agency, National Oceanic & Atmospheric Administration, U. S. Geological Survey, Department of Army, Department of Transportation, Department of Air Force, Gulf Universities Research Corporation, Louisiana State University, and Mississippi State University.

Currently, in addition to maintaining NASA launch vehicle and rocket engine static test certification capability and modification and operation of Space Shuttle Main Engine Test facilities, MTF is involved in developing interfaces and working relationships with appropriate federal and state agencies in determining ways of utilizing NASA technology, management skills and earth survey data to solve environmental problems and providing of support to tenants in accordance with approved agreements.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES	$6,949,000	$7,416,000	$7,079,000	$-337,000

	1971	1972	1973
Basis of Fund Requirements			
Summary of Technical Services			
A. Automatic Data Processing			
1. Lease of equipment.....	$84,000	$211,000	$211,000
2. Maintenance of equipment....	343,000	791,000	791,000
Subtotal, equipment.....	$427,000	$1,002,000	$1,002,000
3. Programming and operation services.....	$5,225,000	$4,850,000	$4,850,000
Subtotal.....	$5,652,000	$5,852,000	$5,852,000
B. Engineering Services.....	$13,000	$15,000	$15,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$69,000	$69,000	$69,000
2. Educational/informational programs.....	819,000	1,063,000	887,000
3. Scientific and technical information.....	396,000	417,000	256,000
Subtotal.....	$1,284,000	$1,549,000	$1,212,000
Total.....	$6,949,000	$7,416,000	$7,079,000
A. Automatic Data Processing.....	$5,652,000	$5,852,000	$5,852,000

The R&PM appropriation provides for the lease, purchase, maintenance, and programming and operations services of ADP equipment which is not dedicated to specific research or operational systems and funded from the Research and Development appropriation. Business-type applications utilize 31 remote input terminals to support an on-line inventory system to provide complete electronic processing of all supply transactions from the charting of the Program Operating Plan, contracts and change orders, and control and engineering support. Additional applications consist of payroll, labor distribution and costing, personnel records, and data management. The Data Processing requirements in 1973 are expected to be at the same level of support as in 1972.

	1971	1972	1973
B. Engineering Services.....	**$13,000**	**$15,000**	**$15,000**

Engineering services provide for engineering design services for the design of minor repair and alteration projects, and other related engineering services. Funding requirements will remain at the 1972 level.

C. Scientific and Technical Information and Educational Programs	**$1,284,000**	**$1,549,000**	**$1,212,000**

Included in these programs are the costs of the technical libraries, educational/informational programs, and the scientific and technical information services. The costs are summarized as follows:

1. Operation of technical libraries.....	**$69,000**	**$69,000**	**$69,000**

The technical library was established to serve the needs of employees and authorized contractor personnel for books, periodicals, technical reports, and other documentation. The level of activity at MSFC in 1973 is expected to remain the same as in 1972.

2. Educational/informational programs.....	$819,000	$1,063,000	$887,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news-worthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material. It also includes the cost for the services received from the Redstone Scientific and Information Center which maintains a complete library of periodicals, text and reference books of a scientific and technical nature. The decrease in 1973 is related to reduced services to be received from the Redstone Information Center.

3. Scientific and technical information.....	$396,000	$417,000	$256,000

The scientific and technical information activity includes the cost of documentation and publication services, systems development, and translation services. These costs are for the documentation of worldwide aerospace journal and report literature; monographs and technical reviews; analyzing, evaluating, and testing new methods and systems in the field of scientific communications to increase the effectiveness of the technical information program; and translating foreign language technical books, reports, and journal articles required to meet the needs of MSFC and its contractor scientific personnel to keep abreast of world developments in the space sciences and related fields. The decreases in 1973 result from reduced personnel to be served and reduced services.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT.....	$7,885,000	$7,730,000	$6,494,000	$-1,236,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$654,000	$593,000	$593,000
2. Local telephone service..	675,000	811,000	811,000
3. Other communications.....	143,000	145,000	145,000
Subtotal.....	$1,472,000	$1,549,000	$1,549,000
B. Administrative Printing.....	$394,000	$390,000	$390,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials...	$1,145,000	$944,000	$935,000
2. Equipment.....	205,000	73,000	29,000
Subtotal.....	$1,350,000	$1,017,000	$964,000
D. Transportation			
1. Center operations.....	$3,201,000	$3,072,000	$2,608,000
2. Common carrier.....	11,000	66,000	66,000
Subtotal.....	$3,212,000	$3,138,000	$2,674,000
E. Administrative Support Services			
1. Installation support services.....	$1,057,000	$1,211,000	$492,000
2. Medical services.....	400,000	425,000	425,000
Subtotal.....	$1,457,000	$1,636,000	$917,000
Total, Administrative Support.....	$7,885,000	$7,730,000	$6,494,000

	1971	1972	1973
A. Communications.....	$1,472,000	$1,549,000	$1,549,000

Included in this estimate are the costs of leased lines which include all circuits and associated equipment; long distance tolls; local telephone exchange services which includes services provided by other government agencies which are on a reimbursable basis or contractually by commercial concerns; and switchboard, installation, and service charges. Other communications include message transmission, land telegraph service, marine cable service, wireless telegraph service, rental of post office boxes, postage meter machines, mailing machines, and teletype equipment and TWX services. MSFC business is conducted with companies and institutions in all states. Consequently, the cost of communications is large. With the increased activity associated with Skylab and Shuttle programs, the costs in 1973 are expected to remain at the same level as 1972.

B. Administrative printing.....	$394,000	$390,000	$390,000

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, including the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions, are included. This activity is expected to remain at the same level in 1973 as 1972.

C. Supplies and materials.....	$1,350,000	$1,017,000	$964,000

This activity includes those items of a general nature which service the entire installation. Included are fuels and lubricants, general operating materials, general service materials, missile, aircraft, and vehicle parts, equipment and accessories, office supplies, laboratory equipment, photographic equipment, electrical and electronic equipment, furniture and office equipment, motor vehicle and transportation equipment, personal service equipment, and non-capitalized equipment. Severely restricted activity in the overall operation of the facility, as well as personnel reductions, have resulted in a decrease in supplies and equipment requirements in 1973.

D. Transportation.....	$3,212,000	$3,138,000	$2,674,000

Transportation services include motor pool operations and associated services, center aircraft operations and services, as well as the movement of supplies, materials, equipment, and related items by common carrier. Continued emphasis on vehicle and mileage reductions and the severely restricted activity in service related areas is expected to reduce the transportation requirements in 1973.

	1971	1972	1973
E. Administrative support services.....	$1,457,000	$1,636,000	$917,000

Administrative support services include those services which support the total installation generally. This includes rental of business equipment; contractual motion picture and photographic services, storage and issue services; forms and publications; moving and hauling, as well as contracted services for stenographic and court reporting, advertising and translating, and medical services. As a result of the continuing emphasis on reducing costs, and the reduction of personnel levels, it is anticipated that savings will be realized in 1973.

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	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	1	1
GS-14	10	10
ALL OTHER GS	64	62
WAGEBOARD	—	—
TOTAL PERMANENT	77	76

MISSISSIPPI TEST FACILITY

	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	1	1
GS-14	10	10
ALL OTHER GS	64	62
WAGEBOARD	—	—
TOTAL PERMANENT	77	76

DIRECTOR OF PROGRAM DEVELOPMENT

	72	73
EXCEPTED	2	2
GS-18	—	—
GS-16	2	2
GS-14	—	—
ALL OTHER GS	3	2
WAGEBOARD	—	—
TOTAL PERMANENT	7	6

DIRECTOR OF SCIENCE AND ENGINEERING

	72	73
EXCEPTED	2	2
GS-18	1	1
GS-16	3	3
GS-14	1	1
ALL OTHER GS	2	1
WAGEBOARD	—	—
TOTAL PERMANENT	9	8

DIRECTOR OF PROGRAM MANAGEMENT

	72	73
EXCEPTED	2	2
GS-18	—	—
GS-16	1	1
GS-14	1	1
ALL OTHER GS	2	2
WAGEBOARD	—	—
TOTAL PERMANENT	6	6

MANAGEMENT SUPPORT OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	—	—
GS-14	—	—
ALL OTHER GS	5	5
WAGEBOARD	—	—
TOTAL PERMANENT	5	5

RESEARCH PLANNING OFFICE

	72	73
EXCEPTED	—	—
GS-18	1	1
GS-16	3	3
GS-14	3	3
ALL OTHER GS	15	15
WAGEBOARD	—	—
TOTAL PERMANENT	22	22

PRODUCTS OFFICE

	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	5	5
GS-14	5	5
ALL OTHER GS	5	5
WAGEBOARD	—	—
TOTAL PERMANENT	17	17

PLANNING & RESOURCES OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	—	—
GS-14	3	3
ALL OTHER GS	38	37
WAGEBOARD	—	—
TOTAL PERMANENT	41	40

ENVIRONMENTAL APPLICATIONS OFFICE

	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	2	2
GS-14	2	2
ALL OTHER GS	5	5
WAGEBOARD	—	—
TOTAL PERMANENT	11	11

PROJECT LOGISTICS OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	2	2
GS-14	4	4
ALL OTHER GS	5	4
WAGEBOARD	—	—
TOTAL PERMANENT	11	10

PLANNING & RESOURCES OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	4	4
GS-14	4	3
ALL OTHER GS	24	24
WAGEBOARD	—	—
TOTAL PERMANENT	32	31

MANNED FLIGHT AWARENESS OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	1	1
GS-14	2	2
ALL OTHER GS	4	4
WAGEBOARD	—	—
TOTAL PERMANENT	7	7

TECHNO

EXCEP	
GS-18	
GS-16	
GS-14	
ALL O	
WAGE	
TOTAL	

PROGRAM PLANNING OFFICE

	72	73
EXCEPTED	1	1
GS-18	—	—
GS-16	4	4
GS-14	4	4
ALL OTHER GS	14	14
WAGEBOARD	—	—
TOTAL PERMANENT	23	23

ADVANCED PROGRAM SUPPORT OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	6	6
GS-14	3	3
ALL OTHER GS	8	7
WAGEBOARD	—	—
TOTAL PERMANENT	17	16

CENTRAL SYSTEMS ENGINEERING

	72	73
EXCEPTED	3	3
GS-18	4	4
GS-16	23	23
GS-14	33	31
ALL OTHER GS	86	85
WAGEBOARD	—	—
TOTAL PERMANENT	119	116

AERO- ASTRODYNAMICS LABORATORY

	72	73
EXCEPTED	1	1
GS-18	5	5
GS-16	34	34
GS-14	27	28
ALL OTHER GS	181	174
WAGEBOARD	—	—
TOTAL PERMANENT	248	242

SATURN PROGRAM OFFICE

	72	73
EXCEPTED	1	1
GS-18	4	3
GS-16	16	17
GS-14	33	28
ALL OTHER GS	68	29
WAGEBOARD	—	—
TOTAL PERMANENT	126	78

SKYLAB PROGRAM OFFICE

	72	73
EXCEPTED	1	1
GS-18	6	4
GS-16	21	21
GS-14	41	28
ALL OTHER GS	111	69
WAGEBOARD	—	—
TOTAL PERMANENT	179	121

* CENTER PLANS OFFI

EXCEPTED	
GS-18	
GS-16	
GS-14	
ALL OTHER GS	
WAGEBOARD	
TOTAL PERMA	

* DUAL RESPONSIBILITY

ADVANCED SYSTEMS ANALYSIS OFFICE

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	6	5
GS-14	7	7
ALL OTHER GS	29	19
WAGEBOARD	—	—
TOTAL PERMANENT	42	31

MISSION & PAYLOAD PLANNING OFFICE

	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	3	3
GS-14	9	9
ALL OTHER GS	20	20
WAGEBOARD	—	—
TOTAL PERMANENT	34	34

ASTRIONICS LABORATORY

	72	73
EXCEPTED	1	1
GS-18	4	4
GS-16	46	46
GS-14	89	75
ALL OTHER GS	486	476
WAGEBOARD	—	—
TOTAL PERMANENT	622	600

ASTRONAUTICS LABORATORY

	72	73
EXCEPTED	1	1
GS-18	8	8
GS-16	37	37
GS-14	89	87
ALL OTHER GS	632	615
WAGEBOARD	2	2
TOTAL PERMANENT	770	750

ENGINE PROGRAM OFFICE

	72	73
EXCEPTED	1	1
GS-18	2	2
GS-16	8	8
GS-14	25	24
ALL OTHER GS	37	41
WAGEBOARD	—	—
TOTAL PERMANENT	73	76

SHUTTLE PROGRAM OFFICE

	72	73
EXCEPTED	1	1
GS-18	1	2
GS-16	2	6
GS-14	2	16
ALL OTHER GS	37	99
WAGEBOARD	—	—
TOTAL PERMANENT	43	124

FINANCIAL M OFFI

EXCEPTED	
GS-18	
GS-16	
GS-14	
ALL OTHER GS	
WAGEBOARD	
TOTAL PERMA	

PRELIMINARY DESIGN OFFICE

	72	73
EXCEPTED	—	—
GS-18	2	2
GS-16	5	5
GS-14	16	15
ALL OTHER GS	70	69
WAGEBOARD	—	—
TOTAL PERMANENT	93	91

ADVANCED PROJECTS OFFICE (TASK TEAMS)

	72	73
EXCEPTED	—	—
GS-18	—	—
GS-16	—	—
GS-14	2	2
ALL OTHER GS	5	5
WAGEBOARD	—	—
TOTAL PERMANENT	7	7

COMPUTATION LABORATORY

	72	73
EXCEPTED	2	2
GS-18	1	1
GS-16	11	11
GS-14	27	23
ALL OTHER GS	102	103
WAGEBOARD	—	—
TOTAL PERMANENT	143	140

PROCESS ENGINEERING LABORATORY

	72	73
EXCEPTED	2	2
GS-18	1	1
GS-16	13	13
GS-14	28	27
ALL OTHER GS	570	565
WAGEBOARD	6	6
TOTAL PERMANENT	620	614

CONTRACTS OFFICE

	72	73
EXCEPTED	1	1
GS-18	—	—
GS-16	6	6
GS-14	10	10
ALL OTHER GS	95	93
WAGEBOARD	—	—
TOTAL PERMANENT	112	110

MISSION OPERATIONS OFFICE

	72	73
EXCEPTED	—	—
GS-18	1	1
GS-16	6	6
GS-14	7	7
ALL OTHER GS	31	32
WAGEBOARD	—	—
TOTAL PERMANENT	44	46

MANP OFF

EXCEPTED	
GS-18	
GS-16	
GS-14	
ALL OTHER GS	
WAGEBOARD	
TOTAL PERMA	

QUALITY & RELIABILITY ASSURANCE LABORATORY

	72	73
EXCEPTED	1	1
GS-18	3	3
GS-16	26	26
GS-14	89	89
ALL OTHER GS	304	305
WAGEBOARD	2	2
TOTAL PERMANENT	425	425

SPACE SCIENCES LABORATORY

	72	73
EXCEPTED	1	1
GS-18	1	1
GS-16	15	15
GS-14	17	17
ALL OTHER GS	110	107
WAGEBOARD	—	—
TOTAL PERMANENT	144	141

HEAO OFFICE

	72	73
EXCEPTED	1	1
GS-18	2	2
GS-16	6	6
GS-14	16	16
ALL OTHER GS	26	24
WAGEBOARD	—	—
TOTAL PERMANENT	51	49

MICHOUD ASSEMBLY FACILITY

	72	73
EXCEPTED	—	—
GS-18	1	1
GS-16	5	3
GS-14	6	4
ALL OTHER GS	30	25
WAGEBOARD	—	—
TOTAL PERMANENT	42	33

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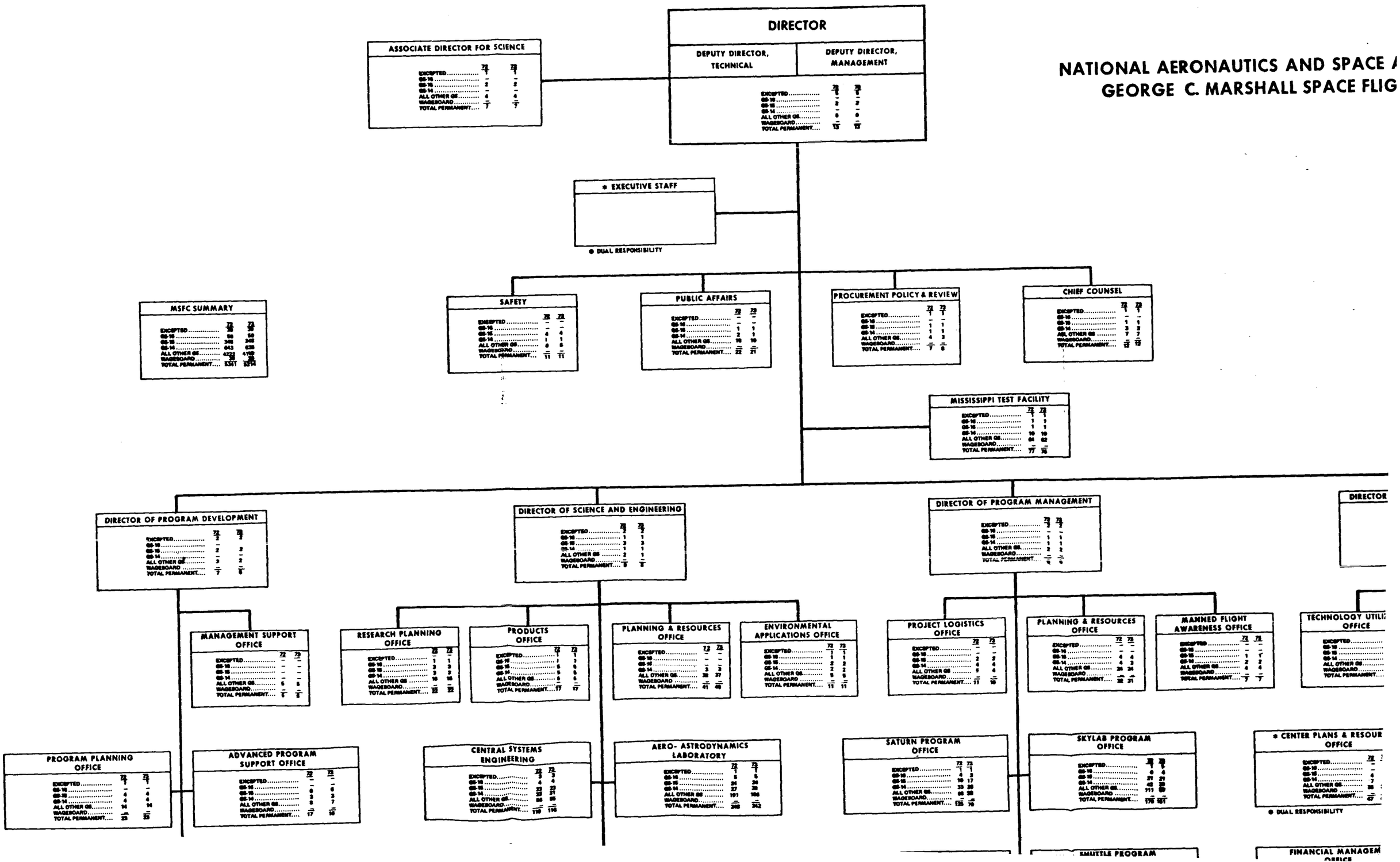
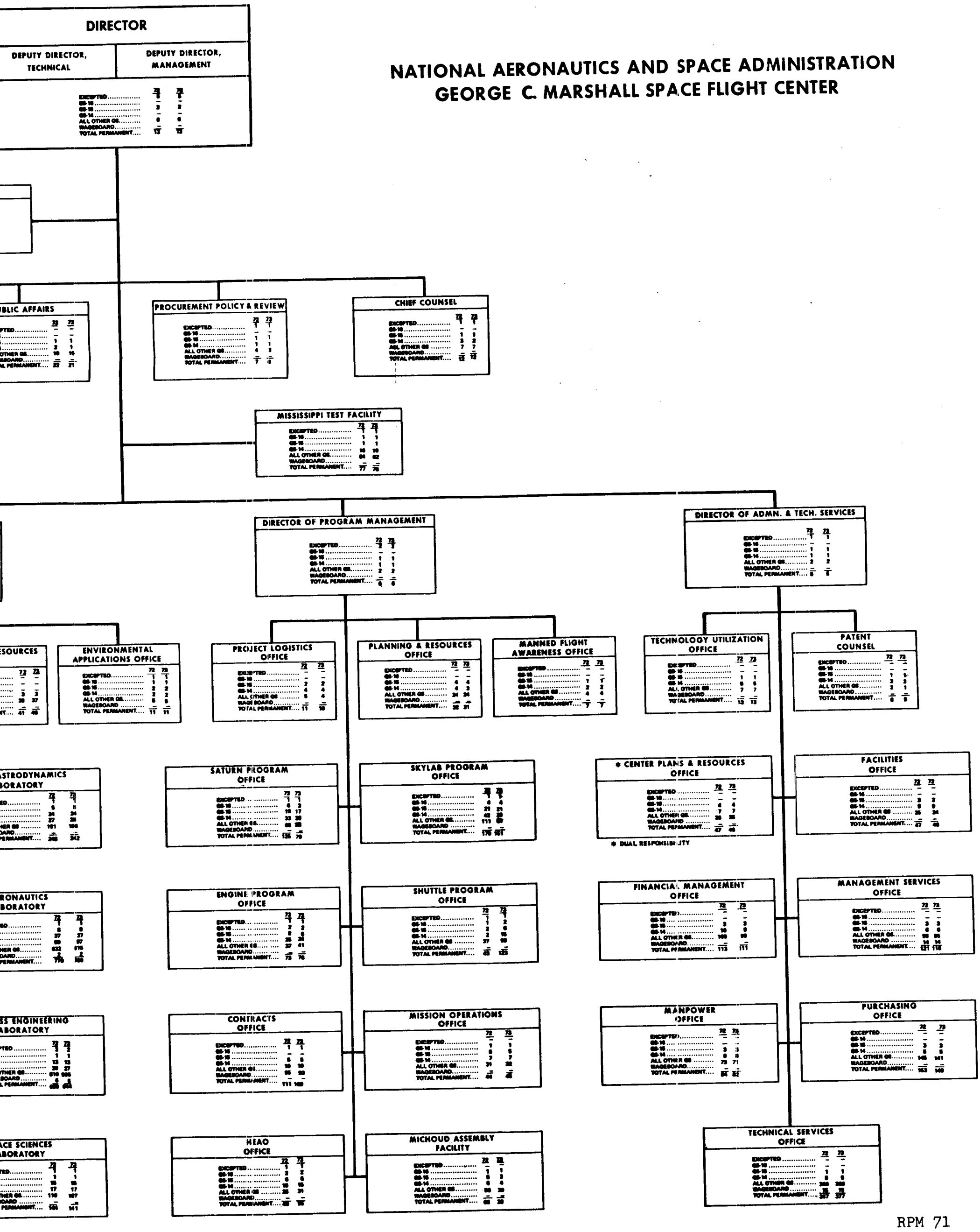
NATIONAL AERONAUTICS AND SPACE A
GEORGE C. MARSHALL SPACE FLIG



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER



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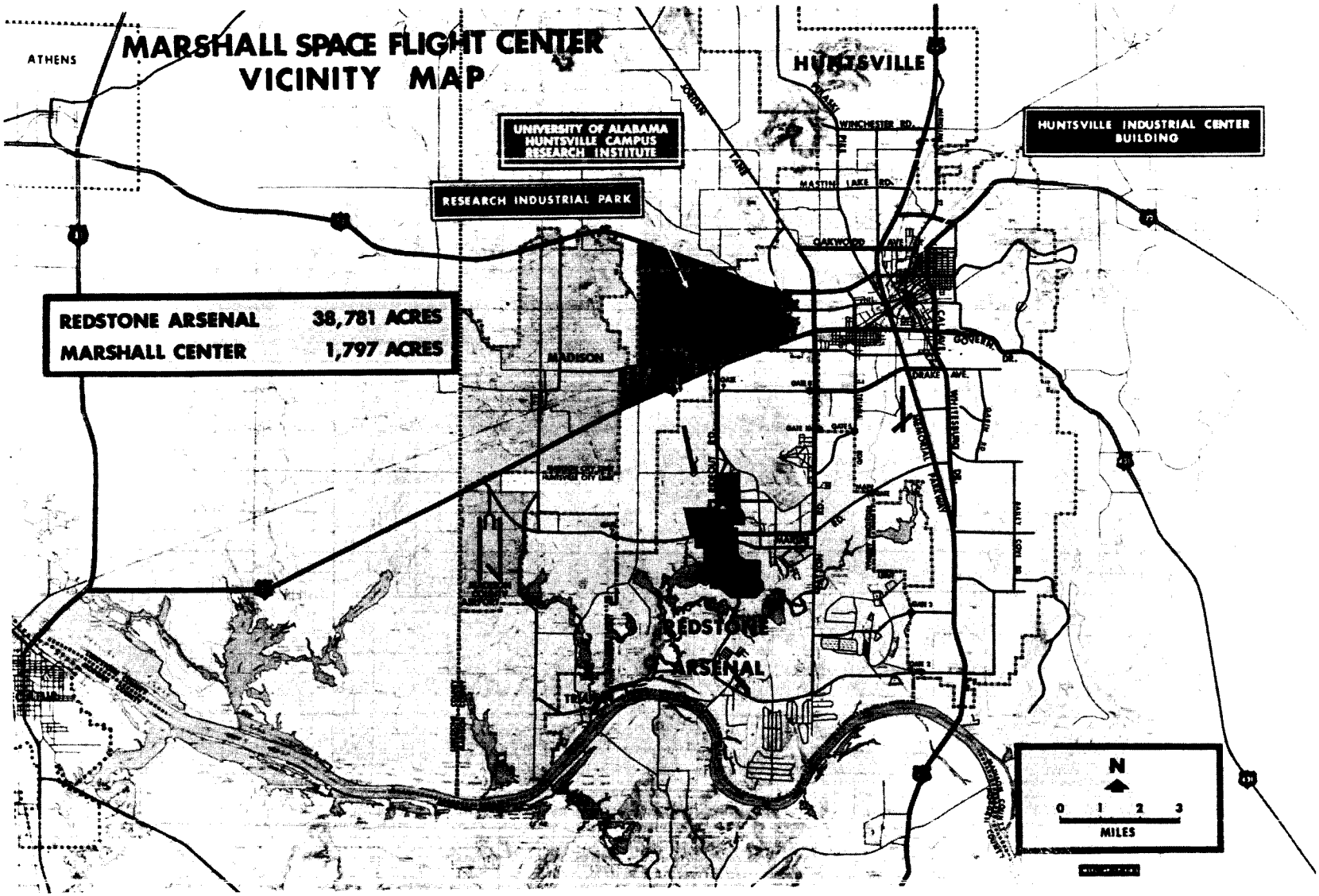
MARSHALL SPACE FLIGHT CENTER
VICINITY MAP
ATHENS
HUNTSVILLE
UNIVERSITY OF ALABAMA
HUNTSVILLE CAMPUS
RESEARCH INSTITUTE
RESEARCH INDUSTRIAL PARK
HUNTSVILLE INDUSTRIAL CENTER
BUILDING
REDSTONE ARSENAL 38,781 ACRES
MARSHALL CENTER 1,797 ACRES
MADISON
REDSTONE
ARSENAL
WINCHESTER RD.
MARTIN LAKE RD.
OAKWOOD AVE.
DRAKE AVE.
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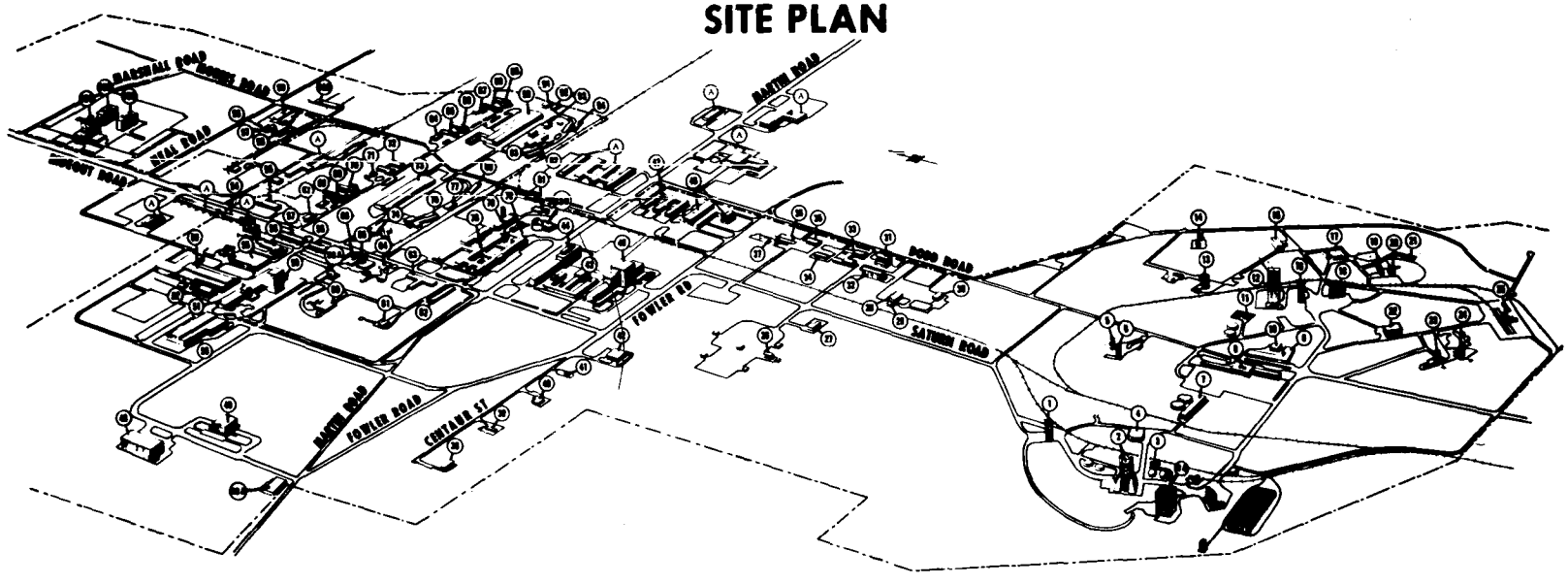
MILES

RPM 72

MARSHALL SPACE FLIGHT CENTER
SITE PLAN



HEADQUARTERS AREA

95	4207	CENTRAL COMMUNICATIONS FACILITY
96	4241	STORAGE BUILDING
97	S-4244	BUTLER BUILDING (STORAGE AND SHOPS)
98	S-4251	SUPPORT SERVICES EQUIPMENT SHED
99	4250	TECHNICAL SERVICES OPERATIONS BUILDING
100	4249	SUPPORT SERVICES OPERATIONS AND MEDICAL CENTER
101	4200	CENTRAL LABORATORY AND OFFICE BUILDING
102	4202	PROJECT ENGINEERING BUILDING
103	4201	ENGINEERING AND ADMINISTRATION BUILDING

LAB AND SUPPORT AREA

38	4628	LOW TEMPERATURE TEST FACILITY
39	4622	LIQUID HYDROGEN TEST PAD
40	4623	ACCELERATOR AND TEST CELL FACILITY
41	4624	HYDROGEN PEROXIDE STATION
42	4605	NON-DESTRUCTIVE TEST LABORATORY
43	4612	MATERIALS LABORATORY
44	4610	ASTRONAUTICS LAB
45	4619	STRUCTURES AND MECHANICS LABORATORY
46	4650	TEST SHOP & INSTRUMENT LAB
47	4663	COMPUTATION LABORATORY
48	S-4755	VEHICLE COMPONENTS HANGER
49	S-4752	COMPONENTS AND SUBASSEMBLY ACCEPTANCE BLDG.
49A		INDUSTRIAL WASTE TREATMENT FACILITY
50	4708	ASSEMBLY AND INSPECTION HANGER
51	4700	SURFACE TREATMENT FACILITY
52	S-4706	NEUTRAL BUOYANCY SIMULATOR
53	4705	ASSEMBLY SHOP AND HANGER
53A	4775	EXPERIMENTAL TEST FACILITY
53B	4467	CELESTIAL SENSOR FACILITY
54	4723	MATERIAL TEST LABORATORY
55	4711	PRECISION MACHINE SHOP
56	4712	FIELD OFFICE BUILDING (MFG. ENG. LAB)
57	4727	MACHINE SHOP AND OFFICE BUILDING
58	4728	EQUIPMENT TEST SHOP
59	4707	COMPONENT HANGER & HYDROSTATIC TEST
60	4750	HIGH ALTITUDE TEST FACILITY
61	4748	LIQUID PROPELLANT TEST SUPPORT BUILDING
62	S-4747	AIR COMPRESSOR STATION
63	4746	OFFICE, TEST DIVISION
64	4741	BERYLLIUM FACILITY
65	4732	WIND TUNNEL FACILITY
66	4733	VACUUM TANK FACILITY
67	4306	SUPPORT OFFICES
68	4312	OFFICE BUILDING
69	4311	SHOCK TUNNEL FACILITY
70	4313	STRUCTURAL TESTING LABORATORY STORAGE
71	4332	ENVIRONMENTAL TEST LABORATORY
72	4331	TESTING AND DEVELOPMENT SHOP
73	4471	STORAGE AND OFFICE BUILDING
74	4485	FINANCIAL MANAGEMENT OFFICE BUILDING
75	4491	COMPUTATION/ADP LABORATORY
76	4487	GUIDANCE AND CONTROL BUILDING ASTRIONICS LAB
77	S-4479	STORAGE SHED
78	4476	ACCELERATION AND ENVIRONMENTAL TEST FACILITY
79	S-4436	AUTOMATION CHECKOUT BUILDING
80	4492	ELECTRICAL SYSTEM LABORATORY
81	4475	HAZARDOUS OPERATIONS LABORATORY
82	4493	MACHINE AND SHEET METAL SHOP
83	4483	VEHICLE MAINTENANCE SHOP
84	4352	NITROGEN STORAGE BUILDING
85	4351	ADMINISTRATIVE BUILDING
86	4353	PHOTOGRAPHIC LABORATORY
87	4372	EQUIPMENT STORAGE
88	4371	STORAGE AND OFFICES
89	4373	GSE LABORATORY
90	4481	ENGINEERING AND MACHINE SHOP/OFFICE
91	S-4498	STORAGE BUILDING (QUONSET)
92	S-4499	STORAGE BUILDING (QUONSET)
93	4482	OPERATIONS SUPPORT BUILDING
94	4494	MARS ACTIVITIES

TEST AREA

WEST AREA

1	4696	F-1 ENGINE TEST STAND
2	4670	SATURN STATIC TEST STAND (S-IC)
3	4674	HELIUM COMPRESSOR BUILDING
4	4674	CONTROL CENTER BUILDING
5		INTERIM TEST STAND
6		JUPITER "HOP" TEST STAND
7	4667	PUMP HOUSE
8	4666	TEST DIVISION ENGINEERING BUILDING
8A	4699	S-II STRUCTURAL TEST STAND

EAST AREA

9	4566	TECHNICAL DOCUMENTATION CENTER
10	4567	BOILER HOUSE AND PUMP STATION
11	S-4549	DEIONIZED WATER TREATMENT PLANT
12	4550	ADVANCED SATURN DYNAMIC TEST STAND
13	4522	TEST STAND (LOX-LH_2 COMPONENTS)
14	4530	TEST STAND (LOX-RP COMPONENTS)
15	4561	CONTROL AND SERVICE CENTER
16	4557	DYNAMIC TEST STAND (SATURN I/IB)
17	4583	COMPONENTS TEST LABORATORY
18	4548	F-1 TURBO TEST FACILITY
19	S-4539	TEST PREPARATION BUILDING
20	4540	ACOUSTIC MODEL TEST FACILITY
21	4541	CONTROL BUILDING
22	4570	BLOCKHOUSE
23	4564	POWER PLANT TEST STAND (H-1 ENGINE)
24	4514	LIQUID HYDROGEN FACILITY (S-IVB)
25	4572	STATIC TEST TOWER (S-I/IB)

TEST SUPPORT AREA

26	4646	GSE TEST CONTROL CENTER
27	4648	HIGH PRESSURE FLUID TEST FACILITY
28	S-4659	SUPPORT BUILDING (N2 VAPORIZATION FAC)
29	S-4660	BOILER HOUSE
30	S-4647	GAS STORAGE & COMPRESSOR BLDG
31	S-4655	ENGINE PREPARATION BUILDING
32	S-4656	SATURN V GSE ASSEMBLY BUILDING
33	S-4653	COMPONENTS SUPPORT BUILDING
34	4678	SUB-STORES BUILDING
35	S-4654	TECHNICAL SYSTEMS WAREHOUSE
36	S-4651	SHOP BUILDING (QUONSET)
37	4649	TRANSPORTATION HANGER
		A - - ARMY BUILDINGS

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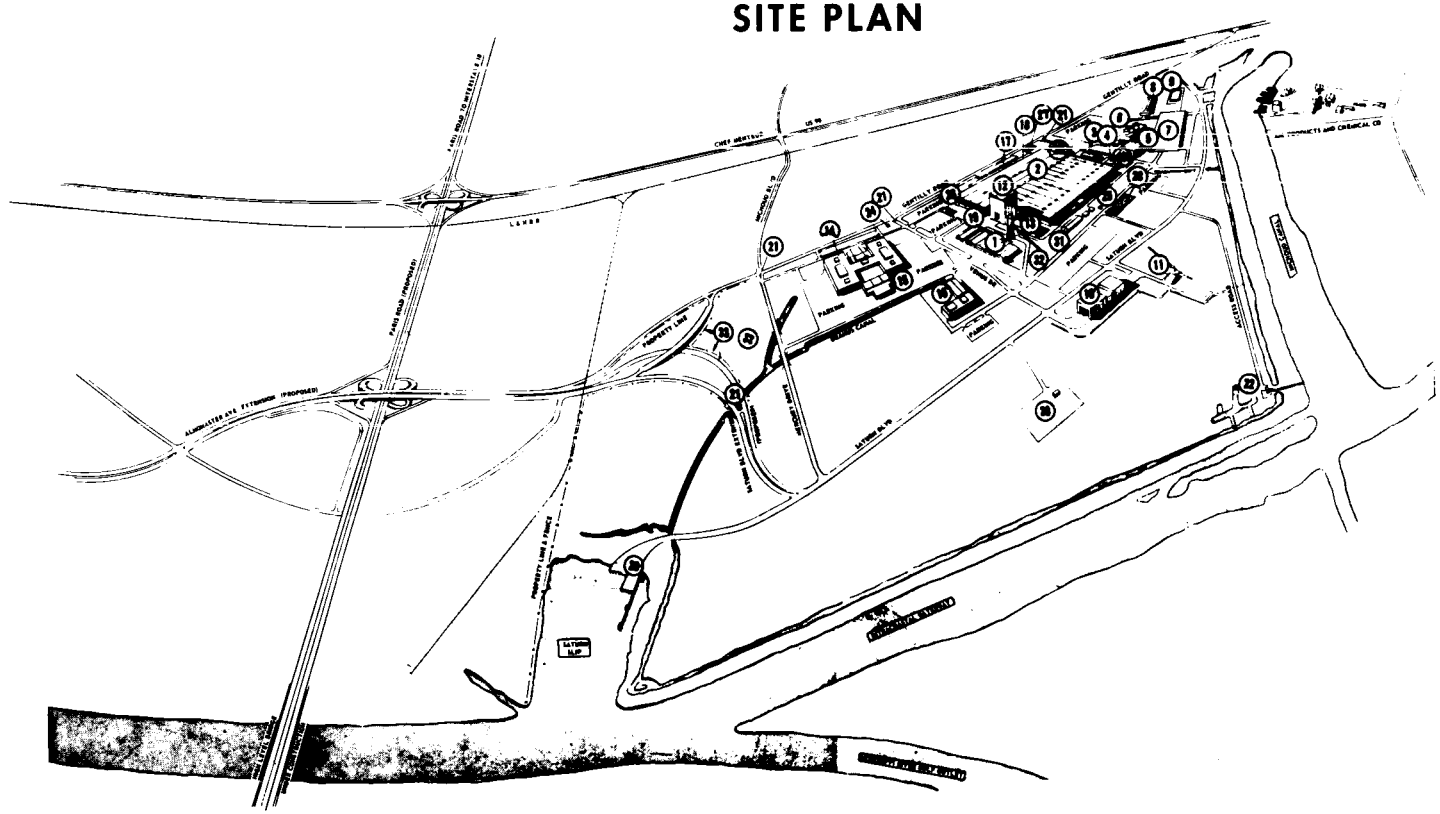
MICHOUD ASSEMBLY FACILITY

SITE PLAN



MANUFACTURING AND ASSEMBLY

1	303	BOOSTER HANGAR
2	103	MANUFACTURING
3	111	LABORATORY
4	104	BATTERY CHARGING & STORAGE
5	207	BOILER HOUSE
6	202	COOLING TOWER
7	220	VEHICLE COMPONENT SUPPLY
8	203	MAINTENANCE SUPPLY
9	221	HAZARDOUS MATERIAL STORAGE

TEST FACILITIES

10	420	S-IC STAGE TEST & CHECKOUT FACILITY
11	404	HIGH PRESSURE TEST FACILITY
12	110	VERTICAL ASSEMBLY & HYDROSTATIC TEST
13	130	SYSTEMS ENGINEERING

ENGINEERING & ADMINISTRATION

14	350	OFFICE AND ENGINEERING BUILDING
15	351	CAFETERIA
16	320	CONTRACTOR SERVICES BUILDING
17	101	ADMINISTRATION
18	102	ENGINEERING
19	301	MAINTENANCE SHOP

TRANSPORTATION, UTILITIES & MISC

20	480	SATURN BARGE DOCK
21		GUARD HOUSE
22	450	MAIN PUMP STATION
23	201	PUMP STATION NO 1
24	304	PUMP STATION NO 3
25	143	PUMP STATION NO 4
26	308	WEST MASTER SUBSTATION
27	121	MAIN SUBSTATION
28		CHEMICAL WASTE LAGOON
29	119	PAINT SHOP
30	403	SALVAGE YARD
31	105	TRANSPORTATION
32		ELEVATED WATER TOWER
33		SATURN BOULEVARD EXTENSION

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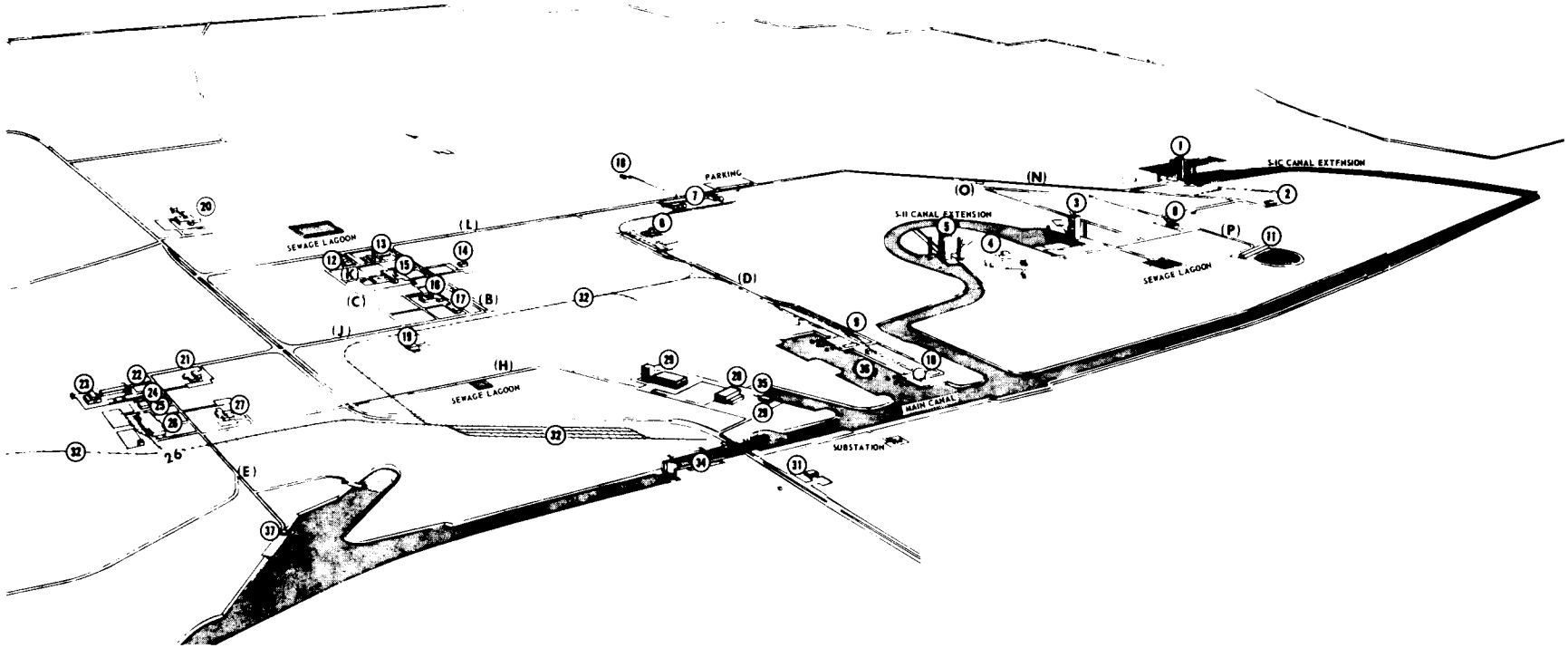
MISSISSIPPI TEST FACILITY
SITE PLAN



SATURN V TEST COMPLEX

1	4220	SATURN S-IC STATIC TEST FAC. (DUAL POSITION)
2	4210	S-IC TEST CONTROL CENTER
3	4122	S-II POSITION A-2
4	4110	S-II TEST CONTROL CENTER
5	4120	S-II POSITION A-1
6	4995	DATA ACQUISITION CENTER
7	3305	HIGH PRESSURE GAS COMPRESSOR FACILITY
8		RP-1 STORAGE AND TRANSFER AREA
9		LH_2 TRANSFER AREA
10		LOX STORAGE AND TRANSFER AREA
11	4400	HI PR WATER STORAGE, PUMP, & DISTR SYSTEM

ENGINEERING AND ADMINISTRATION COMPLEX

12	1201	COMMUNICATIONS & TELEPHONE BUILDING
13	1200	TEST AREA CONTROL CENTER
14	1000	DATA HANDLING CENTER
15	1100	ENGINEERING AND ADMINISTRATION BUILDING
16	1105	ELECTRONICS INSTR & MATERIALS LAB
17	1110	SONIC MEASURING FACIL - ACOUSTIC LAB
18	8201	SONIC MEASURING FACIL - METEOROLOGY LAB
19	3204	CENTRAL HEATING PLANT

INDUSTRIAL COMPLEX

20	8100	COMPONENTS SERVICE FACILITY
21	2101	EMERGENCY SERVICES BLDG.
22	2201	SITE MAINTENANCE BLDG.
23	2205	TEST MAINTENANCE BLDG
24	2202	COMPRESSED GAS CYLINDER STORAGE
25	2203	INFLAMMABLE MATERIAL STORAGE
26	2204	WAREHOUSE
27	2105	MOBILE EQUIPMENT OPERATION BLDG.
28	3202	S-IC STAGE STORAGE BUILDING
29	3203	S-II STAGE STORAGE & C/O FAC.
30	3201	CRYOGENIC BARGE SERVICE BUILDING
31	3102	SECURITY CONTROL FACILITY

TRANSPORTATION & MISC.

32		RAILROAD & SWITCHING YARD
33	2402	RP-1 TRANSFER DOCK
34	2315	NAVIGATION LOCK & BRIDGE
35		BOOSTER TRANSFER DOCK
36		CRYOGENIC DOCK & CANAL EXTEN
37	2401	CONSTRUCTION DOCK

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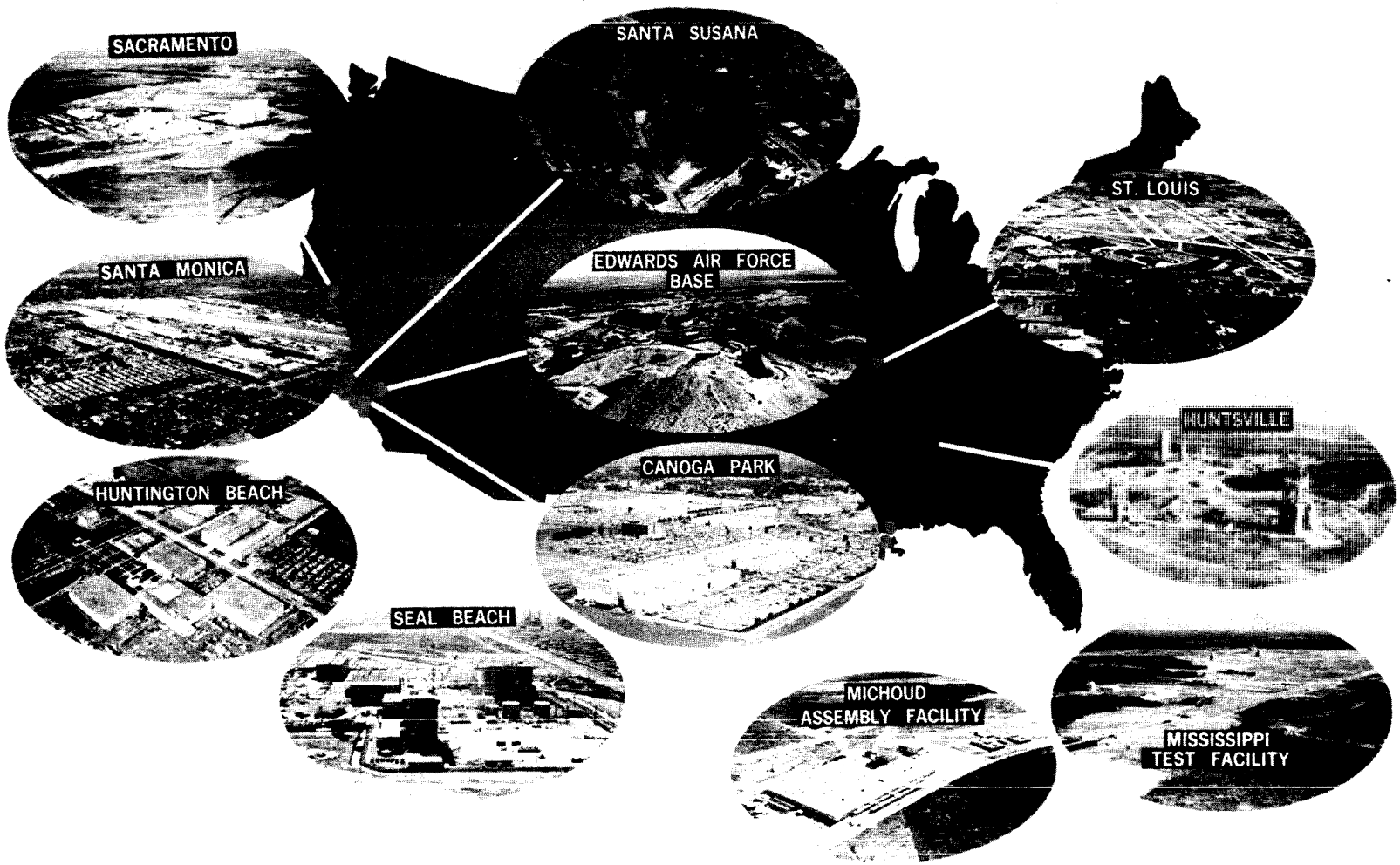
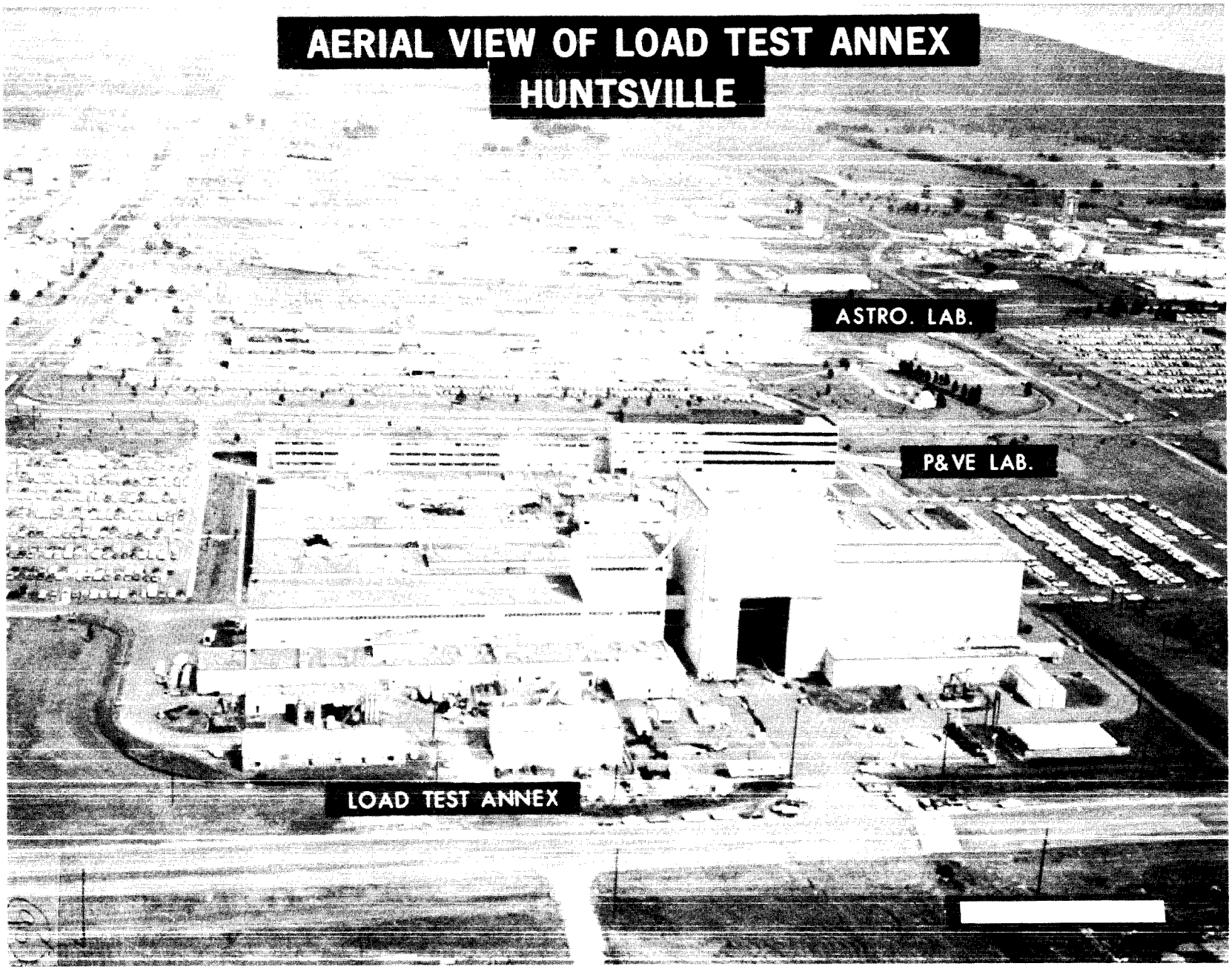
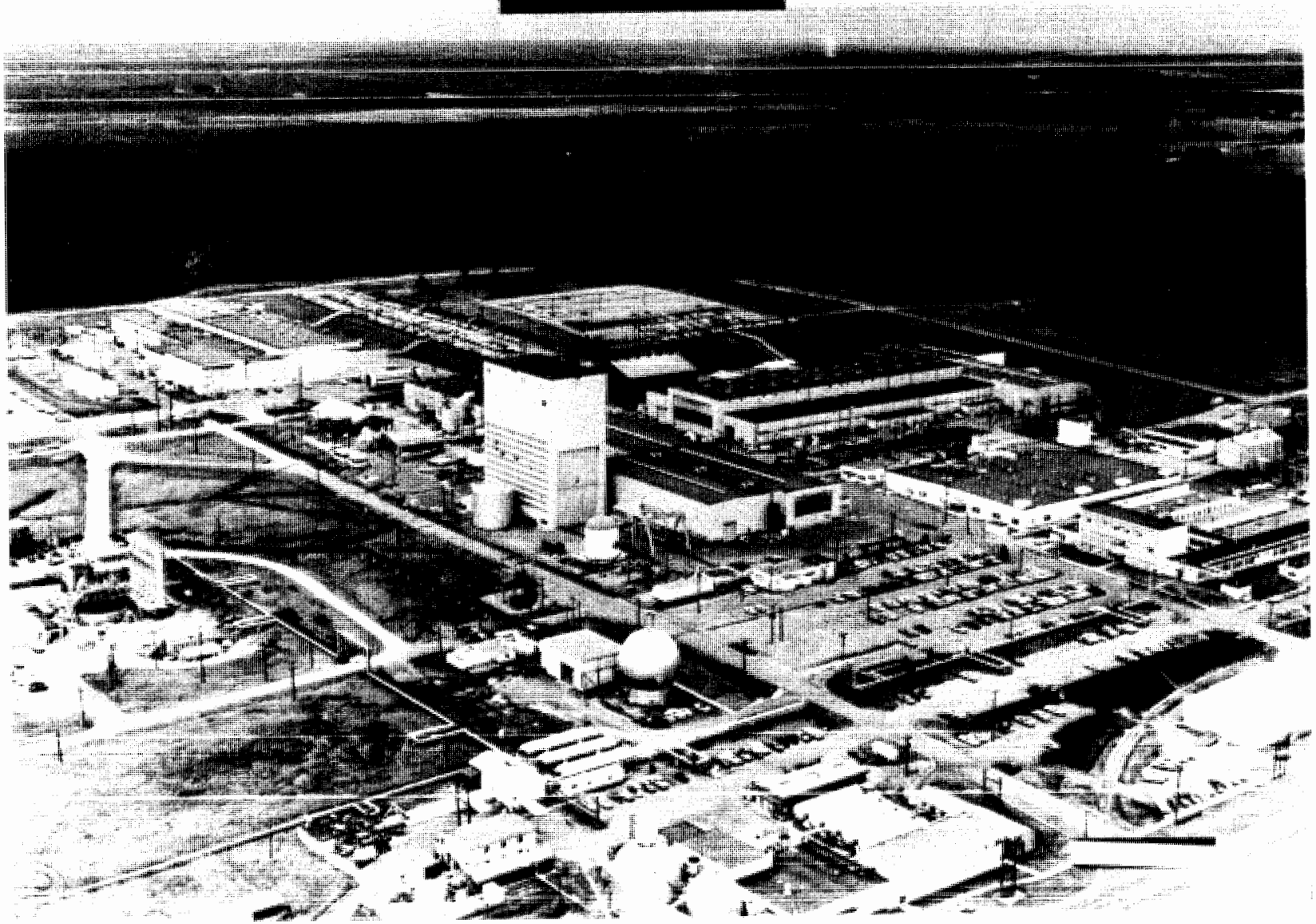
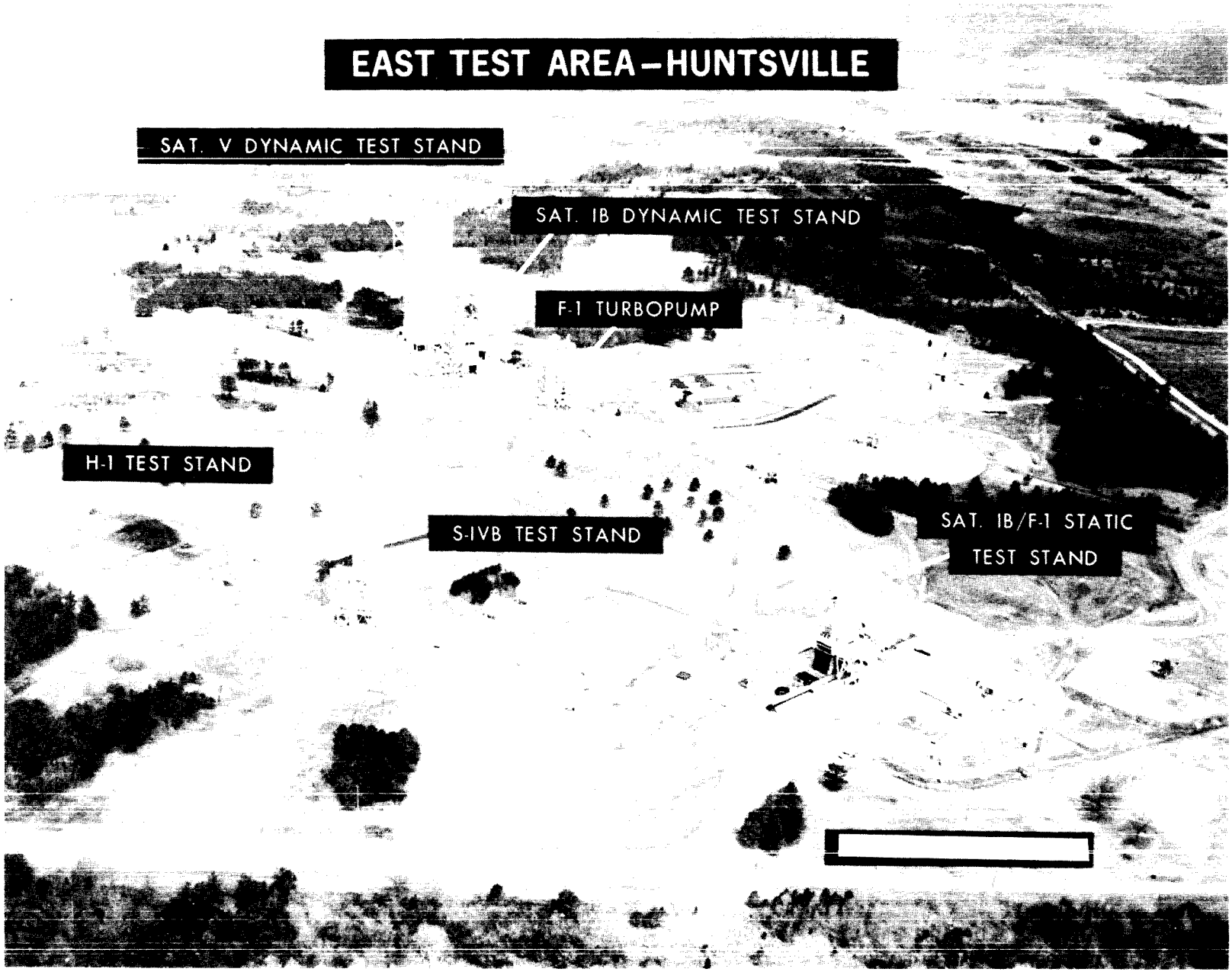
MARSHALL SPACE FLIGHT CENTER
PROGRAM FACILITIES




AERIAL VIEW OF LOAD TEST ANNEX
HUNTSVILLE
ASTRO. LAB.
P&VE LAB.
LOAD TEST ANNEX

PROD. ENGR. & PROC. TECH. LAB.
HUNTSVILLE





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1. MAINTENANCE SUPPLY
2. HAZARDOUS MATLS
3. VEHICLE COMPONENT SUPPLY
4. BOILER PLANT & FUEL TANKS
5. BATTERY CHARGING
6. COOLING TOWER
7. LABORATORY
8. CHEMICAL WASTE RESERVOIR
9. CHRYSLER FAB AREA (S-IB)
10. BOEING FAB AREA (S-IC)
11. ENGINEERING BUILDINGS
12. VERT ASSY & HYDROSTATIC TEST
13. SYSTEMS ENGINEERING BLDG
14. BOOSTER HANGAR
15. MAINTENANCE
16. ENGINEERING & OFFICE BLDG
17. CAFETERIA
18. CONTRACTOR SERVICES BLDG
19. STAGE TEST & CHECK OUT
20. SALVAGE YARD
21. HIGH PRESSURE TEST FACILITY
22. MAIN PUMPING STATION
23. BARGE DOCK
24. LOX & LH_2 PLANT

STAGE AND ENGINE TESTING

SANTA SUSANA

MSFC-67-IND 433

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

GODDARD SPACE FLIGHT CENTER

MISSION

The Goddard Space Flight Center, established in 1959 as the first major United States installation devoted to the investigation and exploration of space, conducts a wide-ranging program of experimentation in space science and applications. The Goddard Center has developed many diverse capabilities: the management of complex satellite projects; the development of wholly integrated spacecraft, ranging from systems engineering to development, integration, and testing; the development and operation of satellite tracking networks; data acquisition and analysis; and scientific research to include both theoretical studies and the development of many significant scientific experiments flown in satellites.

The majority of the Goddard Center's personnel are located at Greenbelt, Md.; other personnel are located at the Goddard Institute for Space Studies in New York City, and throughout the world, managing the operation of satellite tracking and communications network stations.

Goddard is responsible for the management of communications and earth observation satellite programs, such as the Applications Technology, Nimbus, and Earth Resources Technology satellites; the management of scientific satellite projects which include the Orbiting Solar (OSO), and the Orbiting Astronomical Observatories (OAO) and the Explorer series; project management of NASA's Delta launch vehicle; management and operation of the Space Flight Tracking and Data Network; and the development of the sounding rocket program.

Major Goddard activities during the year were concerned with work in the following areas:

International Satellites - An increasingly important mission for the Center is its responsibility for carrying out the international cooperative space program under NASA auspices. During the year, one communications satellite, NATO-2, and two scientific satellites, ISIS B and San Marco C, were launched for the North Atlantic Treaty Organization, Canada and Italy, respectively.

Applications Satellites - Goddard is the primary NASA center for weather, communications and earth resources satellite efforts. The center is currently working on three major applications satellite projects:

(1) Earth Resources Technology Satellites (ERTS) A&B, (2) Applications Technology Satellites (ATS) F&G, and (3) Small Meteorological Satellites (SMS) A-C. The ERTS satellites will investigate the earth's resources from space, the ATS F&G satellites will carry advanced meteorological, communications, air traffic control and scientific experiments, while the SMS A-C satellites will provide the capability for continuous observation of the atmosphere on an operational basis.

Sounding Rockets - During 1971, more than 125 sounding rocket launchings, primarily at the Wallops Station, were conducted by Goddard, bringing to approximately 1,500 the number of launchings in the program since 1959.

Tracking and Data Acquisition - The Goddard-managed Space Flight Tracking and Data Network provided communciations and tracking coverage for all of NASA's scientific and applications satellites launched during the year. The Manned Space Flight Network provided global tracking support for one Apollo manned flight.

DESCRIPTION

The Goddard Space Flight Center, located 15 miles northeast of Washington, D.C., at Greenbelt, Maryland, is situated on a 554 acre main site. Three additional nearby plots of 639 acres comprise the remote site area and contain the Goddard Antenna Test Range, the Goddard Optical Facility, the Propulsion Research Facility, the Magnetic Fields Component Test Facility, the Attitude Control Test Facility, and the Network Training and Test Facility.

The total capital investment for the Goddard Space Flight Center, including fixed assets in progress and contractor-held facilities at various locations as of June 30, 1971, was $667,582,000 (including capital type facilities of the STDN network and other supporting activities including equipment aboard ships and aircraft).

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel.....	$76,924,000	$79,118,000	$78,072,000
Travel.....	2,362,000	2,237,000	2,237,000
Facilities services.....	4,365,000	4,576,000	4,723,000
Technical services.....	5,697,000	4,066,000	2,770,000
Administrative support.....	3,740,000	3,957,000	4,254,000
Total, fund requirements.....	$93,088,000	$93,954,000	$92,056,000

	1971	1972	1973	in 1973
I. **PERSONNEL**.....	$76,924,000	$79,118,000	$78,072,000	$-1,046,000

Basis Of Fund Requirements

A. Compensation and Benefits			
1. Compensation			
a. Permanent positions....	$69,675,000	$71,393,000	$70,421,000
b. Nonpermanent positions.	392,000	460,000	460,000
c. Reimbursable details...	84,000	101,000	115,000
d. Overtime and other compensation.....	538,000	484,000	484,000
Subtotal, Compensation.	$70,689,000	$72,438,000	$71,480,000
2. Benefits.....	$5,752,000	$6,141,000	$6,044,000
Subtotal, Compensation and Benefits.....	$76,441,000	$78,579,000	$77,524,000
B. Supporting Costs:			
1. Transfer of personnel.....	$109,000	$110,000	$110,000
2. Personnel training.....	374,000	429,000	438,000
Subtotal, Supporting Costs.....	$483,000	$539,000	$548,000
Total, Personnel and Related Costs.....	$76,924,000	$79,118,000	$78,072,000
1. Compensation.....	$70,689,000	$72,438,000	$71,480,000
a. Permanent Positions....	$69,675,000	$71,393,000	$70,421,000

The cost of compensation for permanent positions is the largest part of Personnel and Related costs. The funds shown above will support 4,061 permanent positions in 1972 and 3,966 positions in 1973. This represents a reduction of 446 from 1971.

Permanent Positions by Programs:	1971	1972	1973
Manned Space Flight			
Apollo	7	7	5
Space flight operations	3	11	9
Space Science			
Physics and astronomy	1,300	1,178	1,064
Lunar and planetary exploration	128	118	133
Launch vehicle procurement	52	54	54
Space Applications	648	675	708
Aeronautics and Space Technology			
Space research and technology	130	100	99
Nuclear power and propulsion	---	1	1
Tracking and Data Acquisition	802	823	822
Subtotal, positions by program	3,070	2,967	2,895
Indirect Positions:			
Director and staff	15	13	13
Administrative support	920	796	778
Research and development support	407	285	280
Subtotal, indirect positions	1,342	1,094	1,071
Total, permanent positions	4,412	4,061	3,966
Other Than Permanent Positions	300	300	300
Total	4,712	4,361	4,266

The above table illustrates the use to which positions are put. The distribution by occupation of these positions illustrates a significant characteristic of the Goddard workforce. Professional engineers and scientists comprise approximately 46% of the Center workforce. Technicians and technically oriented wage board employees, working in direct support of the professional technical staff, make up another 24% of the complement. The following table summarizes by occupational group the Center's workforce.

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	1,981	44.9	1,882	46.4	1,844	46.5
Technicians.....	912	20.7	803	19.8	785	19.8
Wage board.....	177	4.0	186	4.5	176	4.4
Professional administrative.....	663	15.0	623	15.3	599	15.1
Clerical.....	679	15.4	567	14.0	562	14.2
Total.....	4,412	100.0	4,061	100.0	3,966	100.0

Basis Of Cost For Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973, the cost of permanent positions will be $70,421,000, a reduction of $972,000 from 1972. This reduction results as follows:

Cost of permanent positions in 1972.....		$71,393,000
Cost of increases in 1973		1,686,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	873,000	
Partial year effect of 1973 actions.....	813,000	
Cost decreases in 1973		-2,658,000
Abolished positions:		
Full year effect of 1972 actions.....	-1,863,000	
Partial year effect of 1973 actions.....	-158,000	
Turnover savings.....	-95,000	
Decrease in days paid in 1973.....	-542,000	
Cost of permanent positions in 1973.....		$70,421,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent positions	$392,000	$460,000	$460,000

Goddard utilizes nonpermanent positions for a variety of programs, the largest of which is the President's Youth Opportunity Campaign. Participation in this program enables approximately 160 underprivileged young people to work at unskilled summer jobs at Goddard. About 10 are also employed up to 16 hours a week during the school year.

The summer employment program also includes hiring up to 75 high school and college faculty members and college students. Goddard benefits from the employment of these highly skilled individuals and the training and exposure they receive is an asset to themselves and to the nation.

As in the past, the Center continues to provide significant training opportunities for technically oriented college students participating in the cooperative training program throughout the year. The 55 students employed under cooperative training agreements work for a term at Goddard and then spend a term in regular study at their respective college or university. This work-study program combines practical experience with theory and has been a significant recruitment source for the Center. In addition, 10 positions are utilized during the year to hire short-term or part-time clerical assistance.

	1971	1972	1973
c. Reimbursable details.....	$84,000	$101,000	$115,000

The services of a small group of about 9 military officers are utilized in Goddard's programs where such assignments are of mutual benefit. In accordance with existing agreements, Goddard reimburses the Department of Defense for the salaries and related costs of the detailees. The increase in 1973 represents the cost of promotions and statutory pay raises.

d. Overtime and other compensation	$538,000	$484,000	$484,000

Overtime at Goddard is required to meet peak operational requirements where additional man-hours of work are essential, generally culminating in the launch of a manned or automated spacecraft. Nine major launches are planned for 1973, including, ATS F, Nimbus E, SAS B, IMP H, ITOS E&F, and SMSA, as well as several hundred sounding rocket launches. Those activities which require the majority of the overtime effort include sounding rocket prelaunch field preparation, tracking network and control center operations, post launch data reduction, and testing of satellite experiments and subsystems.

2. Benefits.....	$5,752,000	$6,141,000	$6,044,000

In addition to compensation, Goddard makes an employer's contribution to personnel benefits as authorized and required by law. The reduction of $97,000 in benefits cost in 1973 results from the reductions in planned personnel positions. The following table indicates the costs of personnel benefits by the major categories:

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Category of Cost	1971	1972	1973
Contribution to the Civil Service Retirement Fund.....	$4,872,000	$4,980,000	$4,920,000
Contribution for employee life insurance.....	256,000	258,000	266,000
Contribution for employee health insurance.....	542,000	718,000	758,000
Contribution to FICA.....	9,000	10,000	11,000
Incentive awards.....	21,000	24,000	25,000
Other personnel benefits.....	52,000	57,000	59,000
Severance pay.....	---	94,000	5,000
Total.....	$5,752,000	$6,141,000	$6,044,000
B. Supporting Costs.....	$483,000	$539,000	$548,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel....	$109,000	$110,000	$110,000

The funds requested in this category provide for moving expenses for new Goddard employees and their families and for employees reassigned to other Goddard locations, such as New York Ciry or one of the STDN tracking stations. Estimates are based on the number and historical average cost of relocations. In 1973 the funds will provide for 80 transfers (including 7 foreign) at an average cost of $1,375.

2. Personnel training.....	$374,000	$429,000	$438,000

The maintenance and expansion of the skills of personnel are essential in carrying out the Center's many complex technical programs. Less than 10 percent of the training consists of courses offered by the Civil Service Commission and other federal government agencies. The remainder is split evenly between academic coursework at local colleges and universities and training programs conducted by commercial technical institutes and private corporations.

The increased level of funding in 1972 and 1973 is to provide retraining programs for employees who were relocated as a result of the October 1971 reduction in force.

It is estimated that during 1973 there will be a total enrollment of 2,980 at a cost of $438,000 distributed as follows:

	Personnel	Cost
Scientific, engineering and related professional training.....	855	$160,000
Technical support and administrative skills training.....	1,180	149,000
Supervision, management and executive development.....	533	92,000
Secretarial office support, safety and personnel skills.....	412	37,000

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$2,362,000	$2,237,000	$2,237,000	---

Basis Of Fund Requirements

Summary Of Travel By Major Cateogry

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$1,382,000	$1,057,000	$1,057,000
2. Flight mission support	266,000	582,000	582,000
3. Overseas travel to launch and tracking sites.....	366,000	312,000	312,000
Subtotal.....	$2,014,000	$1,951,000	$1,951,000

	1971	1972	1973
B. Meetings and Technical Seminars			
1. Government-sponsored meetings	$19,000	$15,000	$15,000
2. Other than government-sponsored meetings and technical seminars.....	244,000	195,000	195,000
Subtotal.....	$263,000	$210,000	$210,000
C. Administrative Travel.....	$85,000	$76,000	$76,000
Total, Travel.....	$2,362,000	$2,237,000	$2,237,000
A. Program Related Travel.....	$2,014,000	$1,951,000	$1,951,000

Program related travel is the travel most directly related to the Goddard mission. It is the largest part of the travel function and accounts for approximately 87% of the travel requirements for 1973.

1. Direction, coordination and management of programs.....	$1,382,000	$1,057,000	$1,057,000

The largest individual part of program related travel is for direction, coordination, and management of Research and Development and Construction of Facilities program activities. Goddard has approximately 200 active R&D contracts in excess of $100,000. Technical officers are required to review contractors' performance at design reviews, fabrication, and during integration and test of the spacecraft. A substantial amount of travel is required to coordinate the interface of experiments with the spacecraft. Due to the numerous technical problems associated with R&D effort it is imperative that government monitoring of the contractor performance is accomplished to maintain schedule and cost controls.

2. Flight mission support.....	$266,000	$582,000	$582,000

As projects reach the flight stage, support is required for pre-launch and post-launch activities. The amount of travel required for this purpose is directly related to both the number and complexity of the launches. The estimate for 1973 is in consonance with the schedule of nine major launches, including SMS A, ITOS E&F, Nimbus E, SAS B, IMP H, and ATS F.

3. Overseas travel to launch and tracking sites.....	$366,000	$312,000	$312,000

Overseas travel to launch and tracking sites includes travel required for instrumentation of the tracking sites, and inspection of the sites

prior to launch. There are 21 tracking sites which comprise the worldwide tracking network. The San Marco platform off the east coast of Africa is used as a launch site for several launches per year. In addition, sounding rockets are launched in various parts of the world such as Alaska, Canada and South America.

	1971	1972	1973
B. Meetings and Technical Seminars....	$263,000	$210,000	$210,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. Included among the non-government sponsored meetings are the American Astronautical Society, the American Geophysical Union, the American Association for the Advancement of Science, the Institute of Electrical and Electronic Engineers, and the Committee on Space Research.

Participation allows personnel to benefit from exposure to technological advances in the field which arise outside Goddard as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the types described is granted only after assurance that attendance will be in the best interest of NASA.

The 1973 estimates will provide travel funds for approximately 900 Goddard employees to attend meetings and technical seminars throughout the United States and foreign countries.

C. Administrative travel.....	$85,000	$76,000	$76,000

Administrative travel is for the direction and coordination of general management matters. It includes travel by Center functional managers such as general management, personnel, financial, and procurement management to assure that policies and procedures are being executed. This is required for center management consultation with other NASA centers, other government agencies and aerospace industry management for the purpose of coordinating center mission activities.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES	$4,365,000	$4,576,000	$4,723,000	$+147,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Rental of real property	$336,000	$220,000	$228,000
2. Minor rehabilitation and modification, and construction.....	142,000	163,000	92,000
Subtotal.....	$478,000	$383,000	$320,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$507,000	$469,000	$443,000
2. Maintenance of equipment	52,000	137,000	149,000
3. Custodial services.....	1,008,000	1,100,000	1,135,000
Subtotal.....	$1,567,000	$1,706,000	$1,727,000
C. Operation of Facilities			
1. Utilities.....	$1,945,000	$2,092,000	$2,247,000
2. Supplies and equipment.....	375,000	395,000	429,000
Subtotal.....	$2,320,000	$2,487,000	$2,676,000
Total, Facilities Services....	$4,365,000	$4,576,000	$4,723,000
A. Acquisition of Facilities.....	$478,000	$383,000	$320,000
1. Rental of real property....	336,000	220,000	228,000

We are requesting funds to cover the lease cost of a dual purpose office/warehouse facility, with a gross area of 82,225 sq. ft., and a warehouse with a gross area of 20,000 sq. ft. The majority of this space is to accommodate the storage of supplies and equipment largely related to GSFC's overseas tracking responsibilities, for which government owned facilities are not available.

2. Minor rehabilitation and modification, and construction.....	$142,000	$163,000	$92,000

This activity provides for construction, additions, alteration, rehabilitation and modification of facilities. The reduction in 1973 reflects

the decision to fund only (1) construction of new facilities and additions to existing facilities of $10,000 or less per project and (2) rehabilitation and modification of facilities of $25,000 or less per project from the R&PM appropriation. All items over these amounts will be funded from the CoF appropriation in 1973.

The estimate for 1973 is based on identified need for small alteration projects such as moving partitions, changing air ducts, and installing water saving devices.

	1971	1972	1973
B. Maintenance and Related Services.....	$1,567,000	$1,706,000	$1,727,000
1. Maintenance of buildings and grounds.....	$507,000	$469,000	$443,000

Goddard's physical plant consists of 26 major buildings with a gross area of 2,170,000 sq. ft., situated on a total of 1,193 acres, of which approximately 500 acres are either surfaced or lawn areas. Funds are requested to cover periodic maintenance and repair of these facilities. The decrease in 1973 reflects reduced requirements for building repairs.

2. Maintenance of Equipment..	$52,000	$137,000	$149,000

The costs reflected in this category provide for all services, necessary to maintain the Center's mechanical equipment, utility systems and plants, such as electrical sub-stations and distribution lines, the fire alarm system, generators, electric motors, etc., the water distribution and sewer collection systems, the air conditioning systems and heating plant and the chilled water and steam distribution lines. The 1972 and 1973 estimates reflect an overdue maintenance effort on these utility systems and plant equipment.

3. Custodial services.....	$1,008,000	$1,100,000	$1,135,000

The estimates for custodial services are made up primarily of the janitorial services and guard services contracts.

Under the janitorial contract, 85 manyears of effort are expended to provide services for an approximate gross building area of 2,170,000 sq. ft. Certain areas, such as computer rooms, require specialized cleaning techniques; and other high traffic areas with round-the-clock operation require several cleanings a day. The 42 manyears of effort expended under the guard service contract provide the Center with a 3-shift round-the-clock security force for the protection of civil service and contractor employees, visitors, and the GSFC physical plant. Also included in this category are small amounts for cleaning, fire protection and refuse handling services. The increase in 1973 results from increased manyear rates in all contracts.

	1971	1972	1973
C. Operation of Facilities.....	$2,320,000	$2,487,000	$2,676,000
1. Utilities.....	$1,945,000	$2,092,000	$2,247,000

The cost of utilities - electric power, gas, water, sewage, and fuel oil - is paid from R&PM funds. In addition to supporting GSFC's 1973 population of 6,859 Civil Service and on-site contractor personnel, these services are required to operate Goddard's physical plant of 26 major buildings, with associated laboratories, ADP equipment, and various testing and evaluation facilities.

The increased cost in 1973 is due mainly to increased electric power requirements brought about by the ERTS 4th floor addition to the Data Interpretation Laboratory being on line for a full year.

2. Supplies and equipment.....	$375,000	$395,000	$429,000

Supplies, materials and equipment included in this category are utilized in the operation and maintenance of Goddard's physical plant and the surrounding roads, parking lots, and grounds. Equipment purchases for 1973 have been held to the 1972 level.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$5,697,000	$4,066,000	$2,770,000	$-1,296,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$3,928,000	$2,136,000	$939,000
2. Purchase of equipment.....	105,000	405,000	---
3. Maintenance of equipment....	46,000	64,000	46,000
Subtotal, equipment.....	$4,079,000	$2,605,000	$985,000
4. Programming and Operations..	799,000	668,000	860,000
Subtotal.....	$4,878,000	$3,273,000	$1,845,000

	1971	1972	1973
B. Engineering Services.....	$54,000	$76,000	$86,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$419,000	$409,000	$527,000
2. Educational/information programs.....	304,000	265,000	273,000
3. Scientific and technical information.....	42,000	43,000	39,000
Subtotal.....	$765,000	$717,000	$839,000
Total, Technical Services....	$5,697,000	$4,066,000	$2,770,000
A. Automatic Data Processing.....	$4,878,000	$3,273,000	$1,845,000

The R&PM appropriation provides for the lease, purchase, maintenance, and programming and operations services of ADP equipment which is not dedicated to specific research or operational systems and is not funded from the Research and Development appropriation. The reduced requirement for 1973 is due to the following: (1) the identification of certain leased ADP equipment, initially funded from the R&PM appropriation, as project unique and, therefore, properly chargeable to the R&D projects which benefit the most from the utilization of the equipment, (2) savings resulting from purchase in late 1972 of previously leased equipment, and (3) the fact that no equipment purchases are planned for 1973.

B. Engineering Services.....	$54,000	$76,000	$86,000

Engineering services provide for engineering design and drafting services for the design of minor construction, repair and alteration projects, and other related engineering services. Funding requirements for 1973 have increased slightly over the 1972 level to provide for an environmental and utilities conservation study.

C. Scientific and Technical Information and Educational Programs.....	$765,000	$717,000	$839,000

Included in these programs are the operating costs of GSFC's technical library, the educational/informational programs, and the scientific and technical information services. The costs are summarized as follows:

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1. Operation of technical libraries.....	$419,000	$409,000	$527,000

The Goddard library provides reference, acquisition, cataloging, translating, and dissemination services to all employees. The library collection, which emphasizes physics, astronomy, mathematics, and engineering subjects, includes over 60,000 books, 35,000 volumes of bound journals and 1,800 current journals. The library is staffed with 15 civil service employees and utilizes 9 manyears of contractor effort.

The additional costs in 1973 result primarily from increased contract costs for off-site services such as journal backfiles, citations, films, books, theses, and the binding of journals. In addition, the cyclical factor of subscription renewals for scientific and technical journals results in a somewhat higher cost in 1973.

	1971	1972	1973
2. Educational/informational programs.....	$304,000	$265,000	$273,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news-worthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material.

The cost for these programs in 1973 is slightly higher due to estimated price increases for photographic services, supplies and materials.

Research, development, and operational missions in aeronautics and space provide substantive knowledge and serve as an educational stimulus to students and teachers. GSFC responds to expressed needs of students and teachers by developing curriculum supplements in space-related areas such as physics, biology, chemistry, and math; assisting teacher workshops and professional education meetings; sponsorship of the Youth Science Congresses; and participation in science fairs.

3. Scientific and technical information.....	$42,000	$43,000	$39,000

GSFC makes available information of a scientific and technical nature to the general public under the Freedom of Information Act of 1967. Estimates reflect costs for documentation, publication, and translating services.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT..	$3,740,000	$3,957,000	$4,254,000	$+297,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$565,000	$571,000	$610,000
2. Local telephone service.....	804,000	841,000	899,000
3. Other communications.....	13,000	13,000	15,000
Subtotal.....	$1,382,000	$1,425,000	$1,524,000
B. Administrative Printing.....	$466,000	$491,000	$549,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials.....	$108,000	$122,000	$138,000
2. Equipment.....	123,000	115,000	160,000
Subtotal.....	$231,000	$237,000	$298,000
D. Transportation			
1. Center operations.....	$987,000	$1,245,000	$1,312,000
2. Common carrier.....	260,000	124,000	117,000
Subtotal.....	$1,247,000	$1,369,000	$1,429,000
E. Administrative Support Services			
1. Installation support services.....	$130,000	$105,000	$102,000
2. Medical services.....	284,000	330,000	352,000
Subtotal.....	$414,000	$435,000	$454,000
Total, Administrative Support..	$3,740,000	$3,957,000	$4,254,000

	1971	1972	1973
A. Communications.....	$1,382,000	$1,425,000	$1,524,000

This category includes funds for all administrative communications requirements. The amount represents about 4 percent of the total communications budget for Goddard. Over one-third of the R&PM estimate for 1973 represents long distance tolls through the Federal Telecommunications System (FTS). The remainder is for leased lines, local telephone exchange services, commercial long distance charges, and lease and maintenance of teletype equipment. The increase in 1973 reflects anticipated increases in billing rates.

Costs for certain operational communications related to flight activities and dedicated leased lines are excluded from the Research and Program Management appropriation, but are included in the relevant program in the Research and Development appropriation.

B. Administrative Printing.....	$466,000	$491,000	$549,000

Estimates for administrative printing include funds for contractual printing and reproduction and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions, are included. The increase in 1973 is due to the rental of one additional high speed Xerox machine to replace several slower GSFC-owned machines and the addition of one machine operator. Also, funds have been provided in 1973 to replace some of the older items of equipment in the print shop.

C. Supplies, Materials, and Equipment	$231,000	$237,000	$298,000

Administrative supplies, materials, and equipment include those items of a general nature which service the entire installation. This includes office furniture, typewriters, adding machines, calculators, dictating and transcribing equipment and office supplies. The increase in 1973 is primarily for additional microfilm equipment (readers and printers) to allow reduction of records storage space and facilitate property information recall, and for a system to automate the Goddard mailroom operations.

	1971	1972	1973
D. Transportation.....	$1,247,000	$1,369,000	$1,429,000

Transportation services include all costs associated with GSFC's motor pool, which currently includes 54 passenger vehicles and 1,002 trucks, most of the latter located at the network tracking stations, and purchase of replacement motor vehicles, forklifts, hydraulic equipment, garage operating supplies, fuel, and necessary maintenance services and supplies. Also included in this category are the costs for the center's on-site transportation, rigging and warehousing contract as well as the cost of movement of supplies, materials, equipment, and related items by common carrier. The $60,000 increase for 1973 is to cover wage raises already awarded the on-site contractor's Teamsters' Union employees.

E. Administrative Support Services.....	$414,000	$435,000	$454,000

Administrative support services include those services which support the installation generally, such as logistics support, supply operations, mail and messenger services, center medical services, and other related services. The increase in 1973 is due to increased manyear costs for the occupational medical contract and the addition of one industrial hygienist to the contractor's staff.

GODDARD SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING SUMMARY

STAFFING SUMMARY

	72	73
EXCEPTED	34	34
GS 16	32	31
GS 15	340	340
GS 14	509	510
ALL OTHER GS	2960	2875
WAGE BOARD	186	176
TOTAL	4061	3966

CHIEF ADVANCED PLANS STAFF

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	-	-
GS 14	2	2
ALL OTHER GS	3	3
WAGE BOARD	-	-
TOTAL	6	6

OFFICE OF THE DIRECTOR

	72	73
EXCEPTED	3	3
GS 16	-	-
GS 15	-	-
GS 14	-	-
ALL OTHER GS	4	4
WAGE BOARD	-	-
TOTAL	7	7

DIRECTOR SYSTEMS RELIABILITY

	72	73
EXCEPTED	2	2
GS 16	-	-
GS 15	4	4
GS 14	4	4
ALL OTHER GS	2	2
WAGE BOARD	-	-
TOTAL	12	12

TEST AND EVALUATION DIVISION

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	13	13
GS 14	32	32
ALL OTHER GS	147	142
WAGE BOARD	-	-
TOTAL	193	188

QUALITY ASSISTANCE DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	4	4
GS 14	12	12
ALL OTHER GS	57	55
WAGE BOARD	-	-
TOTAL	73	71

DIRECTOR ADMINISTRATION AND MANAGEMENT

	72	73
EXCEPTED	2	2
GS 16	-	-
GS 15	6	6
GS 14	10	10
ALL OTHER GS	39	38
WAGE BOARD	1	1
TOTAL	58	57

PROCUREMENT DIVISION

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	5	5
GS 14	16	16
ALL OTHER GS	219	214
WAGE BOARD	-	-
TOTAL	241	236

PROGRAM SUPPORT DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	3	3
GS 14	13	13
ALL OTHER GS	115	112
WAGE BOARD	-	-
TOTAL	131	128

MANPOWER UTILIZATION DIVISION

	72	72
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	3	3
ALL OTHER GS	68	66
WAGE BOARD	-	-
TOTAL	72	70

FACILITIES ENGINEERING DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	6	6
ALL OTHER GS	32	31
WAGE BOARD	-	-
TOTAL	39	38

EXPERIMENTAL FABRICATION AND ENGINEERING DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	3	3
ALL OTHER GS	120	117
WAGE BOARD	1	1
TOTAL	125	122

FINANCIAL MANAGEMENT DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	4	4
ALL OTHER GS	77	75
WAGE BOARD	-	-
TOTAL	82	80

MANAGEMENT SERVICES AND SUPPLY DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	2	2
ALL OTHER GS	99	96
WAGE BOARD	25	25
TOTAL	127	124

PLANT OPERATIONS AND MAINTENANCE DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	1	1
GS 14	-	-
ALL OTHER GS	17	23
WAGE BOARD	142	132
TOTAL	160	156

TECHNICAL INFORMATION DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	-	-
GS 14	1	1
ALL OTHER GS	54	52
WAGE BOARD	17	17
TOTAL	72	70

DIRECTOR NETWORKS

	72	73
EXCEPTED	1	1
GS 16	1	1
GS 15	7	7
GS 14	8	8
ALL OTHER GS	20	19
WAGE BOARD	-	-
TOTAL	37	36

NETWORK ENGINEERING DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	14	14
GS 14	28	28
ALL OTHER GS	109	106
WAGE BOARD	-	-
TOTAL	151	148

NASA COMMUNICATIONS DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	3	3
GS 14	11	11
ALL OTHER GS	59	57
WAGE BOARD	-	-
TOTAL	74	72

NETWORK FACILITIES & SERVICES DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	5	5
GS 14	9	9
ALL OTHER GS	88	86
WAGE BOARD	-	-
TOTAL	103	101

NETWORK OPERATIONS

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	20	20
GS 14	20	20
ALL OTHER GS	66	63
WAGE BOARD	-	-
TOTAL	107	104

NETWORK COMPUTING AND ANALYSIS DIVISION

	72	73
EXCEPTED	-	-
GS 16	2	2
GS 15	7	7
GS 14	11	11
ALL OTHER GS	72	70
WAGE BOARD	-	-
TOTAL	92	90

NETWORK PROCEDURES & EVALUATION DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	4	4
GS 14	9	9
ALL OTHER GS	74	72
WAGE BOARD	-	-
TOTAL	88	86

DIRECTOR MISSION & DATA OPERATIONS

	72	73
EXCEPTED	2	2
GS 16	2	2
GS 15	6	6
GS 14	6	6
ALL OTHER GS	15	15
WAGE BOARD	-	-
TOTAL	31	31

MISSION OPERATIONS DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	5	5
GS 14	15	15
ALL OTHER GS	51	49
WAGE BOARD	-	-
TOTAL	71	69

INFORMATION PROCESSING DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	9	9
GS 14	10	10
ALL OTHER GS	93	90
WAGE BOARD	-	-
TOTAL	112	109

TRAJECTORY ANAYLSIS & GEODYNAMICS DIVISION

	72	73
EXCEPTED	1	1
GS 16	1	1
GS 15	12	12
GS 14	12	12
ALL OTHER GS	54	52
WAGE BOARD	-	-
TOTAL	80	78

ADVANCED DATA SYSTEMS DIVISION

	72	73
EXCEPTED	1	1
GS 16	1	1
GS 15	5	5
GS 14	9	9
ALL OTHER GS	53	52
WAGE BOARD	-	-
TOTAL	69	68

COMPUTATION DIVISION

	72	73
EXCEPTED	-	-
GS 16	2	2
GS 15	-	-
GS 14	11	11
ALL OTHER GS	55	53
WAGE BOARD	-	-
TOTAL	71	69

DIRECTOR PROJECTS

	72	73
EXCEPTED	2	2
GS 16	3	3
GS 15	5	5
GS 14	1	1
ALL OTHER GS	3	3
WAGE BOARD	-	-
TOTAL	14	14

OAO PROJECT

	72	73
EXCEPTED	-	-
GS 16	2	2
GS 15	10	10
GS 14	11	11
ALL OTHER GS	5	4
WAGE BOARD	-	-
TOTAL	28	27

AE PROJECT

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	2	2
GS 14	5	5
ALL OTHER GS	5	5
WAGE BOARD	-	-
TOTAL	12	12

ERTS/NIMBUS PROJECT

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	14	14
GS 14	13	13
ALL OTHER GS	15	14
WAGE BOARD	-	-
TOTAL	43	42

OSO PROJECT

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	4	4
GS 14	6	6
ALL OTHER GS	8	7
WAGE BOARD	-	-
TOTAL	18	17

ATS PROJECT

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	7	7
GS 14	8	6
ALL OTHER GS	14	13
WAGE BOARD	-	-
TOTAL	29	26

DELTA PROJECT

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	9	9
GS 14	11	11
ALL OTHER GS	21	20
WAGE BOARD	-	-
TOTAL	38	37

ITOS PROJECT

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	4	4
GS 14	5	5
ALL OTHER GS	6	6
WAGE BOARD	-	-
TOTAL	16	16

SMS PROJECT

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	6	6
GS 14	2	2
ALL OTHER GS	5	5
WAGE BOARD	-	-
TOTAL	13	13

DIRECTOR SPACE APPLICATIONS AND TECHNOLOGY

	72	73
EXCEPTED	3	3
GS 16	-	-
GS 15	1	1
GS 14	-	-
ALL OTHER GS	4	4
WAGE BOARD	-	-
TOTAL	8	8

EXPLORER PROJECTS OFFICE

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	7	7
GS 14	6	6
ALL OTHER GS	15	15
WAGE BOARD	-	-
TOTAL	28	28

INTERNATIONAL PROJECTS OFFICE

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	4	4
GS 14	2	2
ALL OTHER GS	6	5
WAGE BOARD	-	-
TOTAL	12	11

ELECTRONICS DIVISION

	72	73
EXCEPTED	-	-
GS 16	2	2
GS 15	13	13
GS 14	22	22
ALL OTHER GS	123	119
WAGE BOARD	-	-
TOTAL	160	156

MECHANICAL DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	7	7
GS 14	12	12
ALL OTHER GS	81	78
WAGE BOARD	-	-
TOTAL	101	98

EARTH OBSERVATIONS SYSTEMS AND SYSTEMS ENGINEERING DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	22	22
GS 14	25	26
ALL OTHER GS	86	82
WAGE BOARD	-	-
TOTAL	134	131

SOUNDING ROCKET DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	10	10
GS 14	16	16
ALL OTHER GS	104	101
WAGE BOARD	-	-
TOTAL	131	128

COMMUNICATIONS AND NAVIGATION DIVISION

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	9	9
GS 14	16	16
ALL OTHER GS	31	30
WAGE BOARD	-	-
TOTAL	57	56

ENGINEERING PHYSICS DIVISION

	72	73
EXCEPTED	-	-
GS 16	-	-
GS 15	16	16
GS 14	15	15
ALL OTHER GS	101	98
WAGE BOARD	-	-
TOTAL	132	129

DIRECTOR SPACE AND EARTH SCIENCES

	72	73
EXCEPTED	2	2
GS 16	1	1
GS 15	1	1
GS 14	1	1
ALL OTHER GS	40	39
WAGE BOARD	-	-
TOTAL	45	44

LABORATORY FOR PLANETARY ATMOSPHERES

	72	73
EXCEPTED	2	2
GS 16	2	2
GS 15	5	5
GS 14	12	12
ALL OTHER GS	76	74
WAGE BOARD	-	-
TOTAL	97	95

GODDARD INSTITUTE FOR SPACE STUDIES

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	5	5
GS 14	4	4
ALL OTHER GS	19	18
WAGE BOARD	-	-
TOTAL	29	28

LABORATORY FOR SPACE PHYSICS

	72	73
EXCEPTED	2	2
GS 16	3	2
GS 15	9	9
GS 14	13	13
ALL OTHER GS	73	72
WAGE BOARD	-	-
TOTAL	100	98

LABORATORY FOR METEOROLOGY AND EARTH SCIENCES

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	10	10
GS 14	11	11
ALL OTHER GS	58	56
WAGE BOARD	-	-
TOTAL	80	78

LABORATORY FOR HIGH ENERGY ASTROPHYSICS

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	6	6
GS 14	3	3
ALL OTHER GS	62	60
WAGE BOARD	-	-
TOTAL	72	70

LABORATORY FOR OPTICAL ASTRONOMY

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	4	4
GS 14	6	6
ALL OTHER GS	39	38
WAGE BOARD	-	-
TOTAL	50	49

LABORATORY FOR SOLAR PHYSICS

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	4	4
GS 14	7	7
ALL OTHER GS	41	40
WAGE BOARD	-	-
TOTAL	53	52

LABORATORY FOR EXTRATERRESTRIAL PHYSICS

	72	73
EXCEPTED	-	-
GS 16	1	1
GS 15	4	4
GS 14	7	7
ALL OTHER GS	46	45
WAGE BOARD	-	-
TOTAL	58	57

NATIONAL SPACE SCIENCE DATA CENTER

	72	73
EXCEPTED	1	1
GS 16	-	-
GS 15	5	5
GS 14	2	2
ALL OTHER GS	11	10
WAGE BOARD	-	-
TOTAL	19	18

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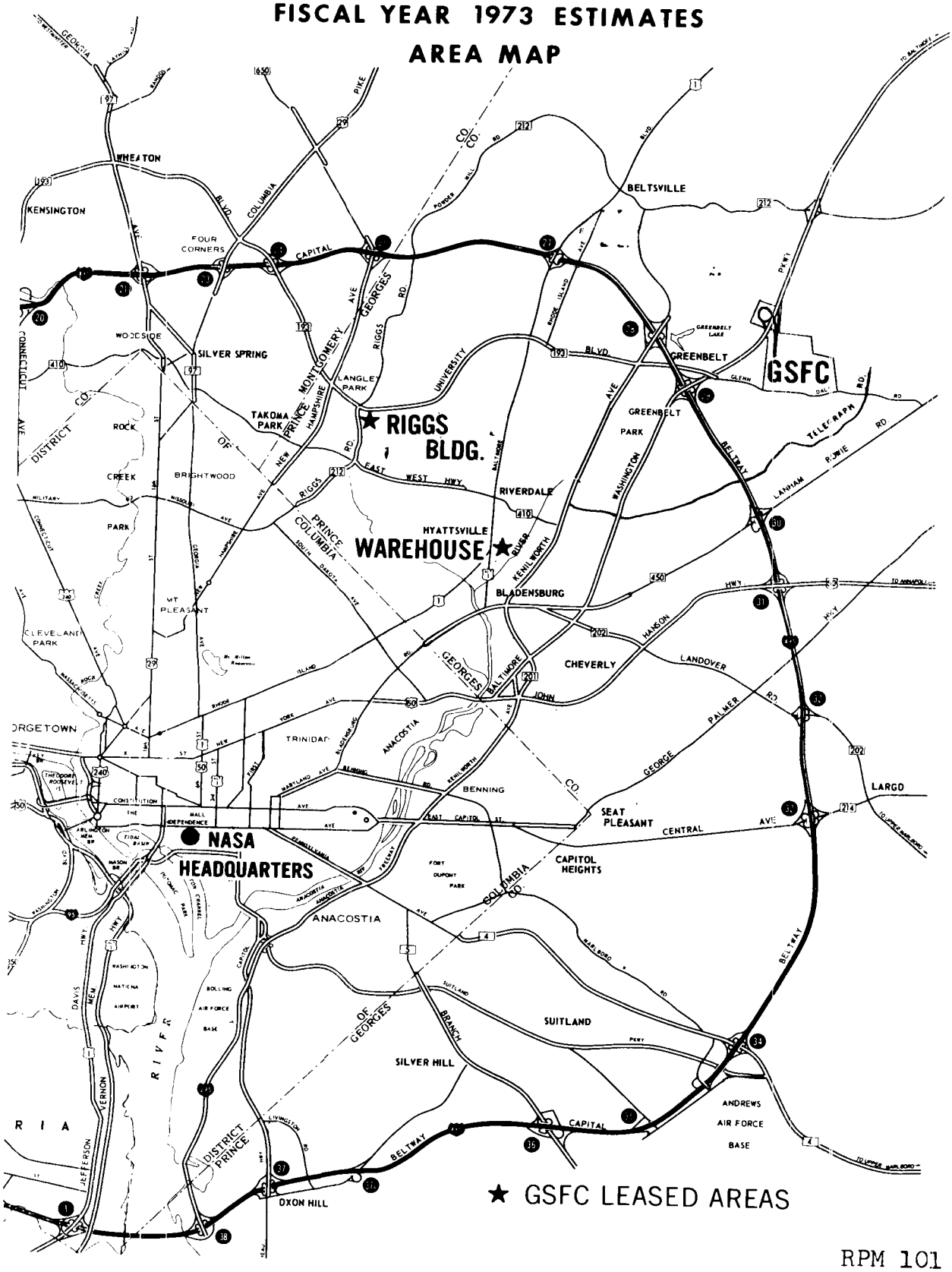
RPM 100

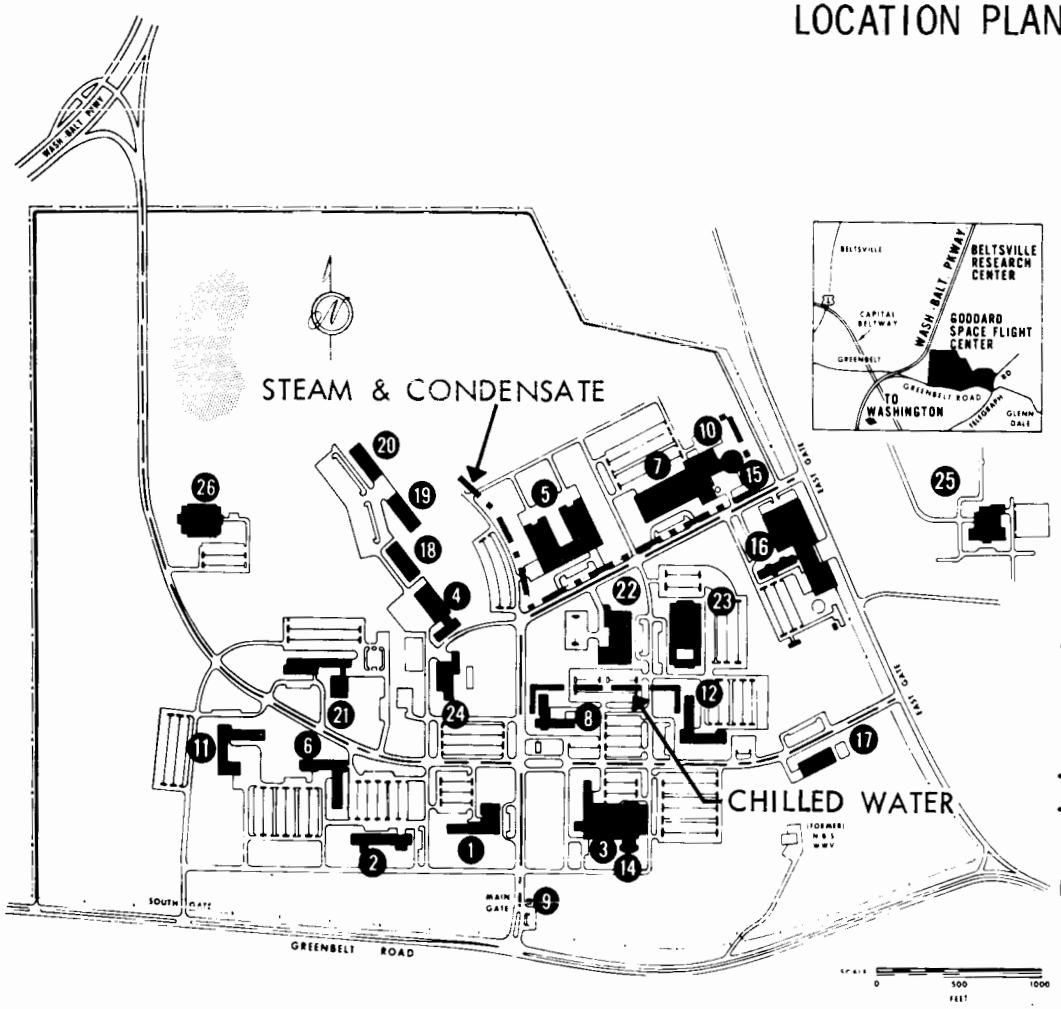
GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1973 ESTIMATES
AREA MAP



RPM 101

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1973 ESTIMATES

LOCATION PLAN



- *1 SPACE PROJECTS BUILDING
- 2 RESEARCH PROJECTS LABORATORY
- 3 CENTRAL FLIGHT CONTROL AND RANGE OPERATIONS BUILDING
- 4 GENERAL PURPOSE FACILITY BUILDING
- 5 INSTRUMENT CONSTRUCTION AND INSTALLATION LABORATORY
- 6 SPACE SCIENCES LABORATORY
- 7 PAYLOAD TESTING FACILITY
- 8 SATELLITE SYSTEMS BUILDING
- 9 MAIN GATE HOUSE
- 10 ENVIRONMENTAL TESTING LABORATORY
- 11 APPLIED SCIENCES LABORATORY
- *12 TRACKING AND TELEMETRY LABORATORY
- 14 SPACECRAFT OPERATIONS FACILITY
- 15 LAUNCH PHASE SIMULATOR
- 16 DEVELOPMENT OPERATIONS BUILDING
- *17 MULTI-PURPOSE BUILDING
- *18 BUSINESS OPERATIONS BUILDING
- *19 MULTI-PURPOSE BUILDING
- *20 GEOCHEMISTRY BUILDING
- *21 METEOROLOGICAL SYSTEMS DEVELOPMENT LABORATORY
- 22 MECHANICAL TEST FACILITY AND QUALITY ASSURANCE LABORATORY
- 23 DATA INTERPRETATION LABORATORY
- **24 CENTRAL HEATING AND REFRIGERATION PLANT
- *25 NETWORK TRAINING & TEST FACILITY
- 26 NASA SPACE SCIENCE DATA CENTER

EXISTING FACILITIES

FY 73 PROJECT LEGEND

- STEAM AND CONDENSATE
- CHILLED WATER
- * BUILDING LOAD CENTERS
- * * STEAM GENERATOR

RPM 102

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1973 ESTIMATES

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

WALLOPS STATION

MISSION

Wallops Station is responsible for planning and conducting applied research and development with emphasis on scientific payload development, instrumentation, facilities and techniques utilized in rocket borne experiments, aeronautical and terminal area research projects and ecological studies.

Wallops Station prepares, assembles, launches, tracks and acquires scientific information from space vehicles. Its facilities are utilized by the scientists and engineers from the laboratories and research centers of NASA, other governmental agencies, colleges and universities, and the worldwide scientific community. Wallops Station personnel assist these scientific research teams with their projects; develop, as necessary, special types of instrumentation and equipment to complete the mission; and manage NASA research projects.

Research at Wallops Station is directed toward gathering information about the earth's atmosphere and its near space environment. The Station utilizes launch vehicles ranging in size from the small Arcas and Hasp meteorological rockets to the 72 foot Scout rocket with orbital capability in obtaining scientific data about the atmosphere and the near space environment. Fifteen satellites have been launched. Wallops Station has launched more than 7,500 research vehicles consisting of from one to seven stages in the quest for scientific knowledge.

Wallops facilities are utilized for many other research projects, such as space component tests, helicopter and aircraft drop tests, helicopter and aircraft noise abatement projects, anti-skid tests on grooved runways, V/STOL terminal air research, collision avoidance programs, laser and radar tracking of aircraft and satellites.

Wallops Station exercises project management responsibility for several NASA sponsored projects such as GEOS C project, the Experimental Inter-American Meteorological Rocket Network (EXAMETNET), the German-American barium project, operation of remote site launching and tracking facilities, operation of NASA's portable range facilities for sounding rockets, and an Arctic launch site at Point Barrow, Alaska.

The Station is also responsible for a portion of the National Sounding Rocket Program. This requires program interface with the scientific, university and international community; engineering support including analytical, feasibility, and design studies, payload, vehicles and recovery system engineering, test and evaluation; and data analysis and reporting.

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A portion of the Station's effort is devoted to NASA's program of international cooperation in space research. Foreign countries are provided with training programs for their personnel, assistance in activation of launch sites, and with technical assistance and advice in launching experiments and in operation of their ranges. Representatives of foreign countries have visited Wallops Station to observe operations or seek assistance in establishing sounding rocket facilities of their own.

Wallops Station is involved in establishing the Chesapeake Bay area as a multidisciplinary ecological test site for developing the applications of remote sensing from aircraft and space platforms. As part of the program the Station is working closely with user groups to develop remote sensing analysis and monitoring techniques for studying the ecology of the area.

DESCRIPTION

The Station includes three separate areas on the Atlantic Coast of Virginia's eastern shore: the main base (formerly Chincoteague Naval Air Station), the Wallops Island launching site and the Wallops mainland site. The administrative offices, range control center, support shops, and main telemetry buildings are located on the main base. Wallops Island is about seven miles southeast of the main base and is connected to the mainland by a causeway and bridge. The island is about five miles long and only one-half mile wide at its widest point. Located on the island are rocket storage buildings, blockhouses, assembly shops and the launch sites. The Wallops mainland site is a one-half mile strip west of the island which houses the radar and optical tracking sites. The Eastville, Va., down range tracking site is located about 50 miles south of the Wallops Station.

Wallops Station, totaling 6,563 acres, consists of 2,315 acres on the main base; 3,000 acres on Wallops Island, 108 acres on the mainland tracking site; and 1,140 acres of unusable marsh land. The Eastville tracking site consists of an additional 53 acres of government-owned property. The total capital investment, including fixed assets in progress and contractor-held facilities at various locations, as of June 30, 1971, was $116,344,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel	$7,088,000	$7,365,000	$7,208,000
Travel	185,000	183,000	177,000
Facilities services	2,039,000	2,284,000	2,055,000
Technical services	157,000	145,000	149,000
Administrative support	797,000	858,000	862,000
Total, fund requirements	$10,266,000	$10,835,000	$10,451,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$7,088,000	$7,365,000	$7,208,000	-$157,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions.....	$6,205,000	$6,394,000	$6,252,000
b. Nonpermanent positions.....	115,000	138,000	138,000
c. Reimbursable details.....	10,000	11,000	11,000
d. Overtime and other compensations.....	157,000	177,000	177,000
Subtotal, Compensation.....	$6,487,000	$6,720,000	$6,578,000
2. Benefits.....	552,000	588,000	575,000
Subtotal, Compensation and Benefits.....	$7,039,000	$7,308,000	$7,153,000
B. Supporting Costs:			
1. Transfer of personnel.....	$6,000	$2,000	---
2. Personnel training.....	43,000	55,000	$55,000
Subtotal, Supporting Costs.	$49,000	$57,000	$55,000
Total, Personnel and Related Costs.	$7,088,000	$7,365,000	$7,208,000
1. Compensation.....	$6,487,000	$6,720,000	$6,578,000
a. Permanent Positions.....	$6,205,000	$6,394,000	$6,252,000

The cost of permanent positions is the largest part of personnel and related costs. The funds shown above will support 448 permanent positions in FY 1972 and 437 positions in FY 1973.

Over 50% of Wallops permanent positions are used in direct support of the various R&D programs. The following table summarizes the actual and planned utilization of positions for direct program activity and for indirect support.

	1971	1972	1973
Permanent Positions by Program:			
Manned Space Flight			
Apollo	1	1	1
Space flight operations	---	1	1
Space Science			
Physics and astronomy	75	72	65
Lunar and planetary exploration	---	3	5
Launch vehicle procurement	1	3	3
Bioscience	2	---	---
Space Applications	32	34	33
Aeronautics and Space Technology			
Aeronautical research and technology	10	7	7
Space research and technology	37	20	19
Tracking and Data Acquisition	118	119	118
Subtotal, positions by program	276	260	252
Indirect Positions			
Director and staff	20	4	4
Administrative support	86	78	76
Research and development support	106	106	105
Subtotal, indirect positions	212	188	185
Total, permanent positions	488	448	437
Other Than Permanent Positions	50	50	50
Total	538	498	487

The above table illustrates the use to which positions are put. The following table summarizes by occupational group the Wallops Station work force.

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	108	22.1	100	22.3	97	22.2
Technicians.....	184	37.7	170	38.0	166	38.0
Wage board.....	77	15.8	72	16.1	70	16.0
Professional administrative.....	47	9.6	40	8.9	40	9.2
Clerical.....	72	14.8	66	14.7	64	14.6
Total.....	488	100.0	448	100.0	437	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the beginning of the year, as modified by within grade advances, promotions, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated time that these modifications are in effect.

In 1973 the cost of permanent positions will be $6,252,000, a reduction of $142,000 from 1972. This reduction is calculated as follows:

Cost of permanent positions in 1972.....		$6,394,000
Cost of increases in 1973.....		178,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$87,000	
Partial year effect of 1973 actions.....	91,000	
Cost of decreases in 1973.....		-320,000
Abolished positions:		
Full year effect of 1972 actions.....	-241,000	
Partial year effect of 1973 actions.....	-25,000	
Turnover savings.....	-11,000	
Decrease in days paid in 1973.....	-43,000	
Cost of permanent positions in 1973.....		$6,252,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Positions.....	$115,000	$138,000	$138,000

The 1972 and 1973 plans include 50 temporary positions for each year. The nonpermanent positions include 5 to be filled by cooperative engineering students who alternate between working at Wallops and attending college (co-ops), 9 temporary clerical/technical positions and 36 positions to support the summer employment program and youth opportunity student aid program.

	1971	1972	1973
c. Reimbursable details	$10,000	$11,000	$11,000

The amount provides for the service of one military officer utilized on programs of mutual interest to NASA and DOD.

d. Overtime and other compensation..	$157,000	$177,000	$177,000

Overtime is directly related to the Wallops launch activity which includes assembly instrumentation, check out tracking, data acquisition and recovery operations. Factors beyond the station's control such as schedules, weather, range clearance, etc., require personnel operating and supporting the activity to work long hours which exceed the 40 hour week in order to launch within the allocated time period. Approximately 83% of overtime is related to launch activity. Average overtime cost per launch is estimated to be $241 in 1973.

2. Benefits.....	$552,000	$588,000	$575,000

Wallops contributes to personnel benefits as authorized and required by law. The following table indicates the cost of personnel benefits by the major categories:

Category of Cost			
Contribution to the Civil Service Retirement Fund.....	$436,000	$448,000	$438,000
Contribution for employee life insurance.....	25,000	26,000	25,000
Contribution to employee health insurance.....	68,000	101,000	99,000
FICA.....	4,000	5,000	5,000
Incentive awards.....	3,000	3,000	3,000
Other personnel benefits.....	16,000	5,000	5,000
Severance pay.....	---	---	---
Total.....	$552,000	$588,000	$575,000

B. Supporting Costs.....	$49,000	$57,000	$55,000

Supporting personnel costs provide for the expense of moving employees to initial duty station or reassignment, and for maintaining and expanding the skills of employees. The costs are summarized as follows:

	1971	1972	1973
1. Transfer of personnel.....	$6,000	$2,000	---

This cost is for the movement of household goods when authorized by law and the estimated cost is within the budget. No requirements are estimated for 1973.

2. Personnel training.....	$43,000	$55,000	$55,000

The maintenance and expansion of the skills of personnel are essential in carrying out Wallops technical programs. Training is authorized under the Government Employees Training Act of 1958. The estimated cost for 1973 is for tuition of graduate study and off-the-job training provided by the Civil Service Commission, universities and colleges and contractors for approximately 305 Wallops personnel.

	1971	1972	1973	Change in 1973
I. TRAVEL.....	$185,000	$183,000	$177,000	$-6,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities..	$32,000	$40,000	$40,000
2. Flight mission support.....	47,000	49,000	49,000
3. Overseas travel to launch and tracking sites.....	49,000	34,000	34,000
Subtotal.....	$128,000	$123,000	$123,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings.....	$17,000	$19,000	$14,000
2. Other than government-sponsored meetings and technical seminars...	5,000	5,000	10,000
Subtotal.....	$22,000	$24,000	$24,000
C. Administrative Travel.....	$35,000	$36,000	$30,000
Total, Travel.....	$185,000	$183,000	$177,000

	1971	1972	1973
A. Program Related Travel.....	$128,000	$123,000	$123,000

These costs include travel to industrial contractors and educational institutions, NASA installations, other government installations, and launch sites in support of Wallops mission. It is the largest part of the travel function and accounts for 69% of the 1973 requirement.

1. Direction, coordination, and management of programs.....	$32,000	$40,000	$40,000

These costs include travel to industrial contractors and industrial institutions, NASA installations and other government installations. Approximately 198 trips are scheduled in 1972 to such locations as Goddard, Langley, Boulder, Colorado, Los Angeles, and White Sands, New Mexico. A comparable level of travel is anticipated for 1973.

2. Flight mission support.....	$47,000	$49,000	$49,000

These costs include travel to launch sites for pre-launch, and post-launch activities in support of assigned R&D activities, such as 1973 solar eclipse, GEOS C, and sounding rockets. Approximately 165 trips are scheduled for 1972 to such locations as Pt. Barrow, Alaska, Mt. Hopkins, Arizona, White Sands, New Mexico, and Canada.

3. Overseas travel to launch and tracking sites.....	$49,000	$34,000	$34,000

This travel is necessary to conduct launchings of sounding rockets, meteorological rockets, and spacecraft at overseas sites. In addition, technical assistance is provided to other countries in the design, layout, and construction of launching ranges and tracking stations. Approximately 20 trips are planned in 1973 to such locations as Norway, Sweden, India, Spain, Canada, French Guiana, Argentina, and Japan.

B. Meetings and Technical Seminars.....	$22,000	$24,000	$24,000

This travel is for attendance at NASA sponsored meetings, other government sponsored meetings, and meetings sponsored by non-government organizations. The 1972 schedule involves approximately 156 trips to such locations as Washington, Langley Research Center, Goddard, and Houston.

C. Administrative Travel.....	$35,000	$36,000	$30,000

Administrative travel includes travel required for the direction and coordination of administrative management programs, such as financial management and budget, procurement, personnel and manpower, and facilities.

Approximately 190 trips are scheduled in 1972. It also includes reimbursements to employees for local transportation, tolls, parking fees, and mileage for use of privately owned vehicle. The decrease in requirements for 1973 reflects a reduction in administrative management and local travel.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES..	$2,039,000	$2,284,000	$2,055,000	$-229,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Minor rehabilitation and modification, and construction.....	$21,000	$274,000	$25,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$447,000	$373,000	$465,000
2. Maintenance of equipment.....	63,000	55,000	167,000
3. Custodial services.....	512,000	524,000	539,000
Subtotal.....	$1,022,000	$952,000	$1,171,000
C. Operation of Facilities			
1. Utilities.....	$269,000	$291,000	$301,000
2. Supplies and equipment.....	727,000	767,000	558,000
Subtotal.....	$996,000	$1,058,000	$859,000
Total, Facilities Services.....	$2,039,000	$2,284,000	$2,055,000
A. Acquisition of Facilities.....	$21,000	$274,000	$25,000
1. Minor rehabilitation and modification, and construction.....	$21,000	$274,000	$25,000

Beginning in 1973, funding in the R&PM appropriation for new facilities and additions to existing facilities is limited to $10,000 or less per project, and $25,000 or less per project for rehabilitation and modification of facilities. All projects over these amounts will be funded from the CoF appropriation. The 1972 amount includes the replacement and installation of new lead covered cables to support launch activity, conversion of building

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F-1 to accommodate the printing operation, removal of partitions in hangar D-1 to provide for additional aircraft maintenance space and air conditioning the Radar Atmosphere Research Facility. In 1972 and 1973 the budget contains funds to support miscellaneous small contracts to install and modify instrumentation systems and launching facilities and small modifications to existing buildings to meet project and management requirements.

B. Maintenance and Related Services...	$1,022,000	$952,000	$1,171,000
1. Maintenance of buildings and grounds.....	$447,000	$373,000	$465,000

This category supports the maintenance and repair of office buildings, laboratories, launch facilities, aircraft hangars, shops and utility facilities in addition to the maintenance and repair of roads, improved and unimproved grounds. This includes over 330 buildings, approximately one million square feet of building space on 6,561 acres. A continuous program of preventive maintenance is especially necessary at Wallops in order to protect exposed surfaces from the effects of the salt-laden climate and damage from high wings up to hurricane force. Without proper maintenance wind-driven rain may penetrate buildings through masonry construction and through door and window casings on which caulking has failed, resulting in damage to expensive equipment and interior surfaces. Repairs to surfaced areas are needed due to traffic, moisture penetration, expansion and contraction from freezing and heat. Spot repairs, joint sealing and resurfacing are required to prevent spalling, sub-bed failure and major replacement of large areas.

2. Maintenance of equipment.....	$63,000	$55,000	$167,000

These costs consists of work necessary to keep mechanical, electrical, laboratory and shop equipment operational. The 1973 estimated cost increase is for power transmission line overhaul in the heating system which has been deferred from previous years and is now critical. The estimate also includes contractual wage increases for maintenance service contracts.

3. Custodial services.....	$512,000	$524,000	$539,000

These estimates provide approximately 28 janitors and 25 guards to furnish cleaning and security for the buildings and grounds. It also includes exterminating, refuse handling, fire protection and laundry services. The increase in 1973 is required to meet the wage increases for service contracts.

	1971	1972	1973
C. Operation of Facilities.....	$996,000	$1,058,000	$859,000
1. Utilities.....	$269,000	$291,000	$301,000

Electricity is the only utility purchased by Wallops Station. The increased costs in 1973 are related to additional power requirements for the expanded computer facility to be completed during the third quarter of 1972 and upgrading of the runway lighting system.

2. Supplies and equipment.....	$727,000	$767,000	$558,000

This category includes all supplies, materials, electrical and mechanical equipment required to support the operation of the physical plant at Wallops. Examples of supplies and equipment are: lumber and building materials, plumbing supplies, pipes and valves, hand tools, electrical materials, sheet metal, fuel oil, gasoline and refrigeration and air conditioning equipment. Inventory value of items in this category is approximately 41 million dollars. The purchase of less replacement equipment and mechanical equipment is planned in 1973.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$157,000	$145,000	$149,000	$+4,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$14,000	---	---
2. Purchase of equipment.....	11,000	---	---
3. Maintenance of equipment.....	5,000	$6,000	$7,000
Subtotal, equipment.....	$30,000	$6,000	$7,000
4. Programming and operation services.....	37,000	49,000	58,000
Subtotal, ADP.....	$67,000	$55,000	$65,000

	1971	1972	1973
B. Engineering Services.....	$2,000	---	---
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$77,000	$78,000	$72,000
2. Educational/information programs	2,000	2,000	2,000
3. Scientific and technical information.....	9,000	10,000	10,000
Subtotal.....	$88,000	$90,000	$84,000
Total, Technical Services.....	$157,000	$145,000	$149,000
A. Automatic Data Processing.....	$67,000	$55,000	$65,000

The R&PM appropriation provides lease, purchase, maintenance, programming and operations services of ADP equipment utilized in business data processing. The equipment costs include maintenance for owned punch card accounting machines used in business activities. The 1973 Programming and Operations costs provide for five manyears of effort at $58,000 to support the contractural operations, keypunching and data preparation of the business data operations. The increase in 1973 is to meet the wage increases of the service contracts for programming, operations, and maintenance.

B. Engineering Services.....	$2,000	---	---

This includes architectural and engineering design services such as the preparation of working drawings of special equipment, and plans and specifications in support of minor construction projects and alterations of buildings and facilities.

C. Scientific and Technical Information and Educational Programs.....	$88,000	$90,000	$84,000

The 1973 amount includes operation of the technical library, provides scientific information, documentary functions, still and motion picture services, and supplies and materials. The 1973 library contract with the University of Maryland provides for three manyears at a cost of $44,000. In addition funds are required for periodicals, books, supplies and materials related to the library. The decrease in 1973 is due primarily to reduction of subscriptions to periodicals and purchase of books.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT...	$797,000	$858,000	$862,000	$+4,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$2,000	$1,000	$2,000
2. Local telephone service.....	86,000	76,000	92,000
3. Other communications.....	1,000	1,000	2,000
Subtotal.....	$89,000	$78,000	$96,000
B. Administrative Printing.....	$51,000	$54,000	$58,000
C. Supplies, Materials, and Equipment.			
1. Supplies and materials.....	$147,000	$161,000	$161,000
2. Equipment.....	111,000	134,000	94,000
Subtotal.....	$258,000	$295,000	$255,000
D. Transportation			
1. Center support.....	$184,000	$200,000	$205,000
2. Common carrier.....	62,000	61,000	63,000
Subtotal.....	$246,000	$261,000	$268,000
E. Administrative Support Services			
1. Installation support services..	$111,000	$133,000	$144,000
2. Medical services.....	42,000	37,000	41,000
Subtotal.....	$153,000	$170,000	$185,000
Total, Administrative Support.....	$797,000	$858,000	$862,000
A. Communications.....	$89,000	$78,000	$96,000

This includes charges for telegraph, telephone and teletype services, switchboard and service charges, and telephone installation charges. The increase in the 1973 estimate is primarily to meet the 1973 contractual wage increase for the switchboard service and increased telephone rates.

	1971	1972	1973
B. Administrative Printing.....	$51,000	$54,000	$58,000

This category provides for printing, duplicating, photostating, blueprinting, photographic reproduction and binding services in support of Wallops Station. The printing and reproduction services are provided by the Station printing plant which is operated by contract personnel (6 manyears at a cost of $56,000 in 1973). A small percentage of printing services, such as production of envelopes and stationery, is performed off-site by commercial printers. The increase in the budget year is to meet the 1973 wage increase for the service contract.

C. Supplies, Materials, and Equipment..	$258,000	$295,000	$255,000

The 1973 requirement includes the purchase of office furniture, office supplies and equipment, photographic supplies and equipment, and training material which is required to support the general operations of the center. It also includes the rental of office equipment and quick copy reproduction equipment. Examples include desks, typewriters, calculators, adding machines, color film and equipment to track sounding rocket launches, and rental of Xerox machines. The 1973 funds provide approximately $80,000 for rent of reproduction and office machines and approximately $175,000 for the purchase of office and photographic supplies and equipment. The decrease in 1973 reflects a reduction in the purchase of replacement office and photographic equipment.

D. Transportation.....	$246,000	$261,000	$268,000

This category provides for the transportation of people and goods within Wallops Station and the movement of goods by common carrier. It includes the contract operation of the Wallops Shuttle Service (5 manyears at a cost of $87,000 in 1973), administrative aircraft services (2 manyears at a cost of $23,000 in 1973), purchase and operation of motor vehicles. The increase in the 1973 estimate is to meet costs associated with the shuttle bus contract.

E. Administrative Support Services.....	$153,000	$170,000	$185,000

Services under this category include the operation of the Station supply management program (20 manyears at a cost of $147,000), the operation of the medical dispensary and Station health program and other support services such as rocket inspection services and tort claims. The increases in 1972 and 1973 are to meet contractual increases in the supply management services.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING CHART
WALLOPS STATION

STAFFING SUMMARY

	1972	1973
Excepted	3	3
GS-16	1	1
GS-15	9	9
GS-14	20	25
All Other GS	343	329
Wage Grade	72	70
Total Permanent	448	437

DIRECTOR

	1972	1973
Excepted	2	2
GS-16	-	-
GS-15	1	1
GS-14	-	-
All Other GS	1	1
Wage Grade	-	-
Total Permanent	4	4

OPERATIONS DIRECTORATE

	1972	1973
Excepted	-	-
GS-16	1	1
GS-15	1	1
GS-14	5	6
All Other GS	119	116
Wage Grade	9	8
Total Permanent	135	132

ENGINEERING DIRECTORATE

	1972	1973
Excepted	1	1
GS-16	0	0
GS-15	4	4
GS-14	11	13
All Other GS	83	78
Wage Grade	-	-
Total Permanent	99	96

ADMINISTRATION DIRECTORATE

	1972	1973
Excepted	-	-
GS-16	-	-
GS-15	1	1
GS-14	1	1
All Other GS	75	73
Wage Grade	1	1
Total Permanent	78	76

TECHNICAL SUPPORT DIRECTORATE

	1972	1973
Excepted	-	-
GS-16	-	-
GS-15	1	1
GS-14	-	1
All Other GS	55	52
Wage Grade	62	61
Total Permanent	118	115

APPLIED SCIENCE DIRECTORATE

	1972	1973
Excepted	-	-
GS-16	-	-
GS-15	1	1
GS-14	3	4
All Other GS	10	9
Wage Grade	-	-
Total Permanent	14	14

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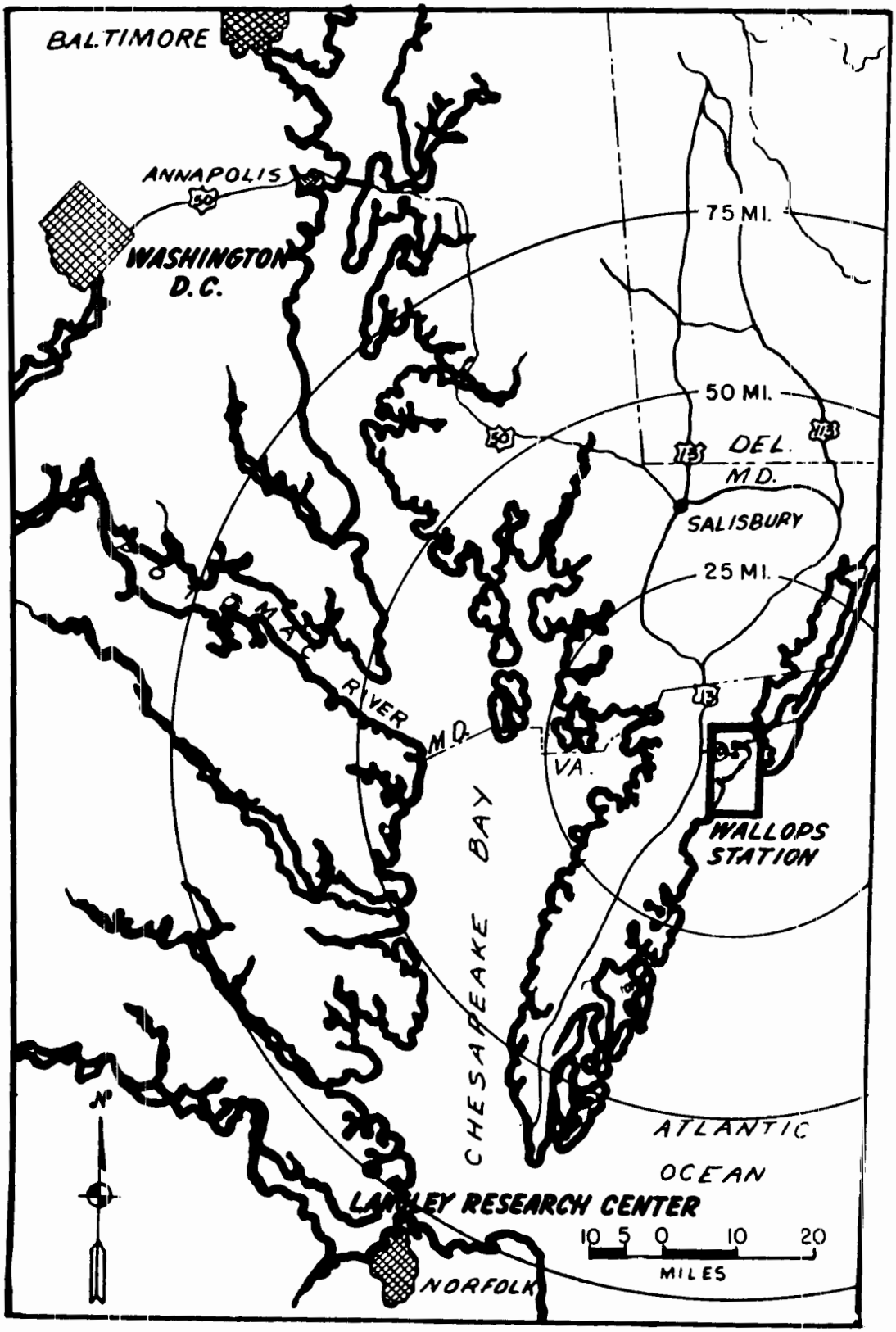
WALLOPS STATION LOCATION



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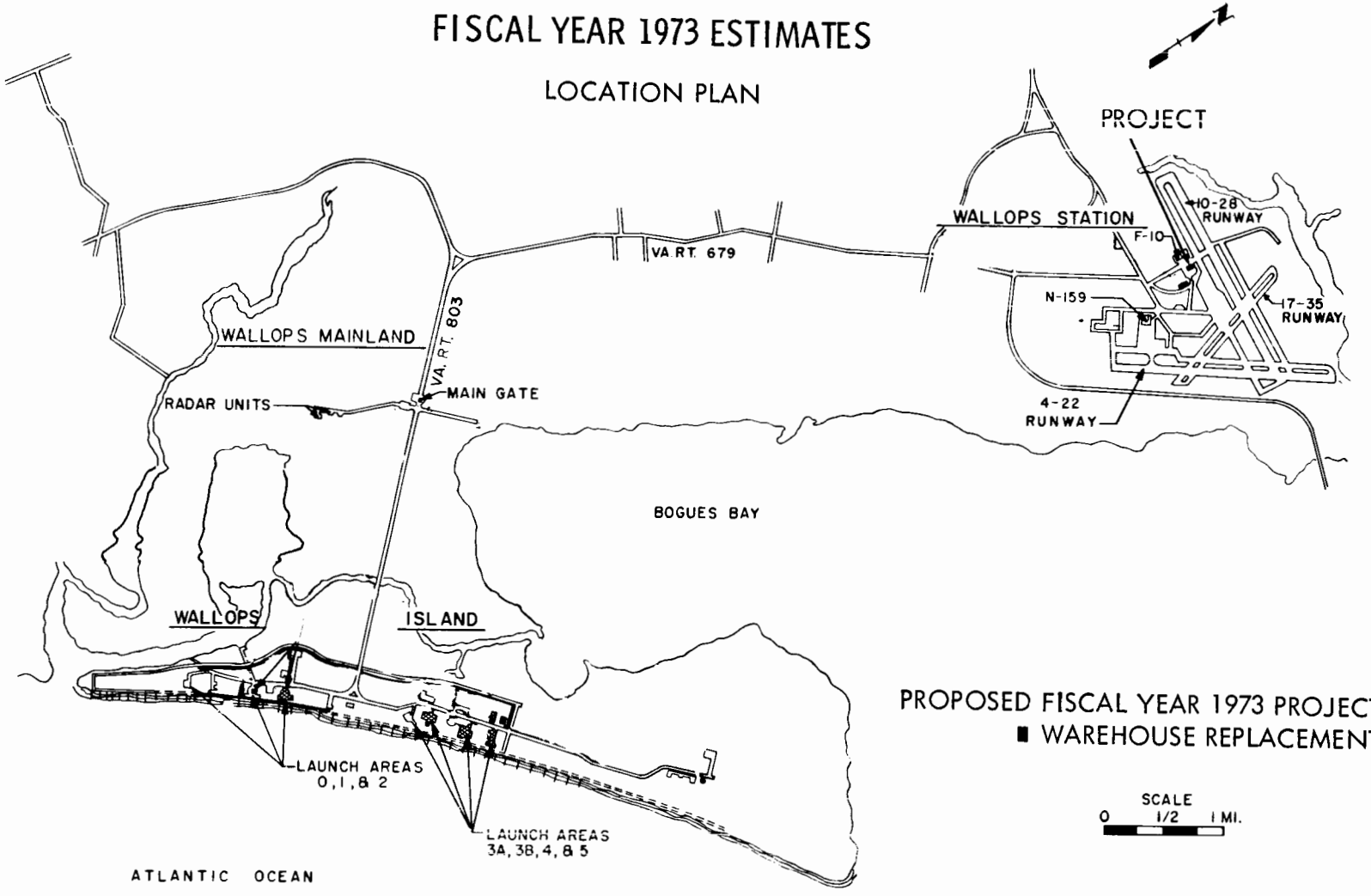
WALLOPS STATION
FISCAL YEAR 1973 ESTIMATES

LOCATION PLAN



PROPOSED FISCAL YEAR 1973 PROJECT
■ WAREHOUSE REPLACEMENT

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WALLOPS STATION

RPM 122

WALLOPS STATION

WALLOPS STATION

RPM 123

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

AMES RESEARCH CENTER

MISSION

The programs at the Ames Research Center are directed at research and development in the fields of aeronautics, space science and spacecraft technology as well as applications to national needs of the new science and technology growing out of the aerospace program. Specifically, the Center's major responsibilities are concentrated in five areas: Aeronautics, Space Shuttle, Life Sciences, Planetary Science and Astrophysics and the Pioneer Project.

The aeronautical research program at Ames is among the most important R&D efforts at the Center. To provide a guide for pursuing our experimental research, emphasis is placed on theoretical analyses as a basis for the prediction and understanding of fluid flows that is intended to lead to a much stronger role of the computer in the design of aeronautical vehicles throughout the speed range. Efforts are underway to exploit the great potential for using computational fluid dynamics in the future in place of certain types of more costly and time consuming wind tunnel experiments. The ILLIAC computer will provide greatly expanded numerical computational capability for exploitation of this potential. In addition to the more basic areas, the Center is also a major contributor to V/STOL technology. VTOL and STOL aircraft systems are important in both civil and military aviation. Success in these applications will depend upon efficient flight and upon the ability to land and take-off quickly and precisely from small areas with safety and regularity under all-weather conditions. Research investigations are being carried out on specific concepts to achieve these broad objectives. This research involves systematic analytical studies and wind tunnel investigations to define and evaluate concepts, study of the flight characteristics of the concepts using flight simulators, and finally flight verification with flight vehicles of the technological advances indicated in the research program.

Military aircraft development programs historically have been supported through investigations in the Center's wind tunnels and simulators, many of which have unique test capabilities. This activity will be continued at a high level because it is vital to specific aircraft programs and because it affords insight into problems requiring further research for application to the design of future aircraft.

The Space Shuttle program is being supported in a number of areas at Ames. Past research at the Center has contributed significantly to the solution of the problem of the survival of spacecraft during the very high aerodynamic heating attendant to high speed entry into the earth's atmosphere. The heat protection systems for a relatively highly maneuverable

reusable craft such as the Space Shuttle present a very different problem from that of previous spacecraft which followed essentially a ballistic trajectory and were designed on the basis of a single mission. Thermal protection systems research is one area of space shuttle support being carried out at Ames. Other areas involve studies of the aerodynamic performance, stability and control of various booster and orbiter vehicle concepts under consideration, the definition of dynamic loads and vehicle response to be expected, and the guidance, control and piloting problems to be encountered in landing such vehicles. Studies are also being made to help provide for the design of the life support systems, a better understanding of space vehicle environmental effects on human performance and the effects of long term exposure to weightlessness on the physiology of humans.

Research in the life sciences is conducted in three major areas: (1) basic research in the physiological and behavioral sciences concerned with obtaining an understanding of the effects of aeronautical and space flight stresses upon man; (2) research in long-term advanced life support systems and in the human factors aspects of the relationships between man and the machines which transport and support him in a hostile environment; and (3) studies in exobiology oriented towards the prediction, detection, and study of extraterrestrial fossils, chemicals, and life forms.

Research in space science includes studies of solar physics, planetary environments and geophysics. The studies pertain to magnetic fields and plasmas in space, the composition and structure of planets and of planetary and stellar atmospheres. Also of concern is the planet earth and how the technology that has been developed in the space program can be used to improve our understanding of the earth and the conservation of its resources. The studies are both theoretical in nature and experimental using laboratory equipment, sounding rockets and experiments carried on satellites and space probes. Experiments are also conducted on a specially outfitted aircraft which serves as an airborne laboratory to provide, for example, a platform for an infrared telescope for astronomical observations which are highly degrated from surface locations by the filtering effects of the atmosphere. Researchers throughout the scientific community are invited to participate in studies conducted from the airborne laboratory.

Ames has flight project management responsibility for the Pioneer Project. Pioneer provides scientific observations of phenomena in interplanetary space from an unmanned spacecraft. Four Pioneer spacecraft are currently in separate orbits about the sun near the earth's orbit and all regularly provide information on solar radiation. One of these is in its sixth year of operation. Pioneer F and G spacecraft are being readied for the study of interplanetary fields and particles beyond the earth's radius, the asteroid belt and the environment of Jupiter.

In carrying out its mission, Ames works closely with the aerospace and educational communities and with other Government agencies. A number of cooperative or joint programs are currently in progress with the Department of Transportation.

DESCRIPTION

The Ames Research Center was established in 1940, and is located at the southern end of San Francisco Bay on land contiguous to the U.S. Naval Air Station, Moffett Field, California. Its physical plant comprises many specialized facilities for aerospace research in the physical sciences as well as the space sciences and life sciences, all of which are included in the mission of the Center. These include wind tunnels, entry-heating simulators, and free-flight ballistic test facilities capable of conducting tests at speeds up to and above earth escape speed as well as laboratories equipped to study solar and geophysical phenomena, life synthesis, life detection, and life environmental factors. The Ames Research Center occupies about 365 acres of land. Certain other facilities, such as the utilities and airfield runways, are used jointly by NASA and the Department of the Navy. Also housed at the Ames Research Center is the U.S. Army Air Mobility, Research and Development Laboratory. Personnel from this laboratory work closely with Ames personnel on research of mutual interest. The capital investment at the Ames Research Center, including fixed assets in progress and contractor-held facilities at various locations as of June 30, 1971, was $269,297,000.

SUMMARY OF RESOURCES REQUIREMENTS

	FUNDS		
Functions	1971	1972	1973
Personnel	$33,991,000	$35,091,000	$34,543,000
Travel	905,000	868,000	858,000
Facilities services	4,238,000	4,376,000	4,022,000
Technical services	327,000	408,000	298,000
Administrative support	1,171,000	1,463,000	1,418,000
Total, fund requirements	$40,632,000	$42,206,000	$41,139,000

	1971	1972	1973	CHANGE IN 1973
I PERSONNEL	$33,991,000	$35,091,000	$34,543,000	-$548,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits			
1. Compensation:			
a. Permanent positions...	$30,729,000	$31,435,000	$31,116,000
b. Nonpermanent positions	327,000	400,000	400,000
c. Reimbursable details..	61,000	90,000	90,000
d. Overtime and other compensation.....	229,000	225,000	225,000
Subtotal, Compensation	$31,346,000	$32,150,000	$31,831,000
2. Benefits.....	2,535,000	2,761,000	2,580,000
Subtotal, Compensation and Benefits.....	$33,881,000	$34,911,000	$34,411,000
B. Supporting Costs:			
1. Transfer of personnel.....	$ 90,000	$ 159,000	$ 111,000
2. Personnel training.....	20,000	21,000	21,000
Subtotal, Supporting Costs	$ 110,000	$ 180,000	$ 132,000
Total, Personnel and Related Costs.....	$33,991,000	$35,091,000	$34,543,000
1. Compensation.....	$31,346,000	$32,150,000	$31,831,000
a. Permanent Positions.....	30,729,000	31,435,000	31,116,000

The cost for permanent positions is the largest part of the personnel and related costs. The funds shown above will support 1,769 permanent positions in 1972 and 1,727 positions in 1973. This represents a reduction of 195 from 1971.

Permanent Positions by Program:	1971	1972	1973
Manned Space Flight			
Apollo	20	16	12
Space flight operations	137	120	117
Space Science			
Physics and astronomy	52	56	55
Lunar and planetary exploration	128	178	174
Bioscience	58	-	-
Space Applications	18	37	39
Aeronautics and Space Technology			
Aeronautical research and technology	510	520	515
Space research and technology	385	280	266
Nuclear power and propulsion	30	25	24
Tracking and Data Acquisition	4	3	3
Technology Utilization	4	4	4
Subtotal, positions by program	1,346	1,239	1,209
Indirect Positions			
Director and staff	35	35	35
Administrative support	207	190	185
Research and development support	334	305	298
Subtotal, indirect positions	576	530	518
Total, permanent positions	1,922	1,769	1,727
Other Than Permanent Positions	160	160	160
Total	2,082	1,929	1,887

The above table illustrates the use to which these positions are put. The distribution by occupation of these positions illustrates a significant characteristic of the Ames workforce. Professional scientific and engineering positions comprise almost 47% of the Ames staff, technicians and technically oriented wage board positions comprise another 33% and administrative support positions amount to another 20%.

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Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	886	46.1	828	46.8	808	46.8
Technicians.....	302	15.7	276	15.6	280	16.2
Wage board.....	351	18.3	308	17.5	290	16.8
Professional administrative.....	155	8.1	144	8.1	141	8.2
Clerical.....	228	11.8	213	12.0	208	12.0
Total.....	1,922	100.0	1,769	100.0	1,727	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973 the cost of permanent positions will be $31,116,000, a decrease of $319,000 from Fiscal Year 1972. This is based upon turnover savings attained through the loss of forty-two positions in 1973 which will be partially off-set by increased costs for within-grade advances, and promotions. This decrease is projected as follows:

Cost of permanent positions in 1972.....		$31,435,000
Cost increases in 1973.....		+986,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$504,000	
Partial year effect of 1973 actions.....	482,000	
Cost decreases in 1973.....		-1,305,000
Abolished positions:		
Full year effect of 1972 actions.....	-678,000	
Partial year effect of 1973 actions.....	-309,000	
Decrease in days paid in 1973.....	-240,000	
Turnover savings.....	- 78,000	
Cost of permanent positions in 1973.....		$31,116,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Positions	$327,000	$400,000	$400,000

The 1972 and 1973 plans include 160 nonpermanent positions each year. These positions are required for a variety of programs, the largest of which is NASA summer employment. Ames hires 60 college students and high school and college faculty members during the summer to provide these people exposure to NASA programs and government operations. Ames benefits from the employment of these highly skilled individuals through the support they provide to the permanent professional staff and the education and training they receive are a considerable asset to themselves and to the Nation.

Ninety of the nonpermanent positions are used to provide for NASA participation in the President's Summer Aide Program and the Stay in School Program which enables disadvantaged youths to work at unskilled jobs at Ames. The participants in the program gain work experience and training which assist them in finding their place in the employment community.

Ames continues to provide training opportunities for technically oriented college students participating in the cooperative training program throughout the year. Currently there is only one student employed under a cooperative training agreement who works for a term at Ames and then spends a term in regular study at his university. This work-study program combines practical experience with theory and has served as a recruitment source for Ames.

c. Reimbursable Details.....	$ 61,000	$ 90,000	$ 90,000

The services of seven military officers with training in specialized scientific disciplines are utilized at Ames where such assignments are of mutual benefit to NASA and the military agency. In accordance with existing agreements, Ames reimburses the parent organization for the salaries and related costs of the detailees. Costs in 1971 are below projections for 1972 and 1973 because Ames was below its authorized ceiling of seven at that time.

d. Overtime and Other Compensation.....	$229,000	$225,000	$225,000

Overtime and other compensation is divided into $185,000 for overtime and $40,000 for night differential. Approximately half of each category is used for off-shift operation of major wind tunnel facilities such as the Unitary Plan Wind Tunnel System, the 40- x 80-foot Wind Tunnel, the 14-Foot Transonic Wind Tunnel, and the 6- x 6-Foot Supersonic Wind Tunnel. Use of these tunnels during these periods not only increases the number of productive hours but makes possible substantial savings because of available

reduced rates for "off peak" electric power. The remainder of night differential provides for off-shift maintenance and shop work. The remainder of overtime is utilized for emergency maintenance and for some administrative work such as year end closing of fiscal records.

	1971	1972	1973
2. Benefits.....	$2,535,000	$2,761,000	$2,580,000

In addition to compensation, Ames makes an employer's contribution to personnel benefits as authorized and required by law. The cost of benefits is $181,000 lower in 1973 than in 1972 because of the reductions in civil service personnel and in the estimated cost of severance pay in 1973. The following table indicates the cost of personnel benefits by the major categories:

Category of Cost			
Contribution to the Civil Service Retirement Fund.....	$2,145,000	$2,200,000	$2,178,000
Contribution for employee life insurance.....	114,000	123,000	117,000
Contribution to employee health insurance.....	243,000	257,000	246,000
FICA.....	13,000	21,000	21,000
Incentive awards.....	8,000	14,000	14,000
Other personnel benefits.....	1,000	1,000	1,000
Severance pay.....	11,000	145,000	3,000
Total.....	$2,535,000	$2,761,000	$2,580,000
B. Supporting Costs.....	$110,000	$180,000	$132,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment, and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel.....	$ 90,000	$ 159,000	$ 111,000

The costs in 1972 and 1973 are based on a forecast that the agency's program for the reduction of complement will, in lieu of new hires, increase the number of inter-Center transfers made to balance the Ames work force. Attaining complement goals before the end of 1973 will reduce these costs from the 1972 level.

2. Personnel training.....	$ 20,000	$ 21,000	$ 21,000

The maintenance and expansion of the skills of personnel are essential in carrying out the Center's technical and administrative programs. These training activities include the development of supervisory and management skills, improvement of clerical and secretarial support, administrative data processing, general and specific courses in safe work practices, and development of specific skills such as technical writing. Part of this training is offered by other government agencies, usually for a fee. The

remainder is provided through non-governmental sources such as colleges and technical institutes. The estimate for 1973 is based upon a continuation of current training programs.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$905,000	$868,000	$858,000	-$10,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$571,000	$563,000	$563,000
2. Flight mission support.....	42,000	65,000	65,000
3. Overseas travel to launch and tracking sites.....	1,000	2,000	2,000
Subtotal.....	$614,000	$630,000	$630,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings.....	59,000	59,000	59,000
2. Other than government-sponsored meetings and technical seminars..	177,000	110,000	100,000
Subtotal.....	$236,000	$169,000	$159,000
C. Administrative Travel.....	$55,000	$69,000	$69,000
Total, Travel.....	$905,000	$868,000	$858,000
A. Program Related Travel.....	$614,000	$630,000	$630,000

Program related travel is the travel most directly related to the NASA mission. It is the largest part of the travel function and accounts for approximately 73% of the travel requirements for 1973.

1. Direction, coordination, and management of programs.....	$571,000	$563,000	$563,000

The largest individual part of program related travel is for direction, coordination, and management of Research and Development program activities. Because of the complexity of the programs and associated experiments and the distribution of contractor and subcontractor effort throughout the entire

United States, coordination and management of activities require frequent examination by personnel responsible for the programs. The four most significant examples of these activities are the Pioneer Program, the STOLAND Program the Quiet STOL Transport Aircraft, and the Solar Pointing Aerobee Rocket Control System.

	1971	1972	1973
2. Flight mission support.....	$42,000	$65,000	$65,000

As projects reach the flight stage, support is required for prelaunch and postlaunch activities. The amount of travel required for this purpose is directly related to both the number and complexity of the launches. The estimate for 1973 is in consonance with the scheduled launch of the Pioneer G Mission to Jupiter, ten planned launches of the Solar Pointing Aerobee Rocket Control System, and experiment support to other launches.

3. Overseas travel to launch and tracking sites.....	$1,000	$2,000	$2,000

Overseas travel to launch and tracking sites provides for coordination with Madrid, Johannesburg, and Woomera tracking sites for Pioneer launches.

B. Meetings and Technical Seminars.....	$236,000	$169,000	$159,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the types described is granted only after assurance that attendance will be in the best interest of NASA. The geographical distance from NASA Headquarters increases the relative cost for this participation. The reductions in 1972 and again in 1973 result from the overall constraint on the Center's travel limitation.

C. Administrative Travel.....	$55,000	$69,000	$69,000

Administrative travel includes travel for the direction and coordination of general management matters. It includes travel by functional managers in such areas as personnel, financial management, and procurement to assure that policies and procedures are being implemented properly. The travel of Center officials to NASA Headquarters in connection with advanced planning and other management matters is provided for in this category.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES	$4,238,000	$4,376,000	$4,022,000	-$354,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Minor rehabilitation and modification, and construction..	$15,000	$25,000	---
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$673,000	$401,000	$133,000
2. Maintenance of equipment.....	41,000	45,000	34,000
3. Custodial services.....	723,000	805,000	780,000
Subtotal.....	$1,437,000	$1,251,000	$947,000
C. Operation of Facilities			
1. Utilities.....	$2,553,000	$2,843,000	$2,843,000
2. Supplies and equipment.....	233,900	257,000	232,000
Subtotal.....	$2,786,000	$3,100,000	$3,075,000
Total, Facilities Services.....	$4,238,000	$4,376,000	$4,022,000
A. Acquisition of Facilities.....	$15,000	$25,000	---
1. Minor rehabilitation and modification, and construction..	15,000	25,000	---

This activity provides for additions, minor rehabilitation and modification, and construction of institutional facilities within statutory limitations. There are no projects chargeable to this appropriation planned for 1973.

B. Maintenance and Related Services.....	$1,437,000	$1,251,000	$947,000
1. Maintenance of buildings and grounds.....	$673,000	$401,000	$133,000

The year-around requirement for landscaping care requires ten manyears of effort. Building maintenance and repair expenditures chargeable to this appropriation are restricted to seven institutional buildings which contain no special purpose equipment other than normal heating and ventilating systems.

	1971	1972	1973
2. Maintenance of equipment.....	$41,000	$45,000	$34,000

Maintenance and repair of equipment consists of contracted services necessary to keep operational the mechanical, electrical, and electronic office and shop equipment such as 67 adding machines, 346 calculators, 601 typewriters, 180 dictating and transcribing machines, etc., necessary for general support of Center activities. The 1973 estimate is based upon a plan to eliminate routine maintenance and provide on-call repair only.

3. Custodial services.....	$723,000	$805,000	$780,000

The estimate for custodial services includes the cost for janitorial cleaning, protective security, fire protection, and refuse handling services. The increase from 1971 to 1972 projects an increase in the cost for providing janitorial services due to increased wages to custodians. The decrease in 1973 is obtained by eliminating special services such as window cleaning. Ames has 1,445,000 square feet of office, laboratory, and shop area under care with each building area meeting a specified level of cleaning dependent upon use. Bid price on refuse handling is based on 51 stops for a total of 134 cubic yards daily. Fire protection for sixty buildings and sixteen aircraft is provided by NAS Moffett Field at a cost negotiated on the basis of building size and numbers of aircraft relative to the Naval installation. Bid price on security service is based on providing twenty manyears of twenty-four hour duty.

C. Operation of Facilities.....	$2,786,000	$3,100,000	$3,075,000
1. Utilities.....	$2,553,000	$2,843,000	$2,843,000

The cost of electricity, gas, water, and sewage treatment is paid from R&PM funds. Ninety percent of the utility cost is expended in providing electric power. Of this cost, over 76% of the electric power is consumed in the operation of high power demand research facilities such as the Unitary Plan Wind Tunnel System, the 40- by 80-Foot Wind Tunnel, the 3.5-Foot Hypersonic Wind Tunnel, the 14-Foot Transonic Wind Tunnel and in the operation of simulators and smaller wind tunnels. Close control over the integrated demand load is maintained to assure that the Center is obtaining the most advantageous rate. The increase of $290,000 in 1972 and 1973 over the costs in 1971 is to provide for a recently granted increase in electric power rates by the Public Utilities Commission and to provide for full year operation of the 14-Foot Transonic Wind Tunnel. Approximately 40% of the cost for natural gas is to provide for operation of the Mass Transfer facility and the 3.5-Foot Wind Tunnel Pebble Bed Heater.

2. Supplies and equipment.....	$233,000	$257,000	$232,000

The $25,000 reduction projects a lessened requirement for new operational support equipment because of the reduced complement. Expenditures will be restricted to replacement of worn or damaged equipment.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$327,000	$408,000	$298,000	-$110,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	---	$25,000	$25,000
2. Purchase of equipment.....	---	---	---
3. Maintenance of equipment.....	$22,000	25,000	25,000
Subtotal, equipment.....	$22,000	$50,000	$50,000
4. Programming and operations services	301,000	310,000	210,000
Subtotal.....	$323,000	$360,000	$260,000
B. Engineering Services.....	$2,000	$10,000	---
C. Scientific and Technical Information and Educational Programs			
1. Educational/information programs...	$2,000	$38,000	$38,000
Total, Technical Services.....	$327,000	$408,000	$298,000
A. Automatic Data Processing.....	$323,000	$360,000	$260,000

The R&PM appropriation provides for that portion of the lease, purchase and maintenance of ADP equipment and programming and operations services of ADP systems which are in support of administrative programs. These include the maintenance of financial records and controls, personnel records and reports, supply transactions and inventory controls, and a management information system which identifies status on manpower utilization, program expenditures, procurement and travel. The $100,000 reduction in 1973 results from the completion of special programming services for updating and improving the Ames management information system.

B. Engineering Services.....	$2,000	$10,000	---

Engineering services provide for building and equipment design studies and other related engineering services. No funds are projected for 1973 because no building alterations are projected.

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	1971	1972	1973
C. Scientific and Technical Information and Educational Programs.....	$2,000	$38,000	$38,000
1. Educational/informational programs.	$2,000	$38,000	$38,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of newsworthy materials in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material. The increase in 1972 and 1973 reflects the new regional assignment to Ames to cover the eleven western states.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT..	$1,171,000	$1,463,000	$1,418,000	-$45,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$224,000	$243,000	$243,000
2. Local telephone service.....	243,000	325,000	325,000
3. Other communications.....	5,000	7,000	7,000
Subtotal.....	$472,000	$575,000	$575,000
B. Administrative Printing.....	$10,000	$45,000	$45,000
C. Supplies, Materials and Equipment.....	$208,000	$215,000	$195,000
D. Transportation.....	$69,000	$78,000	$78,000
E. Administrative Support Services.....	$412,000	$550,000	$525,000
Total, Administrative Support Services.	$1,171,000	$1,463,000	$1,418,000
A. Communications.....	$472,000	$575,000	$575,000

Included in this estimate are the costs of leased lines, long distance tolls, local telephone exchange service and other communications such as TWX. The 1972 and 1973 increases are caused by increased FTS charges by GSA, recently

granted rate increases to the Pacific Telephone Company by the Public Utilities Commission and conversion of the Ames telephone exchange to CENTREX. Ames has twenty incoming trunk lines and 2,185 installed telephone instruments. Past experience has shown that there are approximately 100,000 long distance calls and 180,000 FTS calls per year.

Costs for certain operational communications related to flight activities, such as Pioneer, and dedicated leased lines are excluded from the Research and Program Management appropriation, but are included in the relevant program in the Research and Development appropriation.

	1971	1972	1973
B. Administrative Printing.....	$10,000	$45,000	$45,000

Administrative printing includes the publication of information and operating materials such as telephone directories semi-annually, in-house organ bi-weekly, in-house forms, stores stock catalog revisions, and employee brochures. Estimates include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplication, including photographic reproductions, are included. The increased costs in 1972 and 1973 are a result of the reduced use of in-house capability under Title 44, USC.

C. Supplies, Materials and Equipment.....	$208,000	$215,000	$195,000

Administrative supplies, materials, and equipment include office supplies of a general nature and general office equipment such as furniture, typewriters, and calculators. The reduction in 1973 reflects estimated decreased requirement because of decreased staff.

D. Transportation.....	$69,000	$78,000	$78,000

Transportation services include costs for local motor pool operations and associated services, as well as the movement of supplies, materials, equipment and related items by common carrier. Fifty-four motor pool vehicles are leased from GSA and are used for the delivery of supplies and materials and internal mail within the Center, security patrols, off-site pickup of special supplies and for local transportation of personnel.

E. Administrative Support Services.....	$412,000	$550,000	$525,000

Administrative support services include those services which support the installation generally, such as twenty-one manyears for the operation of the Center's supply and warehousing facilities, eleven manyears for the distribution of internal mail and special messenger service, three manyears for providing medical services, and eleven manyears providing logistic support to the Public Affairs Program. The 1972 increase over 1971 reflects the full year funding of support to the Public Affairs Program resulting from the recently assigned responsibility for the eleven western states. The decreased levels from 1972 to 1973 result from the decrease in complement.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING CHART
AMES RESEARCH CENTER

CENTER TOTAL

	72	73
EXCEPTED	21	21
GS-16	22	21
GS-15	134	134
GS-14	179	177
ALL OTHER GS	1105	1084
WAGE GRADE	308	290
TOTAL PERMANENT	1769	1727

DIRECTOR

	72	73
EXCEPTED	4	4
GS-16	1	1
GS-15	3	3
GS-14	1	1
ALL OTHER GS	7	7
WAGE GRADE	–	–
TOTAL PERMANENT	16	16

OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY
(NASA HEADQUARTERS)

TECHNOLOGY UTILIZATION OFFICE

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	2	2
ALL OTHER GS	2	2
WAGE GRADE	–	–
TOTAL PERMANENT	4	4

PUBLIC AFFAIRS OFFICE

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	6	6
WAGE GRADE	–	–
TOTAL PERMANENT	7	7

PATENT COUNCIL

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	1	1
GS-14	1	1
ALL OTHER GS	1	1
WAGE GRADE	–	–
TOTAL PERMANENT	3	3

CHIEF COUNCIL

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	1	1
GS-14	–	–
ALL OTHER GS	2	2
WAGE GRADE	–	–
TOTAL PERMANENT	3	3

HEALTH AND SAFETY OFFICE

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	3	3
WAGE GRADE	–	–
TOTAL PERMANENT	4	4

DIRECTOR OF AERONAUTICS & FLIGHT SYSTEMS

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	1	1
GS-14	–	–
ALL OTHER GS	3	3
WAGE GRADE	–	–
TOTAL PERMANENT	6	6

DIRECTOR ASTRONAUTICS

	72	73
EXCEPTED	2	2
GS-16	–	–
GS-15	1	1
GS-14	–	–
ALL OTHER GS	3	3
WAGE GRADE	–	–
TOTAL PERMANENT	6	6

DIRECTOR OF LIFE SCIENCES

	72	73
EXCEPTED	2	2
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	3	3
WAGE GRADE	–	–
TOTAL PERMANENT	6	6

DIRECTOR DEVELOPMENT

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	–	–
GS-14	2	2
ALL OTHER GS	2	2
WAGE GRADE	–	–
TOTAL PERMANENT	6	6

DIRECTOR OF ADMINISTRATION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	–	–
GS-14	–	–
ALL OTHER GS	2	2
WAGE GRADE	–	–
TOTAL PERMANENT	4	4

DIRECTOR OF RESEARCH SUPPORT

	72	73
EXCEPTED	2	2
GS-16	–	–
GS-15	1	1
GS-14	–	–
ALL OTHER GS	2	2
WAGE GRADE	–	–
TOTAL PERMANENT	5	5

ADVANCED CONCEPTS & MISSIONS DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	7	7
GS-14	10	10
ALL OTHER GS	27	27
WAGE GRADE	–	–
TOTAL PERMANENT	46	46

AERONAUTICS DIVISION

	72	73
EXCEPTED	1	1
GS-16	–	–
GS-15	12	12
GS-14	15	15
ALL OTHER GS	78	75
WAGE GRADE	27	27
TOTAL PERMANENT	133	130

FLIGHT SYSTEMS RESEARCH DIVISION

	72	73
EXCEPTED	–	–
GS-16	4	3
GS-15	11	11
GS-14	14	15
ALL OTHER GS	70	75
WAGE GRADE	14	6
TOTAL PERMANENT	113	110

SIMULATION SCIENCES DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	4	4
GS-14	9	9
ALL OTHER GS	27	25
WAGE GRADE	1	1
TOTAL PERMANENT	42	40

VISTOL PROJECT OFFICE

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	2	2
GS-14	3	3
ALL OTHER GS	14	14
WAGE GRADE	–	–
TOTAL PERMANENT	20	20

QUESTOL PROJECT OFFICE

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	2	2
GS-14	1	1
ALL OTHER GS	6	6
WAGE GRADE	–	–
TOTAL PERMANENT	10	10

THERMO AND GAS DYNAMICS DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	17	17
GS-14	22	19
ALL OTHER GS	88	87
WAGE GRADE	5	5
TOTAL PERMANENT	134	130

VEHICLE ENVIRONMENT DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	13	13
GS-14	11	11
ALL OTHER GS	64	70
WAGE GRADE	10	2
TOTAL PERMANENT	100	98

SPACE SCIENCES DIVISION

	72	73
EXCEPTED	1	1
GS-16	–	–
GS-15	13	13
GS-14	13	13
ALL OTHER GS	48	48
WAGE GRADE	4	2
TOTAL PERMANENT	79	77

STRATOSPHERE RESEARCH PROJECTS OFFICE

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	2	2
GS-14	1	1
ALL OTHER GS	19	19
WAGE GRADE	–	–
TOTAL PERMANENT	22	22

EXOBIOLOGY DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	2	2
GS-14	4	4
ALL OTHER GS	38	37
WAGE GRADE	–	–
TOTAL PERMANENT	45	44

ENVIRONMENTAL BIOLOGY DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	5	5
GS-14	4	4
ALL OTHER GS	24	23
WAGE GRADE	–	–
TOTAL PERMANENT	35	34

BIOTECHNOLOGY DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	5	5
GS-14	12	12
ALL OTHER GS	39	36
WAGE GRADE	5	5
TOTAL PERMANENT	58	59

SYSTEMS ENGINEERING DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	8	8
GS-14	8	8
ALL OTHER GS	32	30
WAGE GRADE	–	–
TOTAL PERMANENT	49	47

PROJECT PIONEER

	72	73
EXCEPTED	1	1
GS-16	–	–
GS-15	5	5
GS-14	12	12
ALL OTHER GS	29	27
WAGE GRADE	–	–
TOTAL PERMANENT	47	45

SPECIAL PROJECTS

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	4	4
GS-14	4	4
ALL OTHER GS	4	4
WAGE GRADE	–	–
TOTAL PERMANENT	12	12

RESOURCES MANAGEMENT OFFICE

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	2	2
ALL OTHER GS	8	8
WAGE GRADE	–	–
TOTAL PERMANENT	10	10

FISCAL DIVISION

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	42	40
WAGE GRADE	–	–
TOTAL PERMANENT	43	41

PERSONNEL DIVISION

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	1	1
GS-14	1	1
ALL OTHER GS	35	34
WAGE GRADE	–	–
TOTAL PERMANENT	37	36

PROCUREMENT DIVISION

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	1	1
GS-14	4	4
ALL OTHER GS	47	46
WAGE GRADE	–	–
TOTAL PERMANENT	52	51

TECHNICAL INFORMATION DIVISION

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	26	26
WAGE GRADE	6	6
TOTAL PERMANENT	33	32

SERVICES & SUPPLY DIVISION

	72	73
EXCEPTED	–	–
GS-16	–	–
GS-15	–	–
GS-14	1	1
ALL OTHER GS	33	33
WAGE GRADE	13	13
TOTAL PERMANENT	47	47

RESEARCH FACILITIES & INSTRUMENTATION DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	7	7
GS-14	12	11
ALL OTHER GS	123	117
WAGE GRADE	59	59
TOTAL PERMANENT	202	195

TECHNICAL SERVICES DIVISION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	–	–
GS-14	–	–
ALL OTHER GS	83	77
WAGE GRADE	164	164
TOTAL PERMANENT	248	242

COMPUTATION DIVISION

	72	73
EXCEPTED	1	1
GS-16	1	1
GS-15	–	–
GS-14	4	4
ALL OTHER GS	55	53
WAGE GRADE	–	–
TOTAL PERMANENT	61	59

INSTITUTE FOR ADVANCED COMPUTATION

	72	73
EXCEPTED	–	–
GS-16	1	1
GS-15	5	5
GS-14	1	2
ALL OTHER GS	13	12
WAGE GRADE	–	–
TOTAL PERMANENT	20	20

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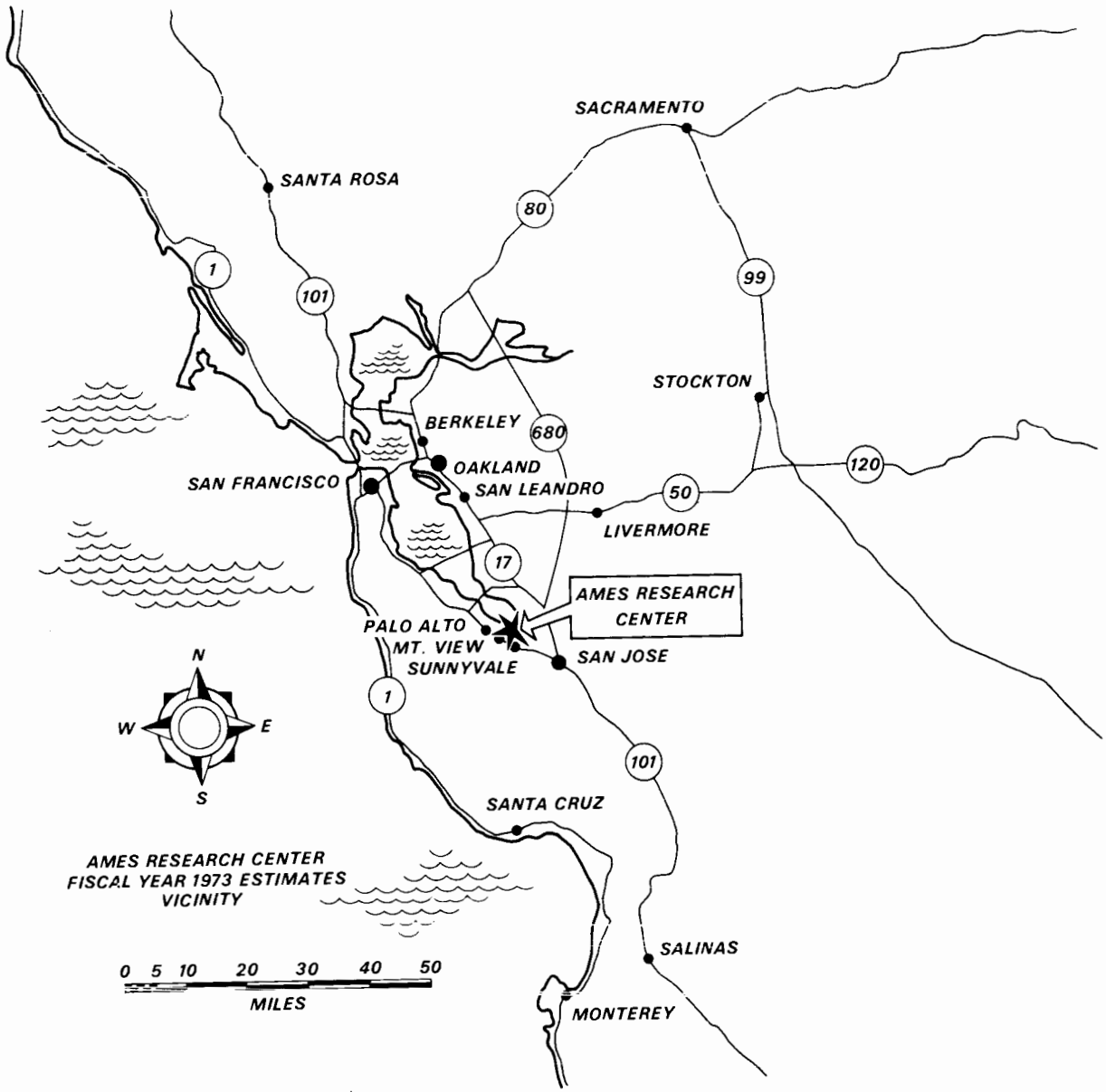


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

RPM 140

AMES RESEARC
FISCAL YEAR 197
LOCATION

LEGEND

N-200	ADMINISTRATION BLDG.
N-201	AUDITORIUM
N-202	ADMINISTRATION BLDG. ANNEX
N-203	ENGINEERING SERVICES BLDG.
N-204	SPACE TECHNOLOGY BLDG.
N-204A	SPACE TECHNOLOGY BLDG. ANNEX
N-205	PILOT MODEL OF 3.5-FOOT H. W.T.
N-206	12-FOOT PRESSURE W.T.
N-206A	12-FOOT PRESSURE W.T. AUXILIARIES BLDG.
N-207	1- BY 3-FOOT SUPERSONIC WIND TUNNEL
N-207A	HFF SHOCK TUBE LABORATORY
N-208	UNDERGROUND BALLISTIC RANGE
N-209	PRESSURIZED BALLISTIC RANGE
N-210	FLIGHT SIMULATION LABORATORY
N-211	AIRPLANE HANGAR AND SHOP
N-212	STRUCTURAL FABRICATION SHOP
N-213	INSTRUMENT RESEARCH LAB
N-214	MODEL FINISHING SHOP
N-215	7- BY 10-FOOT W.T. NO. 1
N-216	7- BY 10-FOOT W.T. NO. 2
N-217	MAGNETIC STANDARDS LABORATORY
N-218	14-FOOT TRANSONIC W.T.
N-218A	ELECTRICAL EQUIPMENT BLDG.
N-219	ELECTRICAL SERVICES BLDG.
N-220	TECHNICAL SERVICES BLDG.
N-221	40- BY 80-FOOT W.T.
N-221A	BIOSATELLITE CENTRIFUGE
N-221B	VERTICAL HEIGHT APPARATUS
N-222	2- BY 2-FOOT TRANSONIC W.T.
N-223	HYPERVELOCITY BALLISTIC RANGE
N-224	PAYLOAD INTEGRATION AND TEST FACILITY
N-225	SUBSTATION
N-226	6- BY 6-FOOT SUPERSONIC W.T.
N-227	UNITARY PLAN W.T. BLDG.
N-227A	11-FOOT TRANSONIC W.T.
N-227B	9- BY 7-FOOT SUPERSONIC W.T.
N-227C	8- BY 7-FOOT SUPERSONIC W.T.
N-227D	UNITARY PLAN W.T. AUXILIARIES BLDG.
N-228	42-INCH SHOCK TUNNEL
N-229	3.5-FOOT HYPERSONIC W.T.
N-229A	3.5-FOOT HYPERSONIC W.T. AUXILIARIES BLDG.
N-230	PHYSICAL SCIENCES RESEARCH LABORATORY
N-231	HYPERSONIC HELIUM TUNNEL
N-232	PILOT MODEL OF HFFF
N-233	DATA REDUCTION BLDG.
N-234	GAS DYNAMICS LAB.
N-234A	MASS TRANSFER BOILER HOUSE
N-235	CAFETERIA BLDG.
N-236	BIOSCIENCE LAB
N-237	HYPERVELOCITY FREE FLIGHT FACILITY
N-238	MACH 50 HELIUM TUNNEL
N-239	LIFE SCIENCES RESEARCH LAB.
N-239A	LIFE SCIENCES HIGH BAY
N-240	SPACE ENVIRONMENT RESEARCH FACILITY
N-241	ADMINISTRATIVE MANAGEMENT BUILDING
N-242	STRUCTURAL DYNAMICS LAB.
N-243	FLIGHT AND GUIDANCE SIMULATION LABORATORY
N-243A	SIMULATION EQUIPMENT BLDG.
N-244	SYSTEMS ENGINEERING FACILITY
N-245	SPACE SCIENCE RESEARCH LABORATORY

FISCAL YEAR 1971 PROJECT:

A. ADDITION TO BUILDING N-233 FOR ILLIAC IV COMPUTER SYSTEM

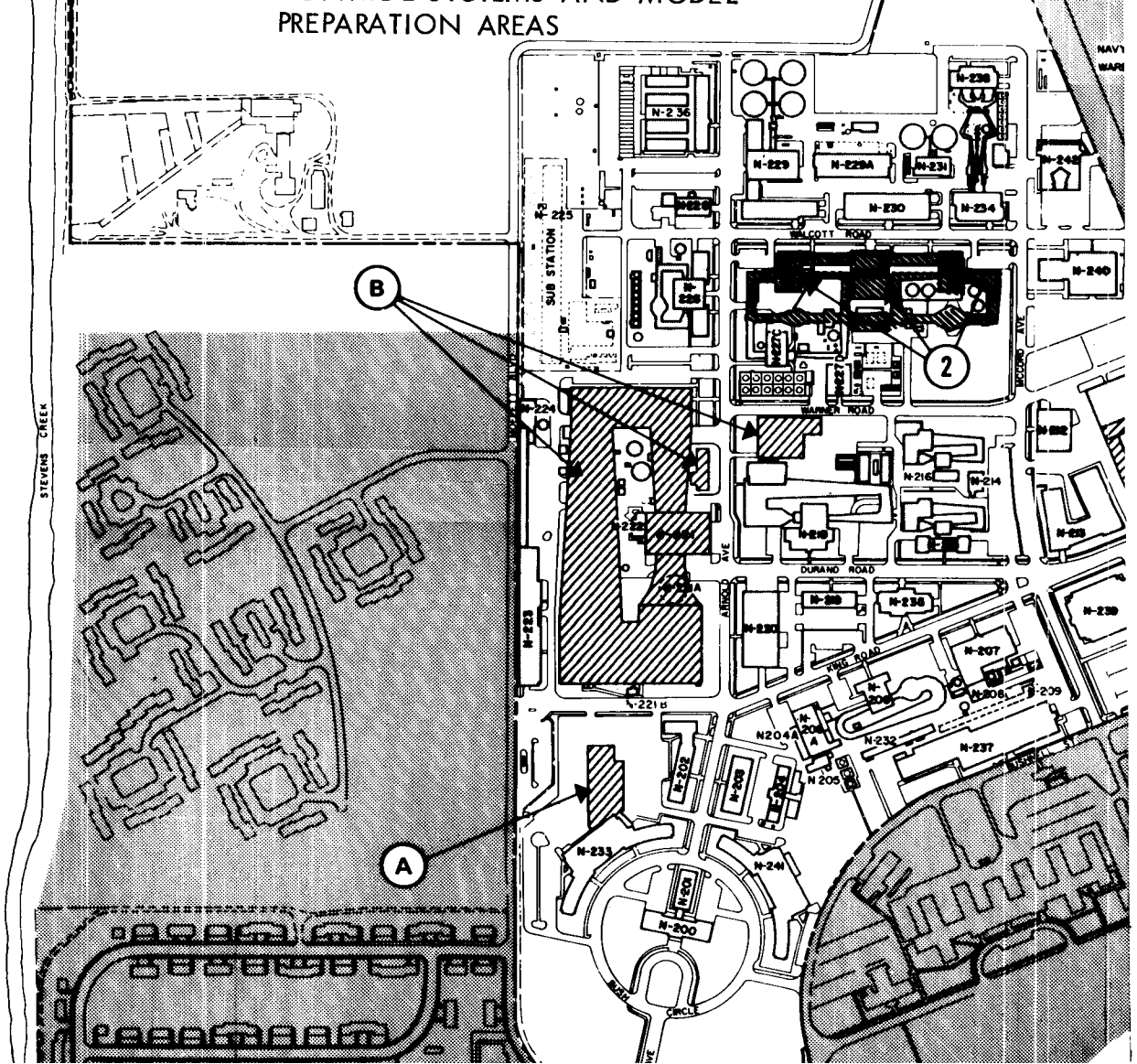
APPROVED FISCAL YEAR 1972 PROJECT:

B. MODERNIZATION OF THE 40 BY 80 FOOT WIND TUNNEL

PROPOSED FISCAL YEAR 1973 PROJECTS

1. REHABILITATION AND MODIFICATION OF AERONAUTICAL, AIRBORNE SCIENCE, AND SUPPORT FACILITIES

2. REHABILITATION OF UNITARY PLAN WIND TUNNEL MODEL SUPPORTS, CONTROL SYSTEMS AND MODEL PREPARATION AREAS



AMES RESEARC
FISCAL YEAR 197
LOCATION

N-220	TECHNICAL SERVICES BLDG.
N-221	40- BY 80-FOOT W.T.
N-221A	BIOSATELLITE CENTRIFUGE
N-221B	VERTICAL HEIGHT APPARATUS
N-222	2- BY 2-FOOT TRANSONIC W.T.
N-223	HYPERVELOCITY BALLISTIC RANGE
N-224	PAYLOAD INTEGRATION AND TEST FACILITY
N-225	SUBSTATION
N-226	6- BY 6-FOOT SUPERSONIC W.T.
N-227	UNITARY PLAN W.T. BLDG.
N-227A	11-FOOT TRANSONIC W.T.
N-227B	9- BY 7-FOOT SUPERSONIC W.T.
N-227C	8- BY 7-FOOT SUPERSONIC W.T.
N-227D	UNITARY PLAN W.T. AUXILIARIES BLDG.
N-228	42-INCH SHOCK TUNNEL
N-229	3.5-FOOT HYPERSONIC W.T.
N-229A	3.5-FOOT HYPERSONIC W.T. AUXILIARIES BLDG.
N-230	PHYSICAL SCIENCES RESEARCH LABORATORY
N-231	HYPERSONIC HELIUM TUNNEL
N-232	PILOT MODEL OF HFFF
N-233	DATA REDUCTION BLDG.
N-234	GASDYNAMICS LAB.
N-234A	MASS TRANSFER BOILER HOUSE
N-235	CAFETERIA BLDG.
N-236	BIOSCIENCE LAB.
N-237	HYPERVELOCITY FREE FLIGHT FACILITY
N-238	MACH 50 HELIUM TUNNEL
N-239	LIFE SCIENCES RESEARCH LAB.
N-239A	LIFE SCIENCES HIGH BAY
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N-241	ADMINISTRATIVE MANAGEMENT BUILDING
N-242	STRUCTURAL DYNAMICS LAB.
N-243	FLIGHT AND GUIDANCE SIMULATION LABORATORY
N-243A	SIMULATION EQUIPMENT BLDG.
N-244	SYSTEMS ENGINEERING FACILITY
N-245	SPACE SCIENCE RESEARCH LABORATORY

FISCAL YEAR 1971 PROJECT:

A. ADDITION TO BUILDING N-233 FOR ILLIAC IV COMPUTER SYSTEM

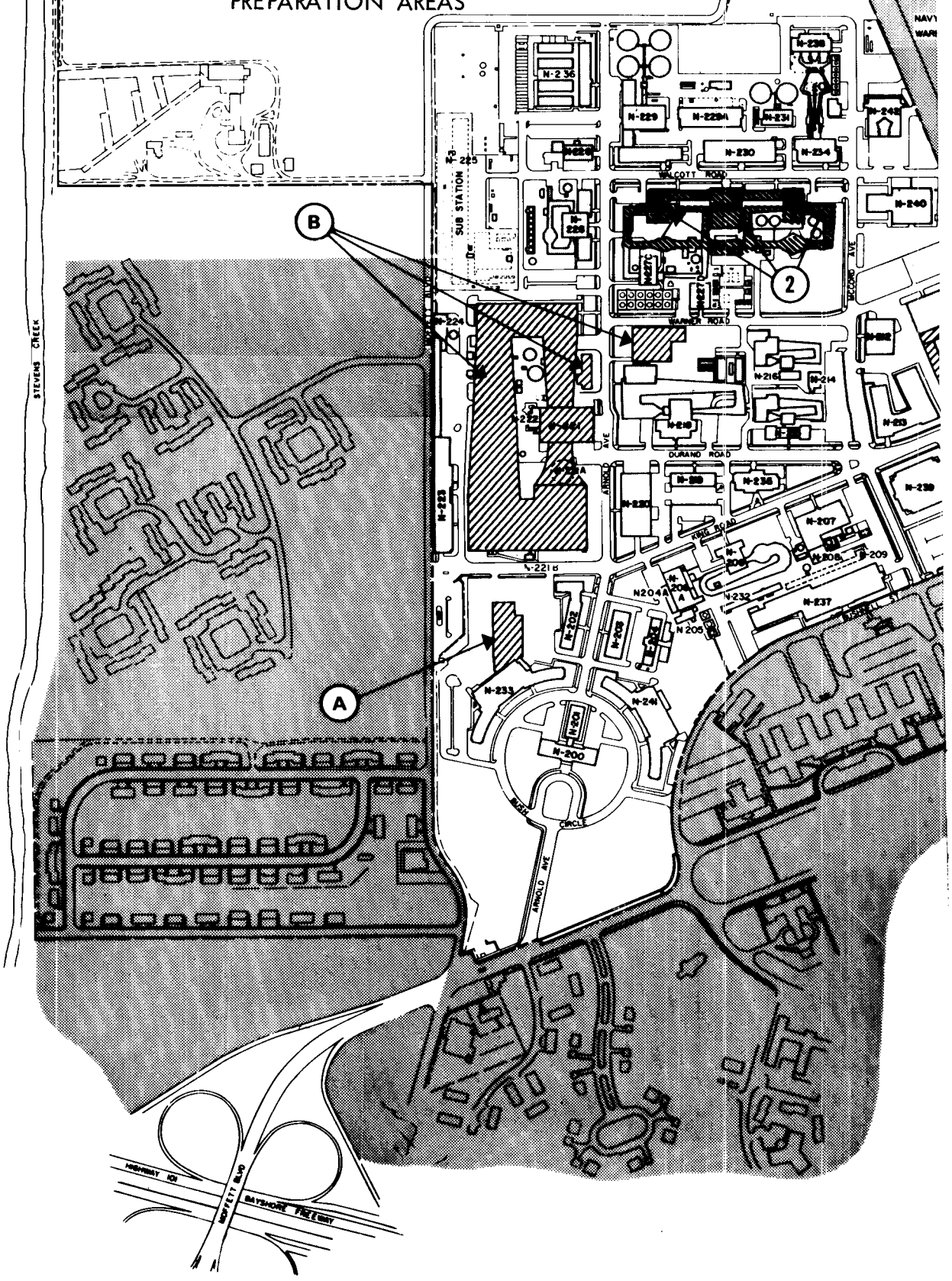
APPROVED FISCAL YEAR 1972 PROJECT:

B. MODERNIZATION OF THE 40 BY 80 FOOT WIND TUNNEL

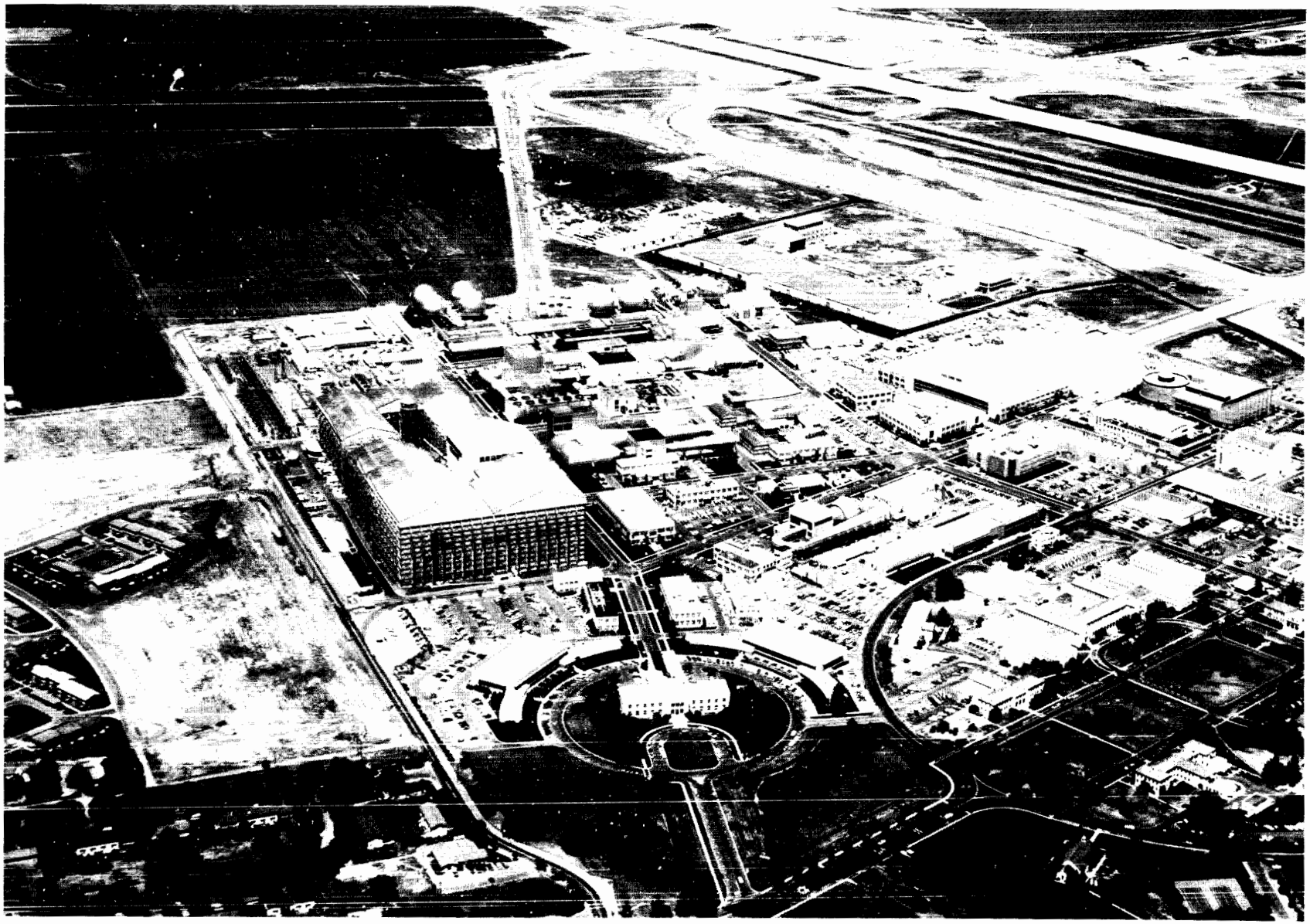
PROPOSED FISCAL YEAR 1973 PROJECTS

1. REHABILITATION AND MODIFICATION OF AERONAUTICAL, AIRBORNE SCIENCE, AND SUPPORT FACILITIES

2. REHABILITATION OF UNITARY PLAN WIND TUNNEL MODEL SUPPORTS, CONTROL SYSTEMS AND MODEL PREPARATION AREAS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA



RPM 142

FLIGHT RESEARCH CENTER

MISSION

The Flight Research Center, established in 1947, conducts aeronautical and space related research using a variety of aerospace vehicles. The work includes effort on problems of take-off, landing, low-speed flight, supersonic and hypersonic flight, and re-entry to verify predicted characteristics and to identify unexpected problems in actual flight.

The current and projected programs at this Center include: aeronautical projects concerning general aviation, STOL research, subsonic and supersonic cruise research; space vehicle systems projects in which the flight behavior of advanced re-entry vehicles including M2-F3, and X-24B heavyweight lifting bodies is studied; and electronic systems projects such as display, guidance, and control in advanced flight missions and improvements on systems and sensors used in biomedical monitoring, tracking, and data acquisition.

Most important of the facilities and special equipment for conducting programs at the Flight Research Center are the aircraft. They range from general aviation aircraft for handling qualities investigations to supersonic aircraft, such as the YF-12A, used for various research investigations having application to both civil and military aviation. Special purpose vehicles such as lifting bodies, STOL, variable stability aircraft, or airborne simulators, are contractor procured or developed in-house. Specialized laboratory facilities are available to complement the flight activities with proper preliminary research and testing. Simulation equipment is used to guide and assist in the performance of productive flight activities. A two-station radar for tracking and data acquisition is operated to support the flight activity.

DESCRIPTION

The Flight Research Center, Edwards, California, is 65 air miles northeast of Los Angeles. The Center is located at the north end of Edwards Air Force Base on 225 acres of land leased from the Air Force. Utilities are provided by the Air Force on a reimbursable basis. The Center is adjacent to Rogers Dry Lake, a 55-square-mile area with a complex of runways varying in length from 5 to 11 miles.

The physical plant consists of an office-laboratory building with adjoining shops, a flight maintenance hangar and a calibration hangar, and a high temperature loads calibrations facility. Auxiliary buildings include warehouses, an auxiliary power systems building, communications buildings, and an aircraft maintenance dock. The main station of the two-station radar range operated by the Center is located on the third floor of the office-laboratory building. The

total capital investment of the Flight Research Center, including fixed assets in progress, and contractor-held facilities at various locations, as of June 30, 1971, was $66,998,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel.....	$9,144,000	$9,344,000	$9,064,000
Travel.....	226,000	214,000	214,000
Facilities services.....	1,343,000	1,415,000	1,232,000
Technical services.....	70,000	85,000	45,000
Administrative support.....	297,000	268,000	269,000
Total, fund requirements..	$11,080,000	$11,326,000	$10,824,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$9,144,000	$9,344,000	$9,064,000	$-280,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions...	$8,005,000	$8,177,000	$7,913,000
b. Nonpermanent positions	202,000	209,000	209,000
c. Reimbursable details..	117,000	99,000	108,000
d. Overtime & other compensation.....	105,000	94,000	105,000
Subtotal, Compensation	$8,429,000	$8,579,000	$8,335,000
2. Benefits.....	$682,000	$725,000	$694,000
Subtotal, Compensation and Benefits.....	$9,111,000	$9,304,000	$9,029,000

	1971	1972	1973
B. Supporting Costs:			
1. Civil Service Commission services.....	$1,000	---	---
2. Personnel training.....	32,000	$40,000	$35,000
Subtotal, Supporting Costs..	$33,000	$40,000	$35,000
Total, Personnel and Related Costs	$9,144,000	$9,344,000	$9,064,000
1. Compensation.....	$8,429,000	$8,579,000	$8,335,000
a. Permanent Positions.....	$8,005,000	$8,177,000	$7,913,000

The reduction of 54 permanent positions from the end of 1971 through 1973 has resulted in a $264 thousand decrease in the cost of permanent personnel. The losses occurred primarily in the area of Aeronautical Research and its associated disciplines. The 1973 staffing will reduce the number of direct programmatic employees to 400 with 81 indirect positions allocated to the Office of the Director and Administrative support.

Permanent Positions by Program:	1971	1972	1973
Manned Space Flight			
Space flight operations.....	3	2	2
Aeronautics and Space Technology			
Aeronautical research and technology	326	327	316
Space research and technology.....	85	50	51
Tracking and Data Acquisition.....	32	32	30
Technology Utilization.....	1	1	1
Subtotal, positions by program.....	447	412	400
Indirect Positions			
Director and staff.....	9	10	10
Administrative support.....	79	71	71
Subtotal, indirect positions.....	88	81	81
Total, permanent positions.....	535	493	481
Other than Permanent Positions.....	90	90	90
Total.....	625	583	571

The above table illustrates the use to which permanent positions are put. The following table summarizes the FRC work force by occupational group:

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	195	36.4	182	36.9	174	36.2
Technicians.....	73	13.6	227	46.1	223	46.4
Wage board.....	171	32.0	4	.8	4	.8
Professional administrative.....	46	8.6	42	8.5	42	8.7
Clerical.....	50	9.4	38	7.7	38	7.9
Total.....	535	100.0	493	100.0	481	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973 the cost of permanent positions will be $7,913,000. This results as follows:

Cost of permanent positions in 1972.....		$8,177,000
Cost of increases in 1973.....		145,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$71,000	
Partial year effect of 1973 actions.....	74,000	
Cost of decreases in 1973.....		-409,000
Abolished positions:		
Full year effect of 1972 actions.....	-$272,000	
Partial year effect of 1973 actions.....	-74,000	
Decrease in days paid in 1973.....	-63,000	
Cost of permanent positions in 1973.....		$7,913,000

Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Positions.....	$202,000	$209,000	$209,000

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The 1972 and 1973 plans include 90 nonpermanent positions each year. These positions are required for a variety of programs, a portion of which provides for summer employment. Flight hires college and high school students and college faculty members during the summer to provide these people exposure to NASA programs and government operations.

A portion of the nonpermanent positions is used to provide for FRC's participation in the President's Youth Opportunity Campaign, which enables disadvantaged youths to work at unskilled jobs both during the summer and throughout the regular school year.

As in the past, the FRC continues to provide significant training opportunities for technically oriented college students participating in the cooperative training program throughout the year. The student employed under a cooperative training agreement works for a term at Flight Research Center then spends a term in regular study at his college or university. This workstudy program combines practical experience with theory and has been a significant recruitment source for the FRC. We have programmed for 28 participants in the cooperative student program.

	1971	1972	1973
c. Reimbursable Details.....	$117,000	$99,000	$108,000

The services of a small group of military officers are utilized in FRC's programs where such assignments are of mutual benefit. In accordance with existing agreements, Flight reimburses the parent organization for the salaries and related costs of the detailees. Currently we plan for 10 such detailees.

d. Overtime and Other Compensation....	$105,000	$94,000	$105,000

This is restricted to emergency repairs and that work requiring other than normal duty time. Requirements include overtime pay for personnel involved with flight launches, emergency repair of equipment and facilities which occurs outside normal working hours and completion of special projects and programs to meet specific deadlines. In addition, personnel required to work other than normal working hours are entitled to night work differential pay which falls under this category.

2. Benefits.....	$682,000	$725,000	$694,000

In addition to compensation, NASA makes an employer's contribution to personnel benefits as authorized and required by law. The cost of benefits is $31,000 lower in 1973 than in 1972 because of the reductions in civil service personnel and severance pay in 1973. The following table indicates the costs of personnel benefits by the major categories:

	1971	1972	1973
Category of Cost			
Contribution to the Civil Service Retirement Fund	$566,000	$571,000	$556,000
Contribution for employee life insurance	30,000	30,000	30,000
Contribution for employee health insurance	71,000	90,000	90,000
FICA	6,000	8,000	8,000
Incentive awards	8,000	10,000	10,000
Other personnel benefits	1,000	---	---
Severance pay	---	16,000	---
Total	$682,000	$725,000	$694,000
B. Supporting Costs	$33,000	$40,000	$35,000

The estimated amount for 1973 represents tuition and training costs associated with maintaining and expanding the skills of our employees. Supporting personnel costs also provide for the expenses associated with movement of employees to initial duty stations and/or reassignments as well as security investigations and other recruitment costs. For the current and budget year no expenditures in these latter areas are anticipated.

1. Civil Service Commission services	$1,000	---	---
2. Personnel training	$32,000	$40,000	$35,000

The maintenance and expansion of the skills of personnel are essential in carrying out the agency's many complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training consists of courses offered by other government agencies; the remainder of the training is provided through non-governmental sources. The cost is for tuition, fees and related costs for training at colleges, universities, technical institutes and related institutions. It is estimated that 170 participants will request continuation of current training programs or other courses to meet the growing requirements to re-orient skills of employees into channels compatible with the direction of the NASA program in the 1970's.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$226,000	$214,000	$214,000	---

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$99,000	$93,000	$93,000
2. Flight mission support.....	12,000	12,000	12,000
Subtotal.....	$111,000	$105,000	$105,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings.....	$41,000	$40,000	$40,000
2. Other than government-sponsored meetings and technical seminars..	24,000	22,000	22,000
Subtotal.....	$65,000	$62,000	$62,000
C. Administrative Travel.....	$50,000	$47,000	$47,000
Total, Travel.....	$226,000	$214,000	$214,000
A. Program Related Travel.....	$111,000	$105,000	$105,000

The largest individual part of program related travel is for direction, coordination, and management of Research and Development program activities. Because of the complexity of the programs and distribution of contractor and subcontractor effort throughout the entire United States, coordination and management of activities require frequent trips by personnel responsible for programs such as the X-24A, B-1, F-15, STOL and Fly-By-Wire areas of research. As projects reach the flight stage, support is required for preflight and post-flight activities. The two categories are combined to represent the experience and projections by type of program. The major portion of the travel will be support of the Aeronautics program. The number of trips and travel funds estimated are listed below for the categories of both program support and flight mission support.

	1973 No. of Trips	1973 Amount
Aeronautics:		
Research and Technology	145	$37,000
Supercritical Wing	66	16,000
YF-12	70	11,000
STOL	61	16,000
Other Aeronautics	46	11,500
Space:		
Lifting Body	35	9,100
Human Factors	8	2,400
Network Operations	16	2,000
Total	447	$105,000

	1971	1972	1973
B. Meetings and Technical Seminars	$65,000	$62,000	$62,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside NASA, as well as allowing them to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve particular problems. Authorization to attend outside meetings is granted only after assurance that attendance will be in the best interest of NASA. The projections for 1973 show a small reduction to 162 trips at a cost of $40,000. The cost of travel to other than government sponsored meetings and technical seminars reflects a decrease in 1973 to 110 trips at a cost of $22,000.

C. Administrative Travel	$50,000	$47,000	$47,000

Administrative travel includes travel for the direction and coordination of general management matters. It includes travel by functional managers in such areas as personnel, financial management, and procurement. The travel of Center officials to NASA Headquarters is provided for in this category. The 1973 requirements are based on an estimated 200 trips at an average cost of $235 per trip.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES..	$1,343,000	$1,415,000	$1,232,000	-$183,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Minor rehabilitation and modifications, and construction.....	$24,000	$20,000	---
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	697,000	810,000	675,000
2. Maintenance of equipment.....	95,000	95,000	95,000
3. Custodial services.....	264,000	273,000	273,000
Subtotal.....	$1,056,000	$1,178,000	$1,043,000
C. Operation of Facilities			
1. Utilities.....	91,000	98,000	98,000
2. Supplies and equipment.....	172,000	119,000	91,000
Subtotal.....	$263,000	$217,000	$189,000
Total, Facilities Services.....	$1,343,000	$1,415,000	$1,232,000
A. Acquisition of Facilities.....	$24,000	$20,000	---

The cost of minor construction projects will be funded under the CoF appropriation in 1973.

B. Maintenance and Related Services.....	$1,056,000	$1,178,000	$1,043,000
1. Maintenance of buildings and grounds.....	$697,000	$810,000	$675,000

The amount required for maintenance of buildings and grounds represents costs to repair and maintain 331,000 square feet of building space, represented by 21 permanent structures, utility plants and systems, 225 acres of improved

and unimproved grounds, and other real property items such as manholes, monuments, bus shelters, etc. The funding in 1973 supports 42 manyears of effort.

	1971	1972	1973
2. Maintenance of equipment.....	$95,000	$95,000	$95,000

Maintenance of equipment consists of work necessary to keep mechanical, electrical, electronic, laboratory and shop equipment operational. The estimate is based on maintaining approximately 282 pieces of office, shop and laboratory equipment through service maintenance contracts or on-call contracts.

3. Custodial services.....	$264,000	$273,000	$273,000

This category includes $119,000 for janitorial services, $142,000 for security guard services, and $12,000 for laundry services, rodent and pest control, refuse handling and fire protection.

The estimate for janitorial services will provide 18 manyears of effort to clean 207,000 square feet of floor space.

The estimate for adequate security protection services will support 18 manyears of effort. Security coverage includes 11 guard posts, five of which are manned on a 24 hour basis. The remaining posts are manned on an eight hour basis or less, depending on requirements.

C. Operation of Facilities.....	$263,000	$217,000	$189,000
1. Utilities.....	$91,000	$98,000	$98,000

The estimates provide for 15 million gallons of water at a cost of $.12285 per 1,000 gallons ($2,000), and approximately 4 million gallons sewage disposal at a cost of $.45891 per 1,000 gallons ($1,500). The estimate for electricity ($54,000) will provide approximately 6,700,000 KWH of electricity at a cost of $8.0439 per 1,000 KWH. A total of $40,500 is included in the budget for natural gas. This will provide approximately 63 billion BTU's of gas at a cost of $.6474 per million BTU's annually. Electricity and water are obtained from the Air Force and natural gas for heating is obtained from a commercial source.

2. Supplies and equipment.....	$172,000	$119,000	$91,000

The supplies and equipment used in the operation of the Center are budgeted for in this subcategory. The majority of the items required consist of air-conditioning, heating and plumbing materials, hand tools, brushes, sealers, and hardware items to maintain our facilities.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$70,000	$85,000	$45,000	-$40,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Purchase of equipment.....	---	$40,000	---
2. Programming and operations services	$30,000	$10,000	$10,000
Subtotal.....	$30,000	$50,000	$10,000
B. Engineering Services.....	$11,000	$10,000	$10,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$8,000	$7,000	$7,000
2. Educational/information programs...	8,000	10,000	10,000
3. Scientific and technical information	13,000	8,000	8,000
Subtotal.....	$29,000	$25,000	$25,000
Total, Technical Services.....	$70,000	$85,000	$45,000
A. Automatic Data Processing.....	$30,000	$50,000	$10,000

Financial programs currently utilize the general purpose computer to generate Center financial reporting for both in-house and out-of-house requirements. The $40,000 in 1972 was for purchase of an ancillary machine to generate hard copy records for our ledgers, while simultaneously generating a punched card for processing in the central computer unit. During the budget year, it is estimated contractor support of $10,000 will be required for keypunch support at the current rate of $.114 per card.

B. Engineering Services.....	$11,000	$10,000	$10,000

Funding in this area is in support of the Center facilities management function. Engineering services are required primarily for drafting and design work which exceed in-house capability, engineering consulting services, and civil engineering facility design approvals.

	1971	1972	1973
C. Scientific and Technical Information and Educational Programs.....	$29,000	$25,000	$25,000
1. Operation of NASA technical libraries.....	$8,000	$7,000	$7,000

The estimates of $7,000 for 1972 and 1973 are required to procure scientific and technical books and periodicals in support of research programs; technical and administrative publications for the benefit of FRC personnel to maintain a current knowledge of the latest techniques and applications of engineering data and management practices; and various other publications such as volumes of microfilm data, and foreign publications of scientific value, and approximately 300 subscriptions for periodicals.

2. Educational/informational programs.	$8,000	$10,000	$10,000

The educational/information programs provide for the gathering and dissemination of information about the center's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news-worthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material. It is estimated that 150 calls will be made upon the support photographic contracts. Half of the cost is distributed to this category.

3. Scientific and technical information.....	$13,000	$8,000	$8,000

Funding in this area will allow the procurement of documentation, publication services and photographic services. The majority of the funds will be used to procure photographic services which exceed our in-house capability. Services will include processing of 16mm film, contact timed prints, color corrected optical masters and various other processing and printing of still and motion picture technical film.

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	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT.....	$297,000	$268,000	$269,000	+$1,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$45,000	$47,000	$47,000
2. Local telephone service.....	63,000	68,000	68,000
3. Other communications.....	5,000	5,000	5,000
Subtotal.....	$113,000	$120,000	$120,000
B. Administrative Printing.....	$2,000	$4,000	$4,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials.....	$85,000	$70,000	$70,000
2. Equipment.....	47,000	29,000	29,000
Subtotal.....	$132,000	$99,000	$99,000
D. Transportation			
1. Common carrier.....	$15,000	$10,000	$10,000
E. Administrative Support Services			
1. Medical services.....	$35,000	$35,000	$36,000
Total, Administrative Support.....	$297,000	$268,000	$269,000
A. Communications.....	$113,000	$120,000	$120,000

Included in this estimate are the costs of leased lines, long distance tolls, local telephone services, and other communications, such as TWX. Funding is required to support three Federal Telephone System circuits. The costs of FTS services and long distance tolls are estimated at $47,000. For local telephone service $68,000 is required for 400 telephones and terminal equipment. The remaining $5,000 included for communications is for rental of lease lines and equipment for our teletype/crypto system.

	1971	1972	1973
B. Administrative Printing.....	$2,000	$4,000	$4,000

The estimate for administrative printing includes funds for contractual printing and the related composition and binding operations. The estimates include printing of 5,000 Center brochures at an approximate cost of $3,500, and $500 for all common processes of duplicating, including photostating, blueprinting, and microfilming.

C. Supplies, Materials and Equipment.....	$132,000	$99,000	$99,000

Administrative supplies, materials and equipment include those items of a general nature which service the entire installation. The majority of the funds are budgeted for office supplies and equipment to support administrative operations.

D. Transportation.....	$15,000	$10,000	$10,000

Estimates in this area are to fund the costs of government bills of lading issued to common carriers to move freight by rail, truck, water and air and to fund shipments provided by United Parcel Service. The estimate is to fund approximately 300 GBL's and 300 UPS shipments.

E. Administrative Support Services.....	$35,000	$35,000	$36,000

Administrative support services represent the Centers occupational health program under contract to the Lovelace Clinic. All Center personnel are eligible for an annual physical under the program and flight physicals are also performed as the requirements necessitate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ORGANIZATION AND STAFFING CHART

FLIGHT RESEARCH CENTER

STAFFING SUMMARY	CY	BY
Excepted	6	6
GS-16	7	7
GS-15	21	21
GS-14	36	34
All Other GS	419	409
Wage Board	4	4
Total Permanent	493	481

OFFICE OF THE DIRECTOR	CY	BY
Excepted	2	2
GS-16	1	1
GS-15	3	3
GS-14	-	-
All Other GS	21	21
Wage Board	-	-
Total Permanent	27	27

RESEARCH DIVISION	CY	BY
Excepted	1	1
GS-16	4	4
GS-15	7	7
GS-14	18	18
All Other GS	67	63
Wage Board	-	-
Total Permanent	97	93

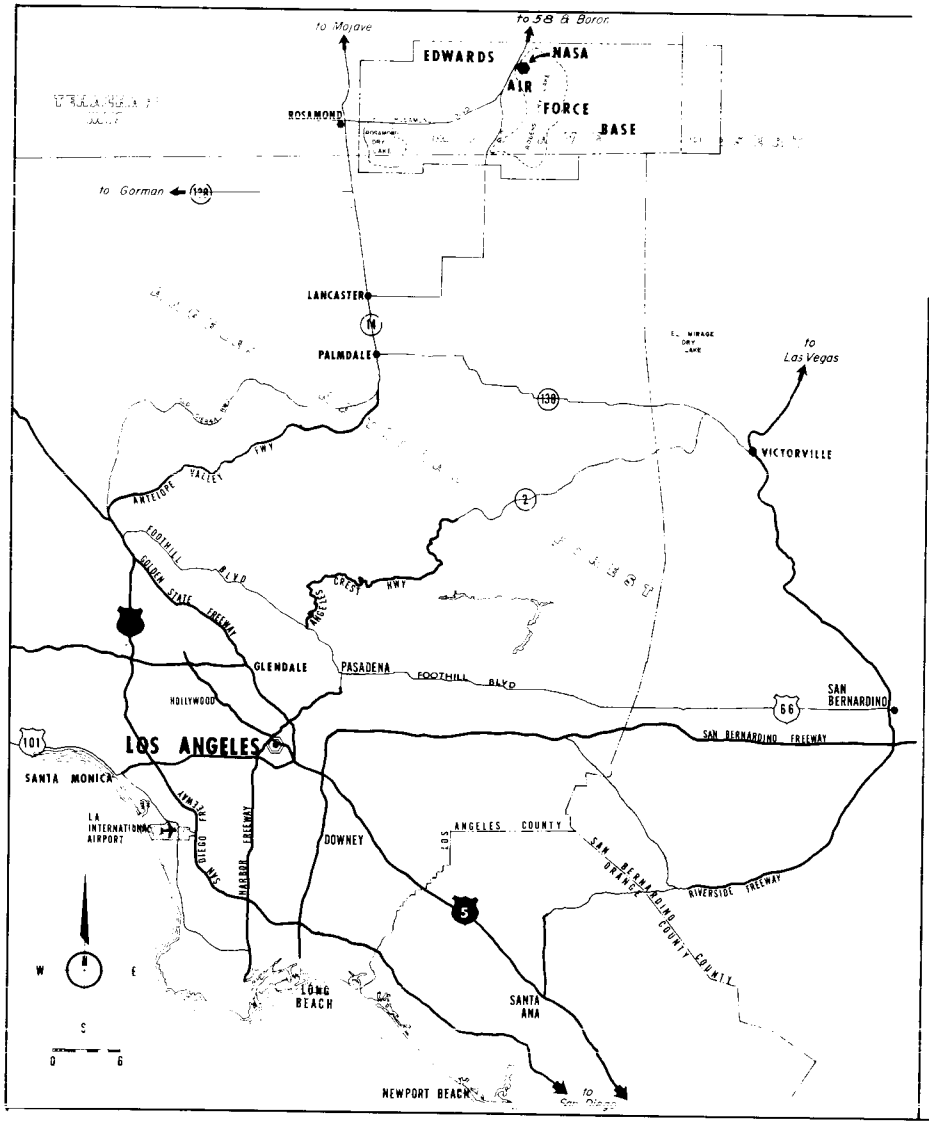
OPERATIONS DIVISION	CY	BY
Excepted	2	2
GS-16	1	1
GS-15	6	6
GS-14	6	4
All Other GS	143	141
Wage Board	-	-
Total Permanent	158	154

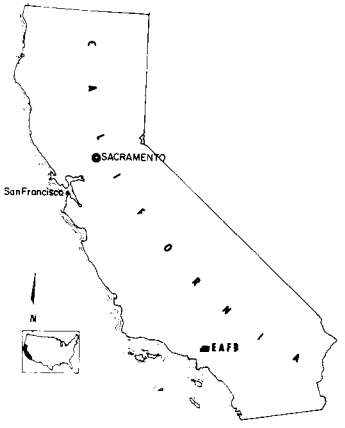
DATA SYSTEMS DIVISION	CY	BY
Excepted	-	-
GS-16	1	1
GS-15	2	2
GS-14	7	7
All Other GS	124	120
Wage Board	-	-
Total Permanent	134	130

BIOMEDICAL OFFICE	CY	BY
Excepted	1	1
GS-16	-	-
GS-15	-	-
GS-14	1	1
All Other GS	4	4
Wage Board	-	-
Total Permanent	6	6

ADMINISTRATIVE DIVISION	CY	BY
Excepted	-	-
GS-16	-	-
GS-15	3	3
GS-14	4	4
All Other GS	60	60
Wage Board	4	4
Total Permanent	71	71

FLIGHT RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES
VICINITY MAP





KEY PLAN

MF-D-013

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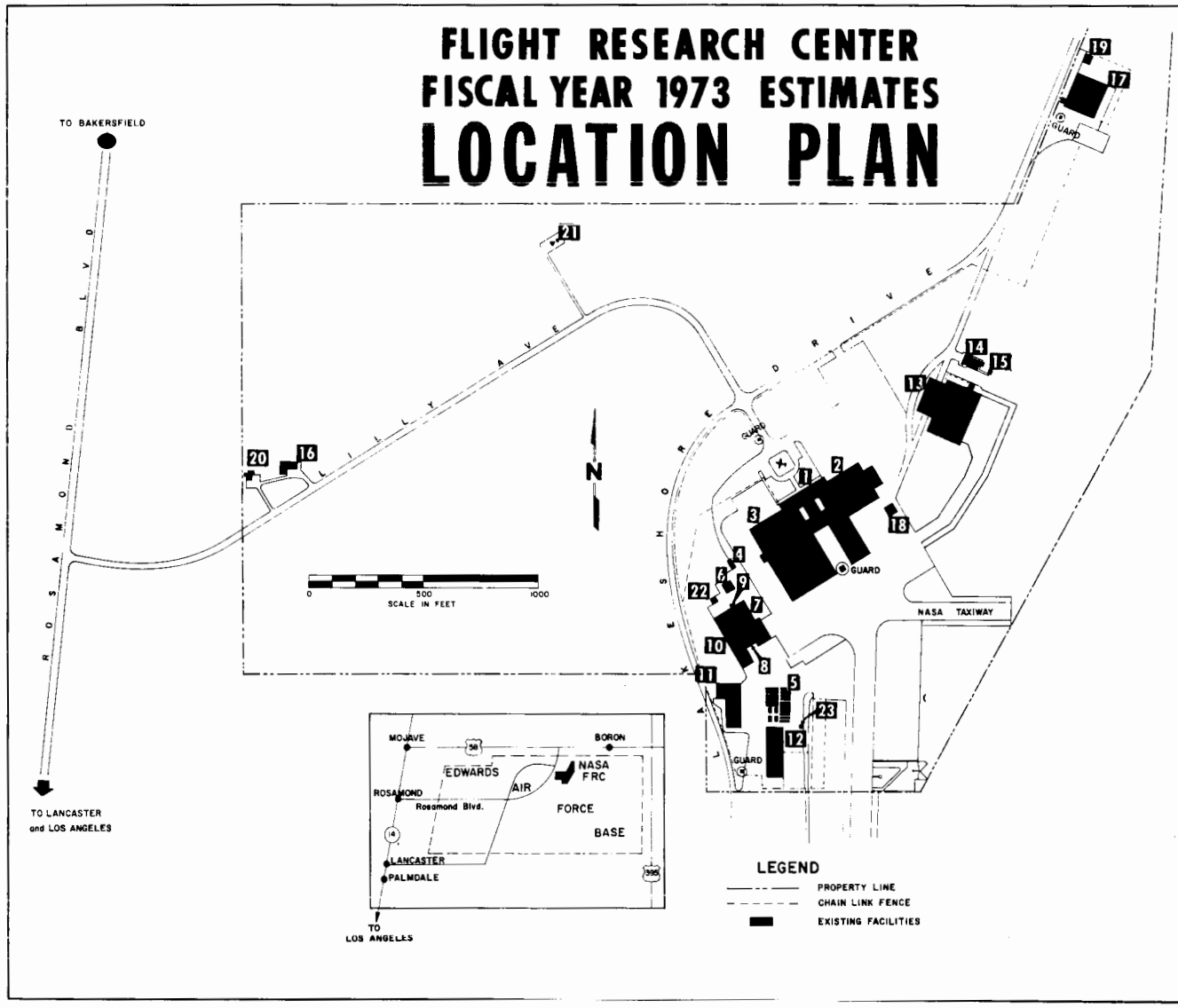
FLIGHT RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES
LOCATION PLAN



1. LABORATORY BUILDING (4800)
2. AIRCRAFT CONSTRUCTION AND MODIFICATION HANGAR (4801)
3. MAIN HANGAR (4802)
4. FIBERGLASS SPRAY BOOTH (4803)
5. TRAILER PARK AND MODULAR BUILDINGS
6. BOILER HOUSE (4805)
7. SHOPS (AGE, MODEL, BATTERY, GARAGE)(4806)
8. STORAGE BUILDING (4807A)
9. PHYSIOLOGY STRESS LAB. (4807B)
10. WAREHOUSE Nº 2 (4808)
11. WAREHOUSE Nº 3 (4809)
12. WAREHOUSE Nº 4 (4810)
13. HIGH TEMPERATURE LOADS CALIBRATION FACILITY (4820)
14. PAINT SPRAY BUILDING (4821)
15. PAINT STORAGE BUILDING (4822)
16. COMMUNICATIONS BUILDING (4824)
17. MAINTENANCE DOCK (4826)
18. AUXILIARY POWER UNIT (4830)
19. WAREHOUSE Nº 5 (4831)
20. RADAR BUILDING (4870)
21. 100 FT. TOWER, BORESIGHT TARGET ASSEMBLY AND EQUIPMENT (4887)
22. CENTRAL STANDBY ELECTRICAL POWER FACILITY (4889)
23. STORAGE BUILDING (4804)

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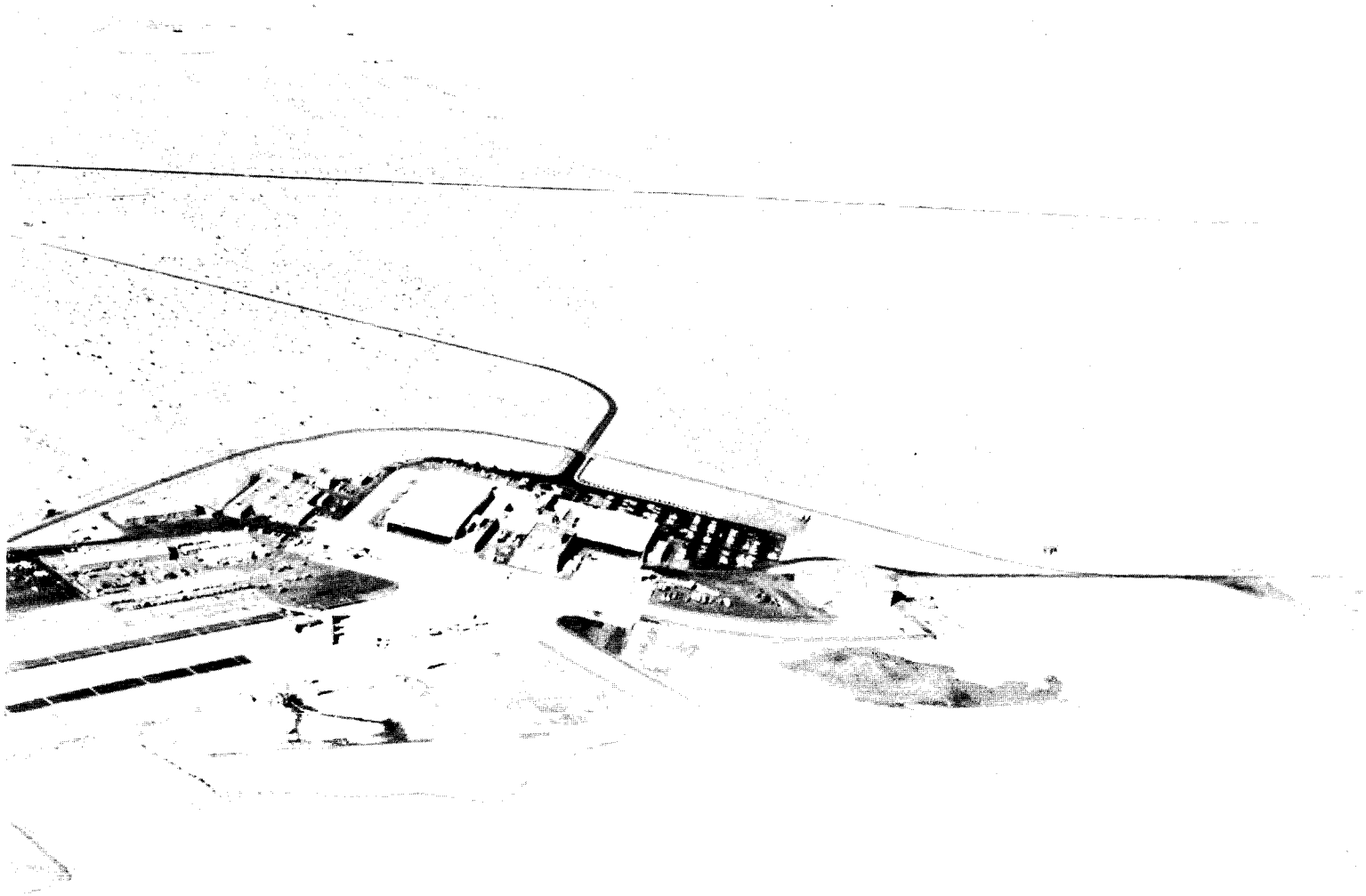
FLIGHT RESEARCH CENTER

FISCAL YEAR 1973 ESTIMATES



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LANGLEY RESEARCH CENTER

MISSION

The Langley Research Center strives to insure U. S. leadership in aeronautics and space by creating and applying new knowledge gained through a broad based research and technology development program. The program is organized to conduct basic and applied research in aeronautics, electronics, space, and structures. Major emphasis is given to developing systems concepts for a wide range of aeronautical and space vehicles; managing important national aerospace projects; providing consulting services and research assistance to other NASA organizations, Federal, state, and local Government agencies, industry, and the universities; and dissemination of research results to the scientific and technical community.

Langley directs an increasing and substantial portion of its research to developing advanced concepts and new technology on which future aircraft with favorable environmental effects and increased performance, range, and greater safety and economy will be based. The new technology includes such promising elements as the supercritical wing, composite structural materials, and automatic flight control systems. A concentrated effort is advancing the technology which supports a program to develop short takeoff and landing (STOL) airplanes and evolving systems for optimum terminal area and air traffic control integration.

Vigorous efforts continue to improve supersonic flight capabilities for both transport and military aircraft. Configurations under study attempt to maximize the favorable interference effects of aerodynamics, with advanced structures and propulsion. The advanced research program is also aimed at the technology required for aircraft performance in the hypersonic speed range.

The evolution of materials and structural systems to perform efficiently in critical temperature environments is in progress and practical methods for active cooling of high heat areas of aircraft surfaces are being developed. Research is also proceeding on the development of hypersonic ramjet engine technology.

In support of general aviation, Langley continues to work with the industry to identify and resolve problems for current designs, to consolidate data and techniques for new designs, to gather information for updating load requirements, and to develop new devices for high lift, control systems and gust alleviation to improve operational capabilities. Simplified low-cost electronic systems to aid stability, navigation, and collision warning are under development.

Other aeronautical research at Langley Research Center focuses on the critical problems of aircraft propulsion noise, detection, and alleviation of aircraft trailing vortices; improvement of landing gear, and increased traction and control under adverse weather conditions; and improved aircraft ride quality and comfort.

A large portion of the Center's skills and resources is assigned to managing important space flight projects. Langley has overall management responsibility for the NASA Viking project, which will orbit Mars and soft land unmanned instrumented vehicles on the planet in 1976. Viking will permit a detailed study of Martian geophysics, atmospheric characteristics, and surface properties. Especially significant are its experiments to indicate the presence of life forms. The support of Viking and other national space flight efforts is based on Langley's extensive experience and continuing contributions to advanced technology in such areas as atmosphere entry heat shielding, space vehicle recovery systems, rocket propulsion, instrumentation, and electronic equipment.

Langley is also responsible for procurement operation and improvement of the Scout launch vehicle in its application to national and international satellite experiments.

Space technology programs have been expanded to support the selection and development of manned systems such as the space shuttle and space station/base. They include mission flight mechanics, trajectory selection, vehicle configuration and performance, loads, structures, cryogenic tankage, thermal protection systems, on-board power systems, life support systems, and the development and integration of mission experiments.

Contributions will continue to be made to the technology of automated spacecraft, such as space telescopes, sensors and data handling for earth resources satellites, payloads for micrometeoroid and radiation environment surveys, as well as the definition of the upper atmosphere. The Langley Research Center is responsible for providing technology, as well as experiments for the Skylab program.

The Center's ground-based research program includes investigations of the effects of the environment on space vehicles, including heat, vacuum, noise, and meteoroids; development and application of advanced composite and polymeric materials to structures and thermal control systems; and improved technology for horizon sensing, antenna and power amplifiers, batteries, high capacity computer memories, logic circuits, and other advanced microelectronic devices.

Langley will continue its role of identifying promising applications of aerospace technology to public sector problems such as air, water, and noise pollution and ground transportation systems.

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DESCRIPTION

The Langley Research Center, Hampton, Virginia, is located approximately 100 air miles south of Washington, D.C. The Center occupies 795 acres of Government-owned land, divided into two areas by the runway facilities of Langley Air Force Base. The West Area consists of 772 acres, 430 owned by NASA and 342 under permit from the Air Force. The East Area comprises 23 acres under Air Force permit. Runways, some utilities, and certain other facilities are used jointly by NASA and the Air Force. In addition, there are 110 acres of NASA-owned land located in the City of Newport News, Virginia, 3,276 acres under permit from the Air Force, and 9 acres under lease. The total acreage presently owned, under permit, or leased, is 4,167. The total capital investment at the Langley Research Center, including fixed assets in progress, and contractor-held facilities at various locations as of June 30, 1971, was $426,073,000.

SUMMARY OF RESOURCES REQUIREMENTS

	FUNDS		
	1971	1972	1973
Personnel	$63,714,000	$66,024,000	$64,844,000
Travel	1,415,000	1,624,000	1,594,000
Facilities services	6,062,000	6,277,000	5,833,000
Technical services	397,000	355,000	371,000
Administrative support	3,693,000	3,647,000	3,637,000
Total, fund requirements	$75,281,000	$77,927,000	$76,279,000

	1971	1972	1973	Change in 1973
I. PERSONNEL	$63,714,000	$66,024,000	$64,844,000	$-1,180,000
A. Compensation and Benefits:				
1. Compensation:				
a. Permanent positions	$57,615,000	$59,235,000	$58,162,000	
b. Nonpermanent positions	549,000	650,000	650,000	

	1971	1972	1973
A. Compensation and Benefits (Cont'd.)			
1. Compensation (Cont'd.)			
c. Reimbursable details	$35,000	$42,000	$42,000
d. Overtime and other compensation.....	378,000	485,000	485,000
Subtotal, Compensation.	$58,577,000	$60,412,000	$59,339,000
2. Benefits	$4,824,000	$5,265,000	$5,100,000
Subtotal, Compensation and Benefits.....	$63,401,000	$65,677,000	$64,439,000
B. Supporting Costs:			
1. Transfer of personnel..	$23,000	$15,000	$15,000
2. Personnel training.....	290,000	332,000	390,000
Subtotal, Supporting Costs.....	$313,000	$347,000	$405,000
Total, Personnel and Related Costs.....	$63,714,000	$66,024,000	$64,844,000
1. Compensation.....	**$58,577,000**	**$60,412,000**	**$59,339,000**
a. Permanent Positions....	$57,615,000	$59,235,000	$58,162,000

The cost of compensation for permanent positions is the largest part of Personnel and Related Costs. The funds shown above will support 3,488 permanent positions in 1972 and 3,405 positions in 1973. This represents a reduction of 385 positions from 1971.

	1971	1972	1973
Permanent Positions by Program:			
Manned Space Flight			
Apollo.....	9	---	---
Space flight operations.....	114	109	107
Advanced manned missions.....	13	---	---

	1971	1972	1973
Permanent Positions by Program (Cont'd.)			
Space Science			
Physics and astronomy	36	69	68
Lunar and planetary exploration	230	315	315
Bioscience	2	---	---
Launch vehicle procurement	42	43	43
Space Applications	56	63	55
Aeronautics and Space Technology			
Aeronautical research and technology	1,186	1,217	1,226
Space research and technology	786	517	476
Nuclear power and propulsion	33	8	8
Tracking and Data Acquisition	33	16	16
Subtotal, positions by program	2,540	2,357	2,314
Indirect Positions			
Director and staff	11	11	11
Administrative support	465	431	421
Research and development support	774	689	659
Subtotal, indirect positions	1,250	1,131	1,091
Total, permanent positions	3,790	3,488	3,405
Other Than Permanent Positions	250	250	250
Total	4,040	3,738	3,655

The above table illustrates the use to which permanent positions are put. The distribution by occupation of these positions illustrates a significant characteristic of the Langley work force. Professional engineers and scientists comprise about 43% of the Center work force. Technicians and technically oriented wage board employees, working in direct support of the professional technical staff, make up another 42% of the complement. The following table summarizes the Center's work force by occupational group:

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	1,598	42.2	1,508	43.2	1,458	42.8
Technicians.....	1,534	40.5	1,346	38.6	1,313	38.6
Wage board.....	92	2.4	87	2.5	87	2.6
Professional administrative.....	202	5.3	195	5.6	195	5.7
Clerical.....	364	9.6	352	10.1	352	10.3
Total.....	3,790	100.0	3,488	100.0	3,405	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In 1973 the cost of permanent positions will be $58,162,000, a reduction of $1,073,000 from 1972. This reduction results as follows:

Cost of permanent positions in 1972.....		$59,235,000
Cost increases in 1973.....		**+1,610,000**
Within grade advances and career development:		
Full year effect of 1972 actions.....	**$900,000**	
Partial year effect of 1973 actions.....	**710,000**	
Cost decreases in 1973.....		**-2,683,000**
Abolished positions:		
Full year effect of 1973 actions.....	$-1,562,000	
Partial year effect of 1973 actions.....	-603,000	
Decrease in days paid in 1973.....	-446,000	
Turnover savings.....	-72,000	
Cost of permanent positions in 1973.....		$58,162,000

Other Compensation Costs

	1971	1972	1973
b. **Nonpermanent positions**.....	**$549,000**	**$650,000**	**$650,000**

The 1972 and 1973 plans include 250 nonpermanent positions each year; 56 of these positions are required for a variety of programs, the largest of which is NASA summer employment. Langley hires college students during the summer to provide these people with exposure to NASA programs and government operations. Langley benefits from the employment of these individuals and the education and training they receive are considerable assets to themselves and to the nation.

One hundred positions are used for participation in the President's Youth Opportunity Campaign. This enables disadvantaged youths, the majority of which are from minority groups, to work in unskilled positions at NASA installations.

Work-study cooperative training programs account for 75 of the nonpermanent positions. They provide significant training opportunities for technically oriented students by supplementing classroom instruction with practical experience. The program is an excellent source for recruiting individuals where requirements exist for highly specialized training.

The remaining 19 positions are used to employ individuals of varying skills to meet temporary requirements, usually less than six months. These positions are used only when the need is of such short duration that employment in a permanent position would be impractical.

	1971	1972	1973
c. Reimbursable Details....	$35,000	$42,000	$42,000

The services of a small group of military officers and civilian detailees from other Government agencies are utilized in Langley's programs where such assignments are of mutual benefit. In accordance with existing agreements, Langley reimburses the parent organization for the salaries and related costs of the detailees.

	1971	1972	1973
d. Overtime and Other Compensation	$378,000	$485,000	$485,000

The use of overtime and other compensation is limited to emergency repairs and work that cannot be accomplished during normal working hours. This includes the monitoring of on-site contracts being performed during off-duty hours and wind tunnel work required at night because of power limitations during the normal high peak hours of day.

2. Benefits.....	$4,824,000	**$5,265,000**	**$5,100,000**

In addition to compensation, NASA makes an employer's contribution to **personnel benefits as authorized and required by law. The cost of benefits is $165,000 lower in 1973 than in 1972 because of the reductions in civil service personnel and in the estimated cost of severance pay in 1973. The following table indicates the costs of personnel benefits by the major categories:**

	1971	1972	1973
Category of Cost			
Contribution to the Civil Service Retirement Fund.....	$4,030,000	$4,371,000	$4,261,000
Contribution for employee life insurance.....	222,000	236,000	234,000
Contribution for employee health insurance.....	492,000	530,000	547,000
Contribution to FICA.....	20,000	22,000	22,000
Incentive awards.....	21,000	22,000	22,000
Other personnel benefits.....	14,000	14,000	14,000
Severance pay.....	25,000	70,000	---
Total.....	$4,824,000	$5,265,000	$5,100,000
B. Supporting Costs.....	$313,000	$347,000	$405,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment, and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel.....	$23,000	$15,000	$15,000

The 1966 legislation provided that the Government would pay for certain relocation costs. Included in these costs are the actual travel expenses involved in the movement of the employee and movement of his household goods.

2. Personnel training.....	$290,000	$332,000	$390,000

The maintenance and expansion of the skills of personnel are essential in carrying out the Center's many complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training consists of courses offered by other Government agencies, usually for a fee. The remainder of the training is provided through non-Governmental sources; the cost is for tuition, fees, and related expenses for training at colleges, universities, and technical institutes; and for the cost of seminars and workshops in which groups of NASA employees receive training in subjects of agencywide interest. The increase indicated for 1973 results from the requirement of additional training for aircraft pilots. It is necessary for all these pilots to have specific test pilot training prior to assuming test pilot duties. This training enables them to better report and analyze behavior of the aircraft being tested.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$1,415,000	$1,624,000	$1,594,000	$-30,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$1,052,000	$1,271,000	$1,157,000
2. Flight mission support.....	118,000	143,000	130,000
3. Overseas travel to launch and tracking sites.....	12,000	16,000	13,000
Subtotal.....	$1,182,000	$1,430,000	$1,300,000
B. Meetings and Technical Seminars			
1. Government sponsored meetings.	$66,000	$46,000	$85,000
2. Other than government sponsored meetings and technical seminars.....	76,000	54,000	98,000
Subtotal.....	$142,000	$100,000	$183,000
C. Administrative Travel.....	$91,000	$94,000	$111,000
Total, Travel.....	$1,415,000	$1,624,000	$1,594,000
A. Program Related Travel.....	$1,182,000	$1,430,000	$1,300,000
1. Direction, coordination, and management of programs.....	$1,052,000	$1,271,000	$1,157,000

Space Projects

The Viking Program, for which Langley has project management responsibility, will be the first United States mission to land on Mars. The landings are scheduled for 1976. This project involves Lander Systems Development and Systems Integration by the Martin Company, Denver, Colorado; Orbiter System Development by Jet Propulsion Laboratory in Pasadena, California; Launch Vehicle System Development by Lewis Research Center, Cleveland, Ohio; and a large number of scientists and major subcontractors at a wide number of geographical locations. Final design and many hardware fabrication activities will be peaking in 1973. Pre-flight planning activities at the Kennedy Space Center launch site and the Jet Propulsion Laboratory Space

Flight Operations Facility will be accelerating in pace. Langley travel requirements for Viking will grow from about $550,000 in 1972 to about $650,000 in 1973 to keep pace with the increasing project tempo.

Langley is playing a major role in development of technologies being factored into NASA's space shuttle decisions in 1973. Key technology support to Shuttle will continue to require travel at the 1972 planned level of about $90,000 as final systems design and contractors are selected.

The on-going Langley-managed Scout launch vehicle project will require a level for program management travel (exclusive of flight mission support) of about $50,000 (jointly funded with DOD).

These space projects require a majority of the travel funds in this category.

Aeronautics Projects

Major on-going or newly emerging aeronautics projects, and general aeronautics research programs, will require increasing travel in accordance with the increasing agency Aeronautics R&D funding levels in 1973 and will expend a majority of the remaining travel funds in this category. Major aeronautics programs planned in 1973 are:

QUESTOL, a flight research program to develop technology for a quiet STOL aircraft that is managed by the Ames Research Center but with direct project support from Langley; an Advanced Supersonic Technology Program in which Langley will play the lead role with strong involvement of other Centers; Vectored In Forward Flight (VIFF), a joint United States-United Kingdom program coordinated with the United States Marine Corps to develop techniques for exploiting maneuverability capability of thrust vectoring using the Harrier fighter as research test system; Advanced Fighter Technology Development involving a joint effort with the Navy and the Air Force; a Rotor Systems Research Aircraft, to develop new rotor concepts in a joint NASA/Army program led by Langley; Lift Fan Transport studies with heavy Langley involvement on a task team directed by Ames to assess the future potential of this type of aircraft and develop future research plans; Advanced Technology Transport studies managed by Langley which will continue with several large industry contracts supplemented by special technical studies; Hypersonic Research Aircraft technology development to define a research aircraft which, like the X-1 through X-15 series, would provide research flight data that could be applied to an air-breathing launch vehicle, commercial transport, or military aircraft of the future.

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Other aeronautics systems-related research programs include Active Control Technology for gust or load alleviation and improved aircraft handling qualities; Vehicle Requirements aspects of Air Traffic Control Systems; Noise Reduction Research; Automated Take-Off and Landing (ATOL) systems for conventional and vertical take-off and landing machines (CTOL and VTOL); and examination of new facility requirements, on an inter-Center-inter-Agency basis, such as large high Reynolds number subsonic and transonic wind tunnels.

These aeronautics projects involve a broad matrix of technical disciplines including aerodynamics, structures and structural dynamics, materials, control systems, and avionics.

Due to the heavy travel demands of the major space and aeronautics programs, availability of travel funds to support technology applications, basic research, and general research and technology programs will continue to be severely curtailed.

Langley's current programs (exclusive of Viking, Scout and Shuttle) involve about 1,000 significant (over $10,000) contracts and grants with a dollar value of over $100 million placed in over 40 states. Over 200 of these contracts and grants, with a value of more than $12 million, were with more than 50 academic institutions.

Program travel is required to achieve the most effective utilization of the scientific, engineering and funding resources available to carry out Langley's research and development responsibilities in accordance with the program plans authorized by Congress.

	1971	1972	1973
2. Flight Mission Support.....	$118,000	$143,000	$130,000

These funds are required to support pre-launch planning, launch, and post-launch operations for space flight projects. The 1973 level is consistent with the currently planned launch schedule of three Scout vehicles from domestic launch sites, including the Langley Meteoroid Technology Satellite, and several small flight experiment launches including flight tests at the White Sands Missile Range supporting Viking Lander Decelerator System development. This category also includes planning and operations of aircraft flight research tests supporting aeronautics projects such as runway traction, noise abatement, vehicle interactions with terminal area air traffic control systems, thrust vectoring, and ride quality studies.

	1971	1972	1973
3. Overseas Travel to Launch and Tracking Sites.....	$12,000	$16,000	$13,000

This travel is primarily in support of overseas launches and reflects a planned Scout launch in 1973 from the San Marco launch site in Africa.

B. Meetings and Technical Seminars....	$142,000	$100,000	$183,000

Travel to meetings and technical seminars is an essential part of the effective utilization of Langley resources. Meeting travel is a principal means by which:

1. Inter-Center and inter-Agency joint programs are coordinated.

2. Langley technical knowledge is focused on and applied to solution of national problems.

3. Research technology is exchanged and transferred to users.

4. Unnecessary program duplication is avoided through exchange of information on research program results and future plans.

The 1972 budget level for meeting travel allows Langley to send, on the average, each professional scientist or engineer to a meeting once every three to five years. Since it is necessary for our key personnel to attend meetings much more frequently, many working level professionals are not attending any meetings. In 1971, Langley scientists and engineers presented about 270 technical papers at technical society symposia and a lesser number are currently planned for 1972. The limiting factor on the number of papers being presented is the availability of travel funds rather than the capability of the Center's staff to produce significant papers acceptable to the societies. These facts, coupled with the increasing need for our scientists and engineers to achieve effective information exchange with their peers in the technological community has led to a Langley management decision to increase the level of the travel budget allocated to this vital function in 1973.

Meeting travel is categorized by sponsorship as noted in the summary total. The objectives of travel in each category are similar with more emphasis on program coordination in Government sponsored meetings.

	1971	1972	1973
C. Administrative Travel.....	$91,000	$94,000	$111,000

Administrative travel is necessary for the direction and coordination of general management matters. It includes travel by senior Center officials as well as managers in areas such as personnel, financial management and procurement. The increasing complexity of administrative management problems will require an increase in this type of travel in 1973.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES.....	$6,062,000	$6,277,000	$5,833,000	$-444,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Rental of real property.....	$2,000	$2,000	$2,000
2. Minor rehabilitation and modification, and construction.....	166,000	240,000	---
Subtotal.....	$168,000	$242,000	$2,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$1,327,000	$1,305,000	$1,146,000
2. Maintenance of equipment.....	142,000	140,000	120,000
3. Custodial services.....	1,139,000	1,140,000	1,000,000
Subtotal.....	$2,608,000	$2,585,000	$2,266,000
C. Operation of Facilities			
1. Utilities.....	$1,789,000	$2,075,000	$2,215,000
2. Supplies and equipment.....	1,497,000	1,375,000	1,350,000
Subtotal.....	$3,286,000	$3,450,000	$3,565,000
Total, Facilities Services.....	$6,062,000	$6,277,000	$5,833,000
A. Acquisition of Facilities.....	$168,000	$242,000	$2,000
1. Rental of real property.....	$2,000	$2,000	$2,000

Obligations under this subfunction cover the rental of trailers for temporary office and laboratory space for small temporary work groups of NASA employees when permanent space is not available. The rental of two trailers for six months is anticipated during the budget year.

	1971	1972	1973
2. Minor rehabilitation and modification, and construction.....	$166,000	$240,000	---

Minor construction projects are to be funded from the Construction of Facilities appropriation in 1973 for projects in excess of $10,000.

B. Maintenance and Related Services...	$2,608,000	$2,585,000	$2,266,000
1. Maintenance of buildings and grounds.....	$1,327,000	$1,305,000	$1,146,000

This reduced level of maintenance is required in order to prevent the deterioration of facilities and grounds currently valued at nearly $300 million. Maintenance costs are high because of the facilities' advanced age and heavy usage. Half of the facilities are over 20 years old and facility utilization has consistently been 100%.

The 1973 estimate includes maintenance costs for grounds of approximately 881 acres, and the maintenance costs for approximately 2,658,000 square feet of space in 213 buildings, and 16 electrical substations.

2. Maintenance of equipment.....	$142,000	$140,000	$120,000

This subcategory includes maintenance of instruments, as well as office and shop equipment. The 1973 estimate reflects a minimal level of effort to support this Center's office and shop equipment of over 30,000 items.

3. Custodial Services.....	$1,139,000	$1,140,000	$1,000,000

This subcategory includes estimates for the cost for janitorial, cleaning, protective, security, and refuse handling services. The major portion of the decrease shown in the 1973 estimate reflects a decrease in manpower for the custodial contract. The custodial contract involves approximately 110 man-years of effort. The level of custodial effort in 1973 is considered the minimum commensurate with efficient operations of this Center. Over 2,163,000 square feet of space, and is located in 117 buildings and 84 trailers must be custodially serviced.

Security guard services are provided by a support service contract involving 43 manyears of effort annually comprising principally a two-shift operation.

	1971	1972	1973
C. Operation of Facilities	$3,286,000	$3,450,000	$3,565,000
1. Utilities.....	$1,789,000	$2,075,000	$2,215,000

These estimates include the cost of electricity, gas, water, and sewage disposal. A recently negotiated contract with VEPCO for electrical power provided for an estimated 15% increase in power costs in 1972 with a corresponding increase in 1973. Over half of this electrical power is used to operate specific major wind tunnels with an additional one-fourth of this power going to operate smaller research facilities and equipment. The cost of other utilities used for research and administrative support has also increased for the same level of usage.

The 1973 estimate for the consumption of utilities includes anticipated usages of over 270 million kilowatt hours of electrical power, 64 thousand cubic feet of natural gas, and over 291 million gallons of water.

2. Supplies and equipment.....	$1,497,000	$1,375,000	$1,350,000

This subcategory includes chemicals, electronic materials, fuels and lubricants, general services materials, instrumentation, metals, pipes, valves, and fittings. It also includes mechanical, laboratory, electrical, and electronic equipment in addition to shop machinery and non-capitalized equipment.

These supplies and equipment are associated with the maintenance costs in carrying out preventive maintenance. Approximately one-third of the supplies and materials included in this subfunction are stock items or general services materials. This comprises approximately 20% of the total stock issues required to support daily operations. Purchases of fuel oil, used to provide heat and steam for the facilities, account for approximately one-third of the 1973 estimate.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$397,000	$355,000	$371,000	$+16,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$8,000	$8,000	$8,000
2. Maintenance of equipment.....	36,000	40,000	40,000
Subtotal, equipment.....	$44,000	$48,000	$48,000

	1971	1972	1973
3. Programming and operation services.....	$196,000	$210,000	$210,000
Subtotal.....	$240,000	$258,000	$258,000
B. Engineering Services.....	$77,000	$75,000	$88,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$9,000	$10,000	$8,000
2. Educational/information programs.....	71,000	11,000	16,000
3. Scientific and technical information.....	---	1,000	1,000
Subtotal.....	$80,000	$22,000	$25,000
Total, Technical Services.....	$397,000	$355,000	$371,000
A. Automatic Data Processing.....	$240,000	$258,000	$258,000
1. Lease of equipment.....	$8,000	$8,000	$8,000

This includes the lease of a more efficient off-line printer for use with other computers.

2. Maintenance of equipment.....	$36,000	$40,000	$40,000

This covers the maintenance contract to maintain the administrative computer system and its associated equipment.

3. Programming and operations services.....	$196,000	$210,000	$210,000

This requirement includes the cost of 17 manyears of contractual effort for administrative computer design, programming, operations, and document conversion. These services are required for operation of the administrative and financial management systems computers. This ADP equipment is not dedicated to specific research or operational systems but rather is used to maintain financial transactions and other business records.

	1971	1972	1973
B. Engineering Services.....	$77,000	$75,000	$88,000

Estimates include engineering services for reliability and quality assurance studies; maintenance projects, special tooling, equipment and machine parts; and other related engineering services. The increase shown for 1973 reflects known cost increases for the same services at the same level of effort. These services are necessary to provide reliable design work for required maintenance of facilities. The costs of six manyears of contractual effort for engineering design and drafting services are included in the 1973 estimate.

C. Scientific and Technical Information and Educational Programs.....	$80,000	$22,000	$25,000
1. Operation of NASA technical libraries.....	$9,000	$10,000	$8,000

These estimates include costs of technical documentation services required to provide the necessary publications for the operation of the Center's library. Services include the key punching into the library's computerized index system of analytical data for approximately 5,000 new reference items annually.

2. Educational/informational programs.....	$71,000	$11,000	$16,000

These estimates include costs for press kits, news releases, television and radio information tapes and clips, and feature material for motion pictures to enable this Center to fulfill its Educational Information Program responsibilities in the states of Virginia, West Virginia, Kentucky, North Carolina, and South Carolina.

The 1973 estimate is based on plans, appropriately constrained to conform to government-wide directives in this area, and for the continuance of this effort at essentially the same level as in the current year. The 1973 estimate reflects known increases in costs for services.

3. Scientific and technical information.....	---	$1,000	$1,000

This includes translating services which are necessary in order for personnel to use research publications of other countries. This requires the translation of approximately one hundred documents each year.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT...	$3,693,000	$3,647,000	$3,637,000	$-10,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$235,000	$270,000	$285,000
2. Local telephone service.....	519,000	610,000	620,000
3. Other communications.....	9,000	10,000	15,000
Subtotal.....	$763,000	$890,000	$920,000
B. Administrative Printing.....	$202,000	$215,000	$340,000
C. Supplies, Materials, and Equipment			
1. Supplies and materials.....	$715,000	$555,000	$403,000
2. Equipment.....	109,000	90,000	70,000
Subtotal.....	$824,000	$645,000	$473,000
D. Transportation			
1. Center operations.....	$350,000	$293,000	$300,000
2. Common carrier.....	238,000	220,000	220,000
Subtotal.....	$588,000	$513,000	$520,000
E. Administrative Support Services			
1. Installation support services.	$1,281,000	$1,349,000	$1,349,000
2. Medical services.....	35,000	35,000	35,000
Subtotal.....	$1,316,000	$1,384,000	$1,384,000
Total, Administrative Support.....	$3,693,000	$3,647,000	$3,637,000
A. Communications.....	$763,000	$890,000	$920,000
1. Leased lines and long distance tolls.....	$235,000	$270,000	$285,000

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These estimates include the cost of 12 IDS lines to Washington, D.C., and two constant use business lines to Norfolk, Virginia. The C&P Telephone Company of Virginia has increased the rate 10% during 1972 and the 1973 estimates include this increase. Langley conducts business in nearly all other states and the leased lines and long distance services are required to effectively manage and coordinate the research programs and business operations. These services are continually reviewed, to insure that costs are maintained at the lowest practical level.

	1971	1972	1973
2. Local telephone service.....	$519,000	$610,000	$620,000

Includes local telephone and exchange service, as well as the maintenance, repair, installation, and relocation of telephones. The C&P Telephone Company of Virginia has increased its rates by 30% during 1972. In addition, the recently negotiated contract between the telephone company and its union provides for 26% graduated rate increases over its three year term. The 1973 estimate reflects these known cost increases, resulting from these factors.

3. Other communications.....	$9,000	$10,000	$15,000

Services under this subcategory include datafax and telegraph services. These services are part of the communications network essential to effective operation of the Center. The increase in cost for these services for 1973 shown in the estimate reflects known and anticipated rate increases for these services.

B. Administrative printing.....	$202,000	$215,000	$340,000

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions are included.

The projected increase for 1973 reflects the planned use of contractual services to accomplish these services. The increased use of contractors is the result of recent legislation under Title 44 of the U.S. Code which, in effect, causes the elimination of a substantial portion of in-house printing and reproduction capability. These services are required not only for the publication of research documents but also reproduction of documents used in the procurement process. Approximately 70% of the administrative printing workload is performed for NASA Headquarters and other Centers. The budget year estimate includes anticipated costs for printing for over 60 million page units.

	1971	1972	1973
C. Supplies, Materials, and Equipment.....	$824,000	545,000	$473,000
1. Supplies and materials.....	$715,000	$555,000	$403,000

These estimates include general maintenance materials, office supplies, and photographic equipment. These supplies are the basic tools for the daily operation for both research and business.

The decrease in cost reflects tight constraints designed to reduce these costs to the lowest possible level.

2. Equipment.....	$109,000	$90,000	$70,000

This includes photographic, training, and office equipment. Procurement under this subcategory has been reduced to the lowest practical level. A modest amount, as indicated by the budget year estimate, must be purchased each year to support certain elements of Center operations. The 1973 estimate includes the necessary replacements for administrative office equipment.

D. Transportation.....	$588,000	$513,000	$520,000
1. Center operations.....	$350,000	$293,000	$300,000

These estimates include the cost of local transportation and rental of passenger motor vehicles; the maintenance, repair, and storage of vehicles; as well as aircraft servicing; and the purchase of motor vehicles and their supporting supplies and materials.

The rental and purchase of equipment, as well as the support services covered under this subcategory, are essential to the operation of the Center. For example, the purchase of vehicles are required to transport Center employees to Washington, D.C., and to other locations when it is most economical to do so. The local transportation contract, which accounts for $193,000 of the estimate, is required because the Center is spread over a total of 772 acres which are divided into two areas approximately three miles apart. This is a 16 manyear of effort contract which also includes the cost of the contractor's taxi vehicles.

Aircraft servicing costs, estimated at $35,000 for 1973 are required for this Center's one administrative aircraft which also serves NASA Headquarters personnel. Supplies and materials costs under this category are for this aircraft and for the Center's 99 motor vehicles.

	1971	1972	1973
2. Common carrier.....	$238,000	$220,000	$220,000

This includes freight, rail, and truck shipments and local movement services. The 1973 estimate actually reflects a reduced level of service accompanied by projected increased cost rates. Local delivery service is required in order to handle and distribute the mail and other communications for the Center. This contract is for 24 manyears of effort estimated to cost over $200,000 during the budget year. This contract also includes the cost of the contractor's delivery vehicles.

E. Administrative Support Services..	$1,316,000	$1,384,000	$1,384,000
1. Installation Support Services	$1,281,000	$1,349,000	$1,349,000

Includes rigging, hauling, and warehousing services, chart related work, management surveys as well as other service contracts. Included in this category are:

Rigging and hauling services for 15 manyears of effort. This contract provides for the installation and transportation of test models, research equipment and other materials.

Transportation hauling services for 36 manyears of effort. This service provides for the transportation equipment, instruments, and materials required in conducting daily operations.

Warehousing services for 38 manyears of effort. Services provided by this contract include shipping, receiving, warehousing, and supply.

These services account for over 60% of the 1973 estimates.

The remaining services include chart work, management surveys as well as technical documentation. The largest of these services relates to technical documentation involving hundreds of small contracts for specific research papers.

2. Medical Services.....	$35,000	$35,000	$35,000

Includes employee physical examinations and other medical services necessary to maintain the health of employees. Included in these services are medical exams for employees working with potentially dangerous radiation sources such as X-ray machines and lasers.

Approximately 575 medical examinations of various types will be required for personnel during 1973.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Organization and staffing chart
LANGLEY RESEARCH CENTER

STAFFING SUMMARY

	72	73
Excepted	32	32
GS-16	31	29
GS-15	210	210
GS-14	296	297
Other GS	2832	2750
Wage Grade	87	87
Total	3488	3405

OFFICE OF DIRECTOR

	72	73
Excepted	4	4
GS-16	1	1
GS-15	1	1
Other GS	5	5
Total	11	11

VIKING PROJECT OFFICE

	72	73
Excepted	2	2
GS-16	1	1
GS-15	20	20
GS-14	30	30
Other GS	80	80
Total	133	133

DIRECTOR FOR CENTER DEVELOPMENT AND EXTERNAL AFFAIRS

	72	73
Excepted	1	1
GS-16	1	1
GS-15	3	3
GS-14	2	2
Other GS	16	15
Total	23	22

OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION PROGRAMS

	72	73
GS-15	1	1
GS-14	1	1
Other GS	63	61
Wage Grade	24	24
Total	89	87

DIRECTOR FOR ELECTRONICS

	72	73
Excepted	1	1
GS-14	1	1
Other GS	2	2
Total	4	4

FLIGHT DYNAMICS AND CONTROL DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	6	6
GS-14	10	10
Other GS	57	55
Total	77	75

ANALYSIS AND COMPUTATION DIVISION

	72	73
Excepted	1	1
GS-16	2	2
GS-15	7	7
GS-14	9	9
Other GS	115	112
Total	134	131

FLIGHT INSTRUMENTATION DIVISION

	72	73
Excepted	1	1
GS-15	14	14
GS-14	25	25
Other GS	178	172
Total	218	212

INSTRUMENT RESEARCH DIVISION

	72	73
Excepted	1	1
GS-16	1	1
GS-15	4	4
GS-14	14	14
Other GS	162	157
Total	182	177

DIRECTOR FOR STRUCTURES

	72	73
Excepted	2	2
GS-15	1	1
Other GS	2	2
Total	5	5

LOADS DIVISION

	72	73
Excepted	1	1
GS-16	2	2
GS-15	12	12
GS-14	23	23
Other GS	67	63
Total	105	101

STRUCTURES DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	11	11
GS-14	14	14
Other GS	57	55
Total	86	84

MATERIALS DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	7	7
GS-14	7	7
Other GS	53	51
Total	71	69

DIRECTOR FOR AERONAUTICS

	72	73
Excepted	2	2
GS-16	2	1
GS-14	1	1
Other GS	2	3
Total	7	7

LOW SPEED AIRCRAFT DIVISION

	72	73
Excepted	1	1
GS-15	11	11
GS-14	11	11
Other GS	51	49
Total	74	72

HIGH SPEED AIRCRAFT DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	21	21
GS-14	13	13
Other GS	90	85
Total	128	123

HYPERSONIC VEHICLES DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	17	17
GS-14	11	11
Other GS	83	81
Total	115	113

RESEARCH AIRCRAFT FLIGHT DIVISION

	72	73
Excepted	1	1
GS-15	6	6
GS-14	9	9
Other GS	52	52
Wage Grade	2	1
Total	70	69

ADVANCED TRANSPORT TECHNOLOGY OFFICE

	72	73
GS-15	4	4
GS-14	3	3
Other GS	6	6
Total	13	13

DIRECTOR FOR SPACE

	72	73
Excepted	2	2
GS-14	0	1
Other GS	3	2
Total	5	5

SPACE TECHNOLOGY DIVISION

	72	73
Excepted	1	1
GS-16	2	2
GS-15	14	14
GS-14	19	19
Other GS	67	64
Total	103	100

ENVIRONMENTAL AND SPACE SCIENCES DIVISION

	72	73
Excepted	1	1
GS-16	1	0
GS-15	10	10
GS-14	12	12
Other GS	45	44
Total	69	67

SPACE SYSTEMS DIVISION

	72	73
Excepted	1	1
GS-16	2	2
GS-15	7	7
GS-14	19	19
Other GS	65	63
Total	94	92

SCOUT PROJECT OFFICE

	72	73
GS-15	3	3
GS-14	8	8
Other GS	22	21
Total	33	32

DIRECTOR FOR ADMINISTRATION

	72	73
Excepted	2	2
GS-15	4	4
GS-14	2	2
Other GS	4	4
Total	12	12

PROGRAMS AND RESOURCES DIVISION

	72	73
GS-16	1	1
GS-14	1	1
Other GS	13	13
Total	15	15

MANAGEMENT INFORMATION SYSTEMS DIVISION

	72	73
GS-15	1	1
GS-14	1	1
Other GS	20	18
Total	22	20

MANAGEMENT SUPPORT DIVISION

	72	73
GS-14	1	1
Other GS	84	82
Total	85	83

FINANCIAL MANAGEMENT DIVISION

	72	73
GS-15	1	1
GS-14	1	1
Other GS	68	66
Total	70	68

PERSONNEL DIVISION

	72	73
GS-15	1	1
GS-14	2	2
Other GS	48	48
Total	51	51

PROCUREMENT DIVISION

	72	73
Excepted	1	1
GS-15	1	1
GS-14	6	6
Other GS	73	71
Total	81	79

DIRECTOR FOR SYSTEMS ENGINEERING AND OPERATIONS

	72	73
Excepted	1	1
GS-15	2	2
GS-14	4	4
Other GS	19	18
Total	26	25

FABRICATION DIVISION

	72	73
GS-14	3	3
Other GS	486	476
Wage Grade	4	3
Total	493	482

FACILITIES AND EQUIPMENT ENGINEERING DIVISION

	72	73
GS-15	8	8
GS-14	16	16
Other GS	151	147
Total	175	171

OPERATIONS SUPPORT DIVISION

	72	73
GS-15	1	1
GS-14	2	2
Other GS	427	413
Wage Grade	57	59
Total	487	475

SYSTEMS ENGINEERING DIVISION

	72	73
GS-15	11	11
GS-14	15	15
Other GS	96	94
Total	122	120

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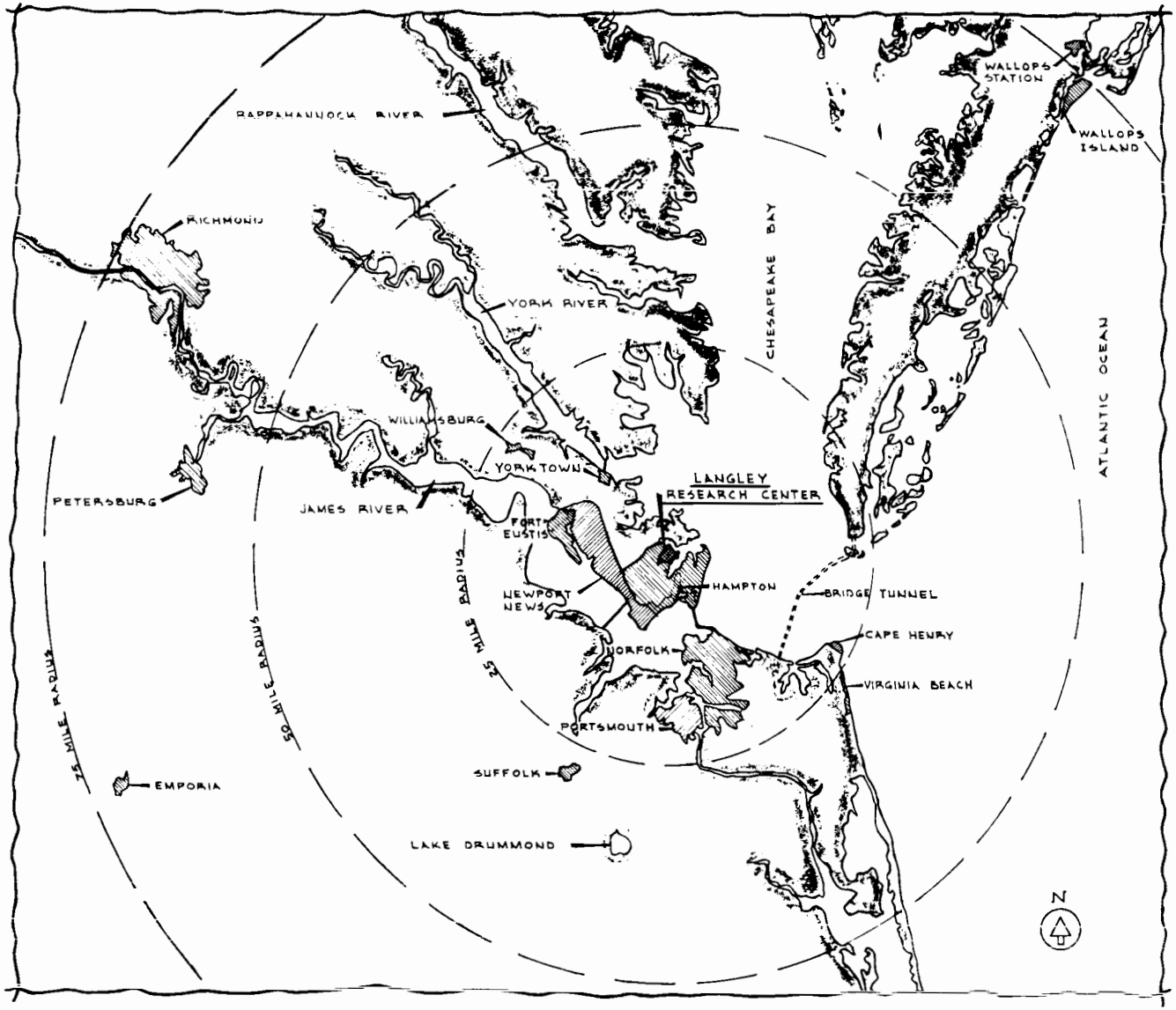


LANGLEY RESEARCH CENTER AND VICINITY

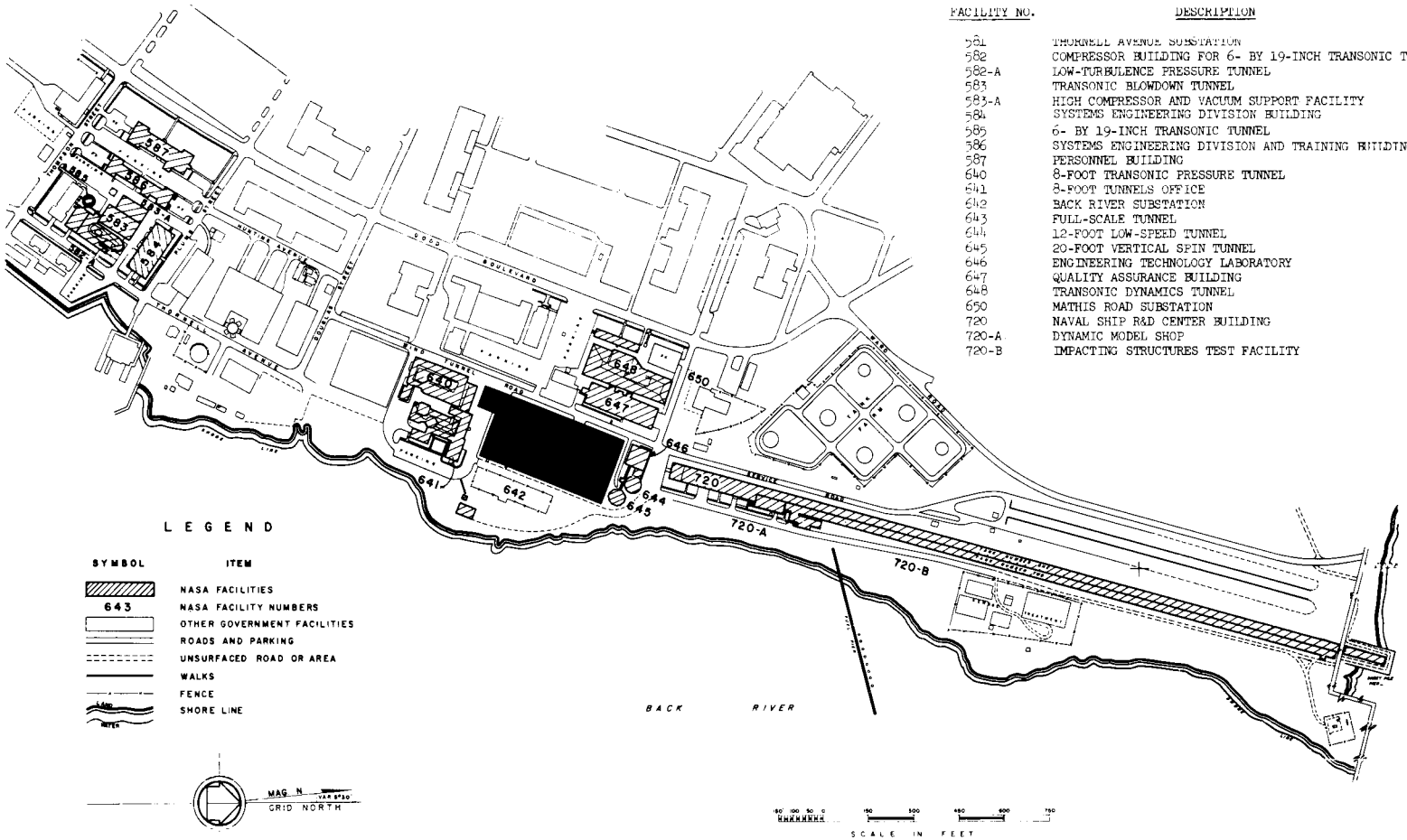
1" = 8 MILES

LANGLEY RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

PROPOSED FY 1973 PROJECTS [redacted]

Location Plan

1. REPAIRS TO THE FULL SCALE TUNNEL



FACILITY NO.	DESCRIPTION
581	THORNELL AVENUE SUBSTATION
582	COMPRESSOR BUILDING FOR 6- BY 19-INCH TRANSONIC TUNNEL
582-A	LOW-TURBULENCE PRESSURE TUNNEL
583	TRANSONIC BLOWDOWN TUNNEL
583-A	HIGH COMPRESSOR AND VACUUM SUPPORT FACILITY
584	SYSTEMS ENGINEERING DIVISION BUILDING
585	6- BY 19-INCH TRANSONIC TUNNEL
586	SYSTEMS ENGINEERING DIVISION AND TRAINING BUILDING
587	PERSONNEL BUILDING
640	8-FOOT TRANSONIC PRESSURE TUNNEL
641	8-FOOT TUNNELS OFFICE
642	BACK RIVER SUBSTATION
643	FULL-SCALE TUNNEL
644	12-FOOT LOW-SPEED TUNNEL
645	20-FOOT VERTICAL SPIN TUNNEL
646	ENGINEERING TECHNOLOGY LABORATORY
647	QUALITY ASSURANCE BUILDING
648	TRANSONIC DYNAMICS TUNNEL
650	MATHIS ROAD SUBSTATION
720	NAVAL SHIP R&D CENTER BUILDING
720-A	DYNAMIC MODEL SHOP
720-B	IMPACTING STRUCTURES TEST FACILITY

EAST AREA

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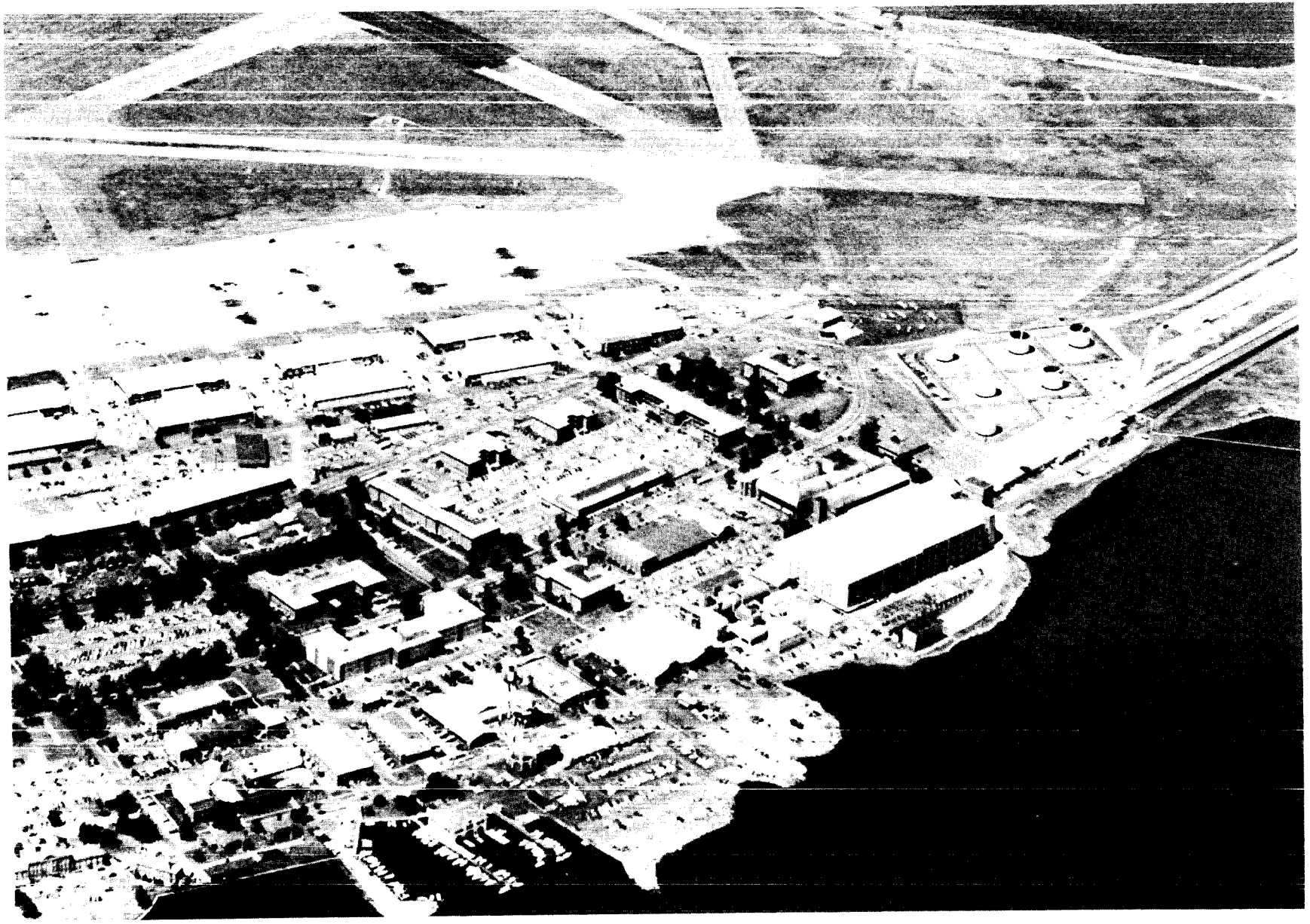
LANGLEY RESEARCH CENTER



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LANGLEY RESEARCH CENTER

RPW 187

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

LEWIS RESEARCH CENTER

MISSION

The Lewis Research Center's principal mission is research and technology in the areas of Propulsion and Electric Power Generation Systems for aircraft and spacecraft. The emphasis is predominantly on research and technology; however, the entire spectrum of activities is undertaken from basic research to development. The scope of technology ranges from work on individual components through complete systems. Most of the critical areas which limit the performance of engines and power systems are the subjects of in-house research effort at this Center. Research by commercial and university laboratories is also conducted under contracts directed by Lewis Research Center personnel.

For NASA missions, Lewis is responsible for Centaur launches of medium weight spacecraft on high energy missions, particularly lunar, planetary and synchronous orbits; for increases in the Centaur reliability and mission flexibility by introduction of an updated improved Centaur stage; for providing additional vehicle performance capability in support of the Viking and subsequent missions by integration of the Titan III booster with the Centaur stage to demonstrate this capability in an engineering flight test (proof flight).

Lewis research is also supporting many other projects. Examples are: The Advanced Technology Transport (ATT), Vertical-lift fans for VTOL applications, externally blown flaps and augmentor wing concepts for STOL aircraft. The engine technology for these applications requires new engine configurations for which the technology has not yet been established. One element of the in-house program is to determine the effects of cross flow on high pressure ratio lift-fans. This is being done in the V/STOL research section of the 8x6 Foot Transonic Wind Tunnel.

High performance engines are presenting an increased requirement for finding means to reduce aircraft noise. Lewis is conducting in-house research to identify noise sources and to develop prototype noise reducing components, particularly for engine inlets, exhaust nozzles and VTOL or STOL systems. A full-scale Quiet Engine has been built, by contract, and will be evaluated at the Engine Noise Test Stand. The Quiet Fan Test Stand continues to provide valuable data in that area of noise reduction research.

Aircraft engines for future subsonic and supersonic aircraft will incorporate high compressor pressure ratios and high turbine inlet temperatures. A large part of the aeronautics research effort at Lewis is directed toward solving the problems imposed by these two factors. Among these research efforts are: Compressor casing treatment to

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increase compressor off-design performance; cooled turbine blades; high-speed bearings, seals, and lubricants for operation at high temperature; engine inlets; engine exhaust nozzles, combustor configurations; high energy fuels; and engine controls.

The problems of high flight Mach number aircraft engines are also being investigated. This research spans the problems of inlets, combustion, nozzles, and engine systems. A new facility at Plum Brook allows experiments on full-scale ramjet engines at speeds up to Mach 7.

A flight test program is being conducted with an F-106 airplane to determine the interaction of engine inlets and exhaust nozzles with wings and fuselage at transonic speeds. These flight tests complement wind tunnel tests which have limited capability in simulating the engine-airframe interactions at transonic speeds.

An experimental flight program will be carried out utilizing the YF-12 aircraft in cooperation with the Flight Research Center. The flight tests will determine static performance and dynamic characteristics of the inlet and the dynamic interaction between the propulsion system and the airframe.

A joint program with the Air Force is being initiated to define and establish the requirements of an advanced integrated propulsion control system for use on aircraft operating from the subsonic through the supersonic ranges. Propulsion control techniques will also be developed to increase compatibility of engine/inlet propulsion process with airframe and aircraft end-use requirements.

Research and development programs are being conducted to improve the state-of-the-art of electrical power processing and distribution systems to meet the needs of future aircraft and spacecraft requirements.

For future deep space missions a number of potentially attractive propulsion systems are receiving serious consideration; however, insufficient data exists upon which to base a selection. One of the systems under consideration utilizes space storable propellants. Lewis has undertaken a program to provide the necessary engine performance data. The program will demonstrate various propellant combinations with flight-type systems to provide the base of technology and hardware that is required to reduce the cost of later flight hardware development.

One important "hardware" item is high efficiency tank insulation. Good results are being obtained with multi-layer insulations at Plum Brook's Cryogenic Propellant Tank Site.

Electric thrusters for satellite and deep space application have been developed in the Electric Propulsion Research Building and the Electric Propulsion Laboratory. Recent tests on board SERT I and SERT II flights have demonstrated the performance and endurance necessary to establish the use of electric thrusters for missions in the near future.

Many devices for power generation in space are being studied. The solar cell converts sunlight directly into electricity. Batteries and fuel cells convert stored chemicals into electricity. For a large and sustained power supply, however, an adaptation of the familiar turbine generator seems most practical. To achieve the tremendous weight reduction necessary will require intensive research and development. Instead of steam, the turbines will be driven by liquid metal vapor (Rankine cycle) or by heated gas (Brayton cycle). The only way to reject the waste heat is by direct radiation to space, so very large radiators will be required. High rotative speeds to reduce weight produce requirements for new designs of compressors, turbines, bearings and electric generators. The heat source will probably be a nuclear reactor.

A 28 million dollar Space Power Facility is in operation at Plum Brook where nuclear powered electric generating systems can be operated under simulated space environment conditions for long periods of time. The first system to be installed was a compressor-turbine unit for a Brayton cycle electric power generating system. This was followed by separation tests of the skylab shroud.

Various problems in connection with the development of nuclear power systems and nuclear rockets are conducted at the Plum Brook Station. A 60-Megawatt thermal reactor facility is used to determine the effects of radiation on various electronic, hydraulic, and mechanical control systems, and on items of equipment.

The NASA Aerospace Safety Research and Data Institute is located at the Lewis Center. The Institute's staff of specialists surveys the research needs and directs research efforts in this field. A data bank of research information is being compiled and cataloged for ready access. A computer system and data retrieval methods are being established to provide the safety information to requestors.

The performance of propulsion and power generation systems, launch vehicles, spacecraft, and practically all hardware is paced by physical limitations of available materials. The Center has maintained a substantial materials research effort aimed at raising these limitations and improving component and system performance. Activity covers the entire temperature range of materials usage going from the cryogenic temperature of liquefied gases to the high temperatures encountered in the rocket nozzles of aircraft engine combustors and turbine wheels. Materials research includes both fundamental studies of what makes materials strong or weak and the development of new materials. "Super" alloys, corrosion resistant coatings, ultra pure tungsten, and composites made of metal whiskers, fibers, or sintered granules are among the many concepts being investigated. The suitability of various materials for use in nuclear environments is evaluated in the Plum Brook Reactor Facility.

In the field of ecology, Lewis research on combustion and high-temperature resistant catalytic materials for thermal reactors will help to reduce the

amount of smoke and noxious pollutants in automobile and aircraft engine exhausts. Lewis scientists are cooperating with local, state and national agencies in their efforts to reduce air and water pollution.

High power communication systems, sub-systems and components are being developed and tested in support of applications for space broadcasting and information networking satellites. A joint NASA/Canadian communications technology satellite project is being conducted to advance the state-of-the art in spacecraft and related ground-based technologies relevant to future communications and other satellite applications systems.

DESCRIPTION

The Lewis Research Center occupies two sites in north central Ohio. The older one was established in 1941 on 200 acres adjacent to the Cleveland-Hopkins International Airport. The original area has been expanded to 364 acres including 14 acres leased from the City of Cleveland. Here there are over 90 buildings, including two large supersonic wind tunnels, a V/STOL tunnel, fan noise and jet noise rigs, two zero gravity research facilities (free drop shafts, one of which is an underground evacuated shaft 477 feet deep in which zero gravity durations of about 10 seconds are obtained), a large Propulsion Systems Laboratory in which full-scale engines are operated under simulated high-altitude conditions, three rocket laboratories, five materials research buildings, eighteen major space simulation facilities ranging from four to thirty feet in diameter, a 50-foot diameter Space Power Chamber 120 feet long in which altitudes up to 100,000 feet are simulated, an Energy Conversion Laboratory, an Engine Research Building containing 64 test cells and covering nearly four acres, four office buildings, machine shops and other service buildings.

A newer site, established in 1956, is located south of Sandusky, Ohio, about fifty miles west of Cleveland, on land formerly occupied by the Plum Brook Ordnance Works. Known as the Plum Brook Station, it occupies 8,054 acres of which 8,008 are owned by the Government and 46 are easements.

There are over 180 buildings on the Plum Brook site, 55 built by the NASA and the rest by the former tenants. The major facilities include a Reactor Facility, an Altitude Rocket Test Facility, a Cryogenic Propellant Tank Facility, a Spacecraft Dynamics Research Facility, a Rocket Systems Hydraulic Laboratory and a Fluorine Pump Laboratory. The latest major research facilities to be completed are the Spacecraft Propulsion Research Facility to test the ignition and operation of full-scale rocket engines after a prolonged shut-down period in a space environment, and the Space Power Facility for testing full-scale nuclear powered electric generating systems and a Hypersonic Tunnel Facility in which burning ramjet engines can be operated at speeds up to Mach 7. The research programs at Plum Brook are under the technical direction of personnel located at Cleveland. They are conducted at the larger site because of the need for large separation distances to minimize hazards.

Testing of nuclear propulsion systems is accomplished at the Nuclear Rocket Development Station (NRDS). The NRDS is located on a 92,518-acre site adjacent to the AEC's Nevada Test Site approximately 90 miles northwest of Las Vegas in southern Nevada and is the national site for the static ground testing of reactors, engines, components and eventually of vehicles associated with nuclear rocket development.

The total capital investment of the Lewis Research Center including fixed assets in progress, and contractor-held facilities at various locations, as of June 30, 1971, was $457,518,000 of which $237,616,000 represents facilities at Cleveland, $118,205,000 at Plum Brook, $30,160,000 at NRDS, and $71,537,000 at various locations.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel	$70,272,000	$73,400,000	$72,898,000
Travel	1,293,000	1,218,000	1,163,000
Facilities services	7,795,000	7,554,000	7,114,000
Technical services	178,000	151,000	151,000
Administrative support	822,000	839,000	841,000
Total, fund requirements	$80,360,000	$83,162,000	$82,167,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$70,272,000	$73,400,000	$72,898,000	$-502,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent Positions.....	$63,645,000	$65,929,000	$65,780,000
b. Nonpermanent Positions..	269,000	350,000	350,000
c. Reimbursable Details....	77,000	60,000	60,000
d. Overtime & other compensation.....	722,000	785,000	784,000
Subtotal, Compensation..	$64,713,000	$67,124,000	$66,974,000
2. Benefits.....	5,391,000	6,077,000	5,730,000
Subtotal, Compensation.. and Benefits.....	$70,104,000	$73,201,000	$72,704,000
B. Supporting Costs:			
1. Transfer of Personnel.....	$27,000	$ 54,000	$ 49,000
2. Personnel Training.....	141,000	145,000	145,000
Subtotal, Supporting Costs	$168,000	$199,000	$194,000
Total, Personnel and Related Costs.....	$70,272,000	$73,400,000	$72,898,000
1. Compensation.....	$64,713,000	$67,124,000	$66,974,000
a. Permanent Positions.....	$63,645,000	$65,929,000	$65,780,000

The cost for permanent positions is the largest part of the personnel and related cost. The funds shown above will support 3870 permanent positions in 1972 and 3779 positions in 1973. This represents a reduction of 422 from 1971.

Permanent Positions by Program:	1971	1972	1973
Space Science			
Launch vehicle procurement.....	282	255	244
Space Applications.....	26	65	75
Aeronautics and Space Technology			
Aeronautical research and technology.	1,352	1,386	1,455
Space research and technology.....	737	487	471
Nuclear power and propulsion.....	816	756	634
Technology Utilization.....	8	8	8
Subtotal, positions by program.....	3,221	2,957	2,887
Indirect Positions			
Director and staff.....	25	24	24
Administrative support.....	380	372	363
Research and development support.....	575	517	505
Subtotal, indirect positions.....	980	913	892
Total, permanent positions.....	4,201	3,870	3,779
Other Than Permanent Positions.....	250	250	250
Total.....	4,451	4,120	4,029

The distribution of the Lewis work force by work on NASA programs is illustrated above. Another characteristic of the Lewis work force is the distribution by broad occupational groupings. Professional scientists and engineers comprise about 43% of this work force. Technicians and technically oriented wage board employees account for another 43%. The remaining 14% furnishes administrative support to the research oriented staff. The following table illustrates this distribution:

Occupational Group	1971 Number	1971 Percent	1972 Number	1972 Percent	1973 Number	1973 Percent
Professional scientists and engineers.....	1,833	43.6	1,677	43.3	1,635	43.3
Technicians.....	341	8.1	290	7.5	282	7.5
Wage Board.....	1,450	34.5	1,359	35.1	1,327	35.1
Professional administrative.....	217	5.2	212	5.5	209	5.5
Clerical.....	360	8.6	332	8.6	326	8.6
Total.....	4,201	100.0	3,870	100.0	3,779	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end positions structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect.

In FY 1973 the cost of permanent positions will be $65,780,000, a decrease of $149,000 from 1972. This decrease results as follows:

Cost of permanent positions in 1972.....		$65,929,000
Cost of increases in 1973.....		2,077,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$ $737,000	
Partial year effect of 1973 actions.....	1,340,000	
Cost decreases in 1973.....		-2,226,000
Abolished positions:		
Full year effect of 1972 actions.....	-1,394,000	
Partial year effect of 1973 actions.....	-260,000	
Decrease in days paid in 1973.....	-497,000	
Turnover savings.....	-75,000	
Cost of permanent positions in 1973.....		$65,780,000

Other Compensation Costs

	1971	1972	1973
b. **Nonpermanent Positions.....**	**$269,000**	**$350,000**	**$350,000**

There are 250 positions required for a variety of programs, the largest of which is summer employment. Lewis hires college students and high school and college faculty members during the summer to provide these people exposure to NASA programs and Government operations. NASA benefits from the employment of these highly skilled individuals, and the education and training they receive **are** a considerable asset to themselves and to the nation.

A portion of the non-permanent positions is used to provide for Lewis participation in the President's Youth Opportunity Campaign, which enables disadvantaged youths to work at unskilled summer jobs at NASA installations.

As in the past, the Center continues to provide significant training opportunities for technically oriented college students participating in the cooperative training program throughout the year. The student employed under a cooperative training agreement works for a term at a NASA installation and then spends a term in regular study at his college or university. The work-study program combines practical experience with theory and has been a significant recruitment source for NASA.

Distribution of Nonpermanent Positions by Program

Co-ops.....	11	10	10
Summer Program (Excluding YOC).....	93	94	94
YOC Program.....	100	100	100
Other.....	46	46	46
Total.....	250	250	250
c. Reimbursable Details.....	$77,000	$60,000	$60,000

In 1971, four military officers were utilized in Lewis programs where such assignments are of mutual benefit. The programs to which they are assigned are electric propulsion, solid state physics, nuclear power systems, and direct energy conversion (fuel cells and batteries). In accordance with existing agreements, Lewis reimburses the military for the salaries and related costs of the detailees. In 1972 and 1973 the number of detailees will drop to three.

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	1971	1972	1973
d. Overtime and Other Compensation	$722,000	$785,000	$784,000

Overtime is utilized only for work in which normally scheduled shifts cannot accomplish the desired results in the time scheduled.

Three major areas of work are responsible for the bulk of overtime at Lewis Research Center: (1) fabrication of research models, (2) installation of models in testing facilities, and (3) operation of facilities on an over run basis. Overtime is used in these areas only to meet research schedules established by the engineering staff and technical management. These activities constitute approximately 70% of the Lewis overtime.

Other areas of work that require overtime include flight technicians for over runs on flight tests, and maintenance and phase inspection of aircraft necessary for unscheduled flights, inspection of contract services that are conducted over the weekends because of facility access (approximately 4 men per weekend). Emergency breakdowns of facilities and utilities, maintenance of around the clock fully staffed fire fighting services utilize approximately 1 day per week. Snow removal requires approximately 6 men each large snowfall. Procurement backlog, print shop overloads, illustrations for peak load during conferences and report typing all require overtime at various times.

To obtain a significant electricity rate reduction, the large Lewis facilities are operated during the off-peak-demand times for electricity. This requires second and third shift operation. The saving in power cost greatly offsets the added night differential costs paid the people involved with facility operation during these second and third shifts.

Holiday pay is used very little at Lewis. This would include the maintenance of only necessary functions of protecting equipment and providing minimal security and safety forces.

2. Benefits.....	$5,391,000	$6,077,000	$5,730,000

In addition to compensation, Lewis makes an employer's contribution to personnel benefits as authorized and required by law. The decrease in the costs of Benefits of $347,000 from 1972 to 1973 results from the reduction in civil service personnel. The following table indicates the costs of personnel benefits by the major categories:

Category of Cost	1971	1972	1973
Contribution to the Civil Service Retirement Fund	$4,449,000	$4,585,000	$4,582,000
Contribution for employee life insurance	229,000	244,000	244,000
Contribution to employee health insurance	571,000	781,000	766,000
FICA	10,000	15,000	15,000
Incentive awards	27,000	35,000	30,000
Other personnel benefits	41,000	35,000	33,000
Severance pay	64,000	382,000	60,000
Total	$5,391,000	$6,077,000	$5,730,000
B. Supporting Costs	$168,000	$199,000	$194,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty stations or reassignment; and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel	$27,000	$54,000	$49,000

The 1966 legislation provided that the Government would pay for certain relocation costs, such as the expense of selling and buying a house, the cost of one trip to the new duty station to secure housing, and the cost of the family relocation allowances. The estimated cost in 1972 is based on the number and historical average cost of relocations. An increase in 1972 is needed to cover the cost of transfers of Lewis personnel to NASA Headquarters to fill key positions. It is anticipated these costs will decrease slightly in 1973 due to NASA complement ceilings with resulting decreased relocations. A typical cost profile of one employee transfer within the Agency is as follows:

Travel (employee)	$50
Travel (family)	100
Household Goods	1,200
House Sale	3,200
Subsistence	250
Miscellaneous	200
	$5,000

	1971	1972	1973
2. Personnel training.....	$141,000	$145,000	$145,000

The maintenance and expansion of the skills of personnel are essential in carrying out the agency's many complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training consists of courses offered by other government agencies, usually for a fee. The remainder of the training is provided through non-government sources; the cost is for tuition, fees and related costs for training at colleges, universities, technical institutes and related institutions. The estimate provides for approximately 2,550 enrollments for training in the following categories: scientific, engineering and related professional training - 1,200; technical support and administrative skills training - 650; supervision, management and executive development - 500; secretarial, office support, safety and personnel skills - 200. A representative list of courses supplied to the above distribution of skills is as follows:

Professional and Scientific Courses
- Transport Phenomena
- Algebraic Numerical Analysis
- Differential Numerical Analysis
- Probability Theory - Engineering Application
- Statistical Inference
- Masticity I and II
- Principle of Experimental Design and Data Analysis
- Theory of Compressible Fluids
- Effective Writing

Technician Courses
- Electric Motor Controls
- Speed Variation Systems
- Refrigeration and Air Conditioning
- Advanced Art of Heli-arc Welding
- Veeco MS9 Leak Detection
- Fire Protection Engineering Seminar
- Basic and Advanced First Aid

Secretarial Courses
- Annual Secretary Seminar
- Executive Secretary Seminar

Management and Supervisory Courses
- Lewis Management Program
- Barriers to Communications
- Problem Areas in Supervision
- Federal Management Union Relations
- Performance Standards and Appraisal
- Berkeley, California Executive Seminars

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$1,293,000	$1,218,000	$1,163,000	$-55,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities.....	$815,000	$781,000	$751,000
2. Flight mission support.....	44,000	40,000	40,000
Subtotal.....	$859,000	$821,000	$791,000
B. Meetings and Technical Seminars			
1. Government-sponsored meetings....	176,000	171,000	172,000
2. Other than government-sponsored meetings and technical seminars.....	230,000	193,000	167,000
Subtotal.....	$406,000	$364,000	$339,000
C. Administrative Travel.....	$28,000	$33,000	$33,000
Total, Travel.....	$1,293,000	$1,218,000	$1,163,000
A. Program Related Travel.....	$859,000	$821,000	$791,000

Program related travel is the travel most directly related to the NASA-Lewis missions.

Travel at Lewis Research Center totalled $1,293,000 in FY 1971 for approximately 5,800 trips. This averages out to be approximately 3 trips for each professional administrative, scientist and engineer or 1.4 trips per employee at an average cost of $225 per trip.

In general, the travel policy at Lewis can be summarized by the following points:

1. Travel to professional meetings and to foreign countries is approved by the Center Director; all other travel is approved by the head of the program directorate.

2. Attendance at professional meetings is limited to those presenting papers and to the day of his presentation. Where possible, one man will read papers prepared by other Lewis personnel.

3. Each directorate head is given a quarterly allotment which he is expected to operate within. Expenditures are tracked twice monthly.

4. Foreign travel and large group meetings are generally discouraged.

The following list represents major travel users at Lewis Research Center:

Operational Centaur Support:

Travel for factory composite testing and acceptance for Centaur stages and Atlas boosters for AC-26 and AC-27.

Travel for the AC-21, OAO launch, AC-23, and AC-24 (Mariner-Mars). This includes travel for tanking, Tiger Team and final acceptance tests, peroxide firing for three launches, spacecraft encapsulation, spacecraft mating, and launch teams.

Travel for guidance system acceptance:

Travel for monitoring 30 engine production contracts at Pratt and Whitney aircraft.

Travel for attending monthly management meetings at Convair Aerospace and quarterly management meetings at Honeywell.

Improved Centaur Support:

Travel to General Dynamics' Convair Aerospace Division for a significant number of conceptual and final design reviews of mechanical systems, and coordination trips in support of the testing of GD/CA propulsion at the Plum Brook B-2 test facility.

Travel to Teledyne for above average monitoring plus monthly management meetings because of overrun conditions.

Travel to Lockheed for major and minor system design reviews and coordination trips to support the unlatch, structural and jettison tests of the shroud.

Titan/Centaur Integration Support:

Travel for extensive cost fact-finding on a $25,000,000 Martin Marietta Corporation proposal to the Air Force and support for negotiation of this procurement, and a significant number of conceptual and final design reviews.

Communications Technology Satellite (CTS):

Travel to West Coast for contract monitoring, design review and interface meeting of the Traveling Wave Tube Experimental Package.

Travel for similar functions of the Power Processor for the TWT Experimental Package.

Travel for systems support of the CTS by the project office personnel to Ottawa, Washington, and the West Coast.

STOL Airplane Powerplant Development.
Cooperation between NASA and Army projects (AMRDL) for evaluation and consulting.
DOT, EPA and FAA cooperation for monitoring propulsion oriented projects.
R&QA and Centaur Quality Review Board requirements.
Nuclear System Z or H reactor development.
Materials and Structures Division project travel.
Basic Research Grants and Contracts.
Integrated Propulsion Control Program (F-111).
YF-12 Research Project.
OSS planning for use of Space Shuttle.
Aeronautics Program travel for all phases.

	1971	1972	1973
1. Direction, coordination, and management of programs.....	$815,000	$781,000	$751,000

The largest individual part of program related travel is for direction, coordination and management of Research and Development and Construction of Facilities program activities. Because of the complexity of the programs above and the distribution of contractor and subcontractor effort throughout the entire United States, coordination and management of activities require frequent examination by personnel responsible for the program. It is estimated that approximately 3,500 trips will be necessary in 1972 and a similar number in 1973 to acquire the level of competence necessary for contract monitoring.

The following table presents the percentage of travel of each directorate at Lewis Research Center (for all types of travel):

Directors Office (R&QA, ORM, OAP)	5.8%
Public Affairs	0.9
Administration	3.8
Aeronautics	15.6
Advanced Research	5.4
Aerospace Safety	2.6
Power and Materials	18.3
Plum Brook Station	2.5
Technical Services	3.8
Engineering Services	2.0
Rockets and Vehicles	39.3
	100.0%

	1971	1972	1973
2. Flight mission support.....	$44,000	$40,000	$40,000

As projects reach the flight stage, support is required for pre-launch, and post-launch activities. A list of space vehicle launch associated meetings and tests requiring large numbers of persons to travel follows:

FY 1972 - 1973 Launch Associated Travel Requirements

Vehicle/Mission	Activity	Location	Men	Days	Planned Month
AC-26					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Dec. 71
AC-28					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Jan. 72
AC-27					
Pioneer F	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	TE-364 Accept	ETR	5	3	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Feb. 72

Vehicle/Mission	Activity	Location	Men	Days	Planned Month
AC-29					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	May 72
AC-22					
OAO-C	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Aug. 72
AC-31					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Dec. 72
AC-30					
Pioneer G	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	TE-364 Accept	ETR	5	3	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	Apr. 73
AC-32					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	
	Launch Team	ETR	25	4	May 73
AC-33					
Intelstat IV	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	
	Tiger Team	ETR	21	5	May 73
TC-1					
Proof Flt	Titan Accept	Denver	8	4	
	Centaur Accept	San Diego	5	4	Jun 73
AC-34					
Mariner-Venus-Mercury	Atlas Accept	San Diego	4	4	
	Centaur Accept	San Diego	5	4	June 73

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	1971	1972	1973
B. Meetings and Technical Seminars..	$406,000	$364,000	$339,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government sponsored and non-government sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the types described is granted only after assurance that attendance will be in the best interest of NASA. On the average, 61% of the Lewis personnel attending meetings are required to do so as they are presenting technical papers, are members of panels, or are otherwise actively participating in the meeting.

	Total Trips	Percent Participation of Those Attending
Advanced Research	107	67
Aeronautics	68	52
Power and Materials	141	73
Rockets and Vehicles	44	55
Other	46	28
Total	406	61

	1971	1972	1973
C. Administrative Travel.....	$28,000	$33,000	$33,000

Administrative travel includes travel for the direction and coordination of general management matters. The travel of center officials to NASA Headquarters is provided for in this category. This category also includes the cost of travel in and around the centers, including bus and taxi service and rental of motor vehicles. Administrative travel accounts for approximately 2.5% of the center's total travel.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES..	$7,795,000	$7,554,000	$7,114,000	$-440,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$835,000	$769,000	$529,000
2. Maintenance of equipment.....	523,000	333,000	235,000
3. Custodial services.....	2,095,000	2,256,000	2,256,000
Subtotal.....	$3,453,000	$3,358,000	$3,020,000
B. Operation of Facilities			
1. Utilities.....	$3,141,000	$3,138,000	$3,138,000
2. Supplies and equipment.....	1,201,000	1,058,000	956,000
Subtotal.....	$4,342,000	$4,196,000	$4,094,000
Total, Facilities Services.....	$7,795,000	$7,554,000	$7,114,000
A. Maintenance and Related Services..	$3,453,000	$3,358,000	$3,020,000
1. Maintenance of buildings and grounds.....	$835,000	$769,000	$529,000

During 1972 and 1973 there is projected both routine and one-time maintenance of buildings and grounds. Routine maintenance, that is projected at a constant annual level, includes grass mowing at Cleveland of 208 acres at a cost of $80,000; grass mowing at Plum Brook of 37 acres and field mowing of 2,500 acres at a cost of $25,000; maintenance and cleaning of drainage ditches and draining of shallow water areas at a cost of $75,000; tree removal and replacement of trees and shrubs, brush removal along road right-of-ways and under high voltage lines, fertilizing services, and sod replacement at a cost of $15,000; Plum Brook railroad right-of-way maintenance at a cost of $20,000; maintenance of roads, parking lots, and guard rails at a cost of $80,000; and other miscellaneous requirements for an estimated cost of $52,000.

One-time maintenance that is scheduled during the 1972 and 1973 period includes: interior painting of the Development Engineering Building and its Annex which contain approximately 300 offices at a cost of $30,000; miscellaneous interior painting of other office buildings at a cost of $10,000; exterior painting of two electrical substations ($10,000 each), steam plant at Cleveland ($3,000), 8-foot by 6-foot air dryer building ($4,000), Special Projects Laboratory ($4,000), west wing of the Engine

Research Laboratory and enclosures and piping on the roof ($14,000), Engineering Services Building ($3,000), Rocket Office Building and Shop ($2,000), Fracture Mechanics Laboratory ($2,000), other exterior painting ($15,000); roofing maintenance of buildings ($60,000); door and window maintenance ($15,000).

	1971	1972	1973
2. Maintenance of equipment.....	$523,000	$333,000	$235,000

Labor, materials, and contract effort are required, as follows, to keep mechanical, electrical, electronic equipment and plant machinery and systems operational! Repair and rebuilding of machine tools - $36,000; maintenance and repair of 35 passenger vehicles - $11,000; heavy equipment, such as snow plows, bulldozers, dump trucks, trailers, at Lewis and Plum Brook - $30,000; service and overhaul, as needed, of 1,200 office machines (typewriters, calculators, copiers, dictation transcribers) - $25,000; overhauling and reconditioning valves, controllers, heating units, and other common-use items - $35,000; maintenance and reconditioning of air conditioning, heating and ventilating equipment - $25,000; testing and reconditioning CO_2 cylinders - $17,000; maintenance and upgrading of steam plant equipment - $18,000; aircraft maintenance and storage - $25,000; elevator maintenance - $13,000; and repair, overhaul and updating of other miscellaneous shop and laboratory equipment.

3. Custodial services.....	$2,095,000	$2,256,000	$2,256,000

Janitorial Services

At Cleveland, normal daily janitorial services are performed by 35 service contract personnel who service 1.7 million square feet of office and facility floor area. The annual cost of this service is projected at $726,000. At Plum Brook, the daily janitorial services are performed by 35 service contract personnel who service 430 thousand square feet of office and facility floor area. The annual cost of this service is projected at $200,000.

Security Guard

At Cleveland, the security guard consists of 58 service contract personnel which means a three-shift, seven-day week. A minimum force is maintained at periods other than the normal working day. Night running of major facilities does require access through the gates during the full 24-hour day.

At Plum Brook, the security guard consists of 26 service contract personnel which means a three-shift, seven-day week. Continuous operation of the 60 megawatt test reactor requires access through the main gate during the full 24-hour day. Other major facilities, when tests are underway, require additional security personnel.

The total security guard cost for both Cleveland and Plum Brook is projected to be $1,100,000.

Cleaning, Exterminating, and Refuse Handling

Special cleaning for floors, walls, blinds, rugs, drapes, and light fixtures is projected at $20,000. These special services cover only portions of the center each year according to a pre-established frequency schedule.

Refuse removal amounting to an annual rate of 10,000 cubic yards is estimated at approximately $40,000 for Lewis Research Center. The Plum Brook rubbish removal includes scrap metal recovery costs and runs approximately $6,000 per year.

Laundry

Laundering of items for clean room and health safety will cost $9,000. These items include coveralls, lab coats, smocks, jackets, gloves, booties, caps, vacuum bags, towels, medical clothing, and flight clothing.

Fire Protection

At Cleveland, fire protection services are provided by NASA personnel. At Plum Brook, fire protection services are provided by 16 service contract personnel manning a 3-shift, 7-day week. The annual cost of this service will be $155,000.

	1971	1972	1973
B. Operation of Facilities.....	$4,342,000	$4,196,000	$4,094,000
1. Utilities.....	$3,141,000	$3,138,000	$3,138,000

Electricity

The Center's estimated electric power and requirements approximate 250 M KWh/year at a total cost of about $2,479,000. About 42% of the total power consumed - 104 M KWh ($1,000,000) - will be required to support base operations for the Center and the Plum Brook Station; this includes heating, air conditioning, lighting, service air machinery and other plant operations. Twenty-one percent of the total load will be required to power the 8x6 and 10x10 Supersonic Wind Tunnels; 9% for engine component research; 24% for research facilities used space, materials and power technology research; and the remainder for miscellaneous research tests conducted at Lewis and Plum Brook.

Second and third shift operation of wind tunnels are scheduled whenever possible to take full advantage of off-peak power rates.

Gas

The natural gas requirements for Lewis are primarily (80%) used for space heating of buildings and facilities to normal room temperature at an expense of $370,000 for 600,000,000 cubic feet of natural gas. In support of research operations the natural gas is used in different ways for each of the major facilities. Lewis will use gas to remove moisture from the air dryers for the 10-foot x 10-foot supersonic wind tunnel at a cost of $18,000 for 30,000,000 cubic feet. The Engine Combustion Research Laboratory (ECRL) uses natural gas to operate two heater systems to preheat air for aircraft engine combustion tests. Low pressure (50 psi) gas is used in a heat exchanger to raise inlet air to 600° F, and high pressure (275 psi) gas is used to operate a J57 turbojet engine with afterburner to raise the combustion inlet air in a second heat exchanger to 1,200° F. ECRL will require 95,000,000 cubic feet at a cost of $58,000. Other engine combustor test facilities will use the 50 psi gas to operate a heat exchanger at a cost of $6,000 for 10,000,000 cubic feet. To dry the desiccator for the Propulsion Systems Laboratory, 3,300,000 cubic feet of gas will be used at a cost of $2,000. In the research facilities at Plum Brook natural gas is used primarily to provide the primary burner for burnoff stacks for hydrogen exhaust systems at a cost of $10,000 for 16,600,000 cubic feet.

Water and Sewage

The total water cost for Lewis is $165,000. At Cleveland, 110 million cubic feet will be used at a cost of $143,000 for water from the City of Cleveland. Fourteen million cubic feet are used for makeup water in cooling towers of which 95% of the cooling capacity is used for cooling research rigs and providing refrigeration necessary for wind tunnel operations. Cooling water for all other research cooling requirements requires 80 million cubic feet. The steam plant discussed under natural gas requirements uses 2 million cubic feet of makeup water. Drinking, washing, and toilet water will amount to 9 million cubic feet. Watering and sprinkling of trees, shrubs, and grass requires 5 million cubic feet.

At Plum Brook, 130 million cubic feet will be used at a cost of $22,000. The much lower rate at Plum Brook is a result of a large use of raw, untreated water in use for facility cooling purposes. Thirteen million cubic feet will be required for the steam generator boiler which provides steam for exhausters which provide vacuum exhaust capability at both the Spacecraft Propulsion Research Facility and hypersonic tunnel facility. The balance of the Plum Brook requirement is primarily for facility cooling and building heating makeup water.

Lewis will discharge 20 million cubic feet into the sanitary sewer at a cost of $30,000.

	1971	1972	1973
2. Supplies and equipment.....	$1,201,000	$1,058,000	$956,000

Supplies, materials and equipment used in the operation and maintenance of the Center are included in these costs. These items are not identifiable with any particular R&D project.

The current inventory of supplies at Lewis is maintained between 600 to 800 thousand dollars. This level has been determined as necessary to have available a reasonable variety of stock items for efficient and smooth Center operations.

Supplies are available for all types of maintenance done at the Center including electrical conduit, boxes, washers, switches, angle and channel iron, vehicle parts, all types of building maintenance materials, lumber, roofing materials, plywood, paint, tools, etc. Other than office supplies, fuels and lubricants account for the largest single item of supplies at approximately 25 percent of all supplies.

Equipment charged to the R&PM funds is primarily motor vehicular in nature - automobiles, trucks, fork lifts, cranes, snow plows, etc. Other equipment types in order of dollar values would include shop machinery, photographic equipment, mechanical and a large variety of non-capitalized equipment. The non-capitalized equipment accounts for approximately 50 percent of the equipment costs.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES.....	$178,000	$151,000	$151,000	---

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$11,000	$13,000	$13,000
2. Purchase of equipment.....	20,000	---	---
3. Maintenance of equipment.....	13,000	13,000	13,000
Subtotal, equipment.....	$44,000	$26,000	$26,000

	1971	1972	1973
4. Programming and operations services.....	$12,000	$20,000	$20,000
Subtotal.....	$56,000	$46,000	$46,000
B. Engineering Services.....	$90,000	$73,000	$73,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA technical libraries.....	$30,000	$30,000	$30,000
2. Educational/information programs.....	2,000	2,000	2,000
Subtotal.....	$32,000	$32,000	$32,000
Total, Technical Services.....	$178,000	$151,000	$151,000
A. Automatic Data Processing.....	$56,000	$46,000	$46,000

The Business Data Processing System at the Lewis Research Center is composed of an IBM 1401 computer with peripheral punch card equipment.

The 1401 system and some peripherals are Lewis owned and maintained by an annual maintenance service contract with IBM. The cost of this service is $13,000/yr. for 1971, 1972 and 1973.

In FY 1971 some peripheral punch card equipment was purchased. No projection is made for purchases in 1972 or 1973.

The punch card equipment which is not owned is leased from IBM at an annual rate of $11.000 in 1971, $13,000 in 1972 and $13,000 in 1973.

B. Engineering Services.....	$90,000	$73,000	$73,000

Engineering services for the design of special tooling, equipment and machine parts are included in these costs. License and consulting services for the reactor operations and safety are charged to the account and amount to approximately $10,000.

C. Scientific and Technical Information and Educational Programs	$32,000	$32,000	$32,000

This category includes the costs of the technical libraries, educational/informational programs, and the scientific and technical information services. The costs are summarized as follows:

	1971	1972	1973
1. Operation of technical libraries	$30,000	$30,000	$30,000
2. Educational/information programs	2,000	2,000	2,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news-worthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips and feature material.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT..	$822,000	$839,000	$841,000	$+2,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$296,000	$306,000	$306,000
2. Local telephone service.....	196,000	206,000	206,000
3. Other communications.....	35,000	35,000	35,000
Subtotal.....	$527,000	$547,000	$547,000
B. Administrative Printing.....	$74,000	$80,000	$80,000
C. Supplies, Materials and Equipment.	$118,000	$112,000	$114,000
D. Transportation			
1. Center operations.....	$2,000	$2,000	$2,000
2. Common carrier.....	58,000	55,000	55,000
Subtotal.....	$60,000	$57,000	$57,000
E. Administrative Support Services...	$43,000	$43,000	$43,000
Total, Administrative Support.....	$822,000	$839,000	$841,000

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	1971	1972	1973
A. Communications.....	$527,000	$547,000	$547,000

The Lewis costs for communications consists of the following category of services. Included are operation, maintenance and leasing costs for 44 FTS trunks ($251,000); 4 WATS lines ($28,000); Lewis and Plum Brook switchboards and associated PBX equipment ($137,000); 5 tie lines between Cleveland and Plum Brook ($9,000); 4 teletype machines and associated equipment ($35,000); and specialized services as follows:

1 internal line for building security alarms, Lewis

1 launch communications line, Cleveland - Cape Kennedy

1 Lewis - City of Cleveland disaster emergency line

1 Lewis - Washington, Western Union line

2 FTS circuits to Selfridge AFB, F106 program support

1 teleticketing machine for use of Travel Office

UPI line for support of public information program

Facsimile transmission line to Sacramento, California

Miscellaneous conference, scrambling, switching and monitoring services.

These requirements have been established through experience and monitoring of usage to establish the need to increase or decrease communications coverage.

The increase in total communications costs in 1972 reflects increased FTS charges.

B. Administrative Printing.....	$74,000	$80,000	$80,000

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions, are included.

	1971	1972	1973
C. Supplies, Materials and Equipment	$118,000	$112,000	$114,000

Administrative support supplies includes normal housekeeping and clerical supplies to operate a laboratory of approximately 4,000 man-years. Items included are copy machine paper ($15,000/year), financial management tabulating paper, and general office supplies.

The equipment included are copying machines, dictating equipment, typewriters, adding machines, date stamps, etc. New equipment is currently being purchased only as replacements for worn out or non-serviceable equipment. Our current inventory includes approximately 360 manual typewriters, 254 electric typewriters, 46 copying machines, 226 calculators, 90 transcribers and numerous other small items.

D. Transportation.....	$60,000	$57,000	$57,000

Transportation of freight, truck and rail deliveries and local movements and drayage of R&PM associated equipment including Government Bills of Lading are included in these costs.

The local service contract for movement of Lewis personnel and equipment throughout the Center costs approximately $40,000 utilizing two to six men. This service accounts for the bulk of the transportation charges.

E. Administrative Support Services..	$43,000	$43,000	$43,000

Administrative support services includes those services which relate to local tort claim actions, $6,000; and medical services, $37,000.

Medical examination of staff management is approximately $15,000 per year. Part-time Industrial Hygiene Specialist at Plum Brook ($4,000), chest x-rays ($5,000), Mercury level teeth examinations, urinalysis and all other medical services at local hospitals are included.

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National Aeronautics and Space Administration
Organization and Staffing Chart
LEWIS RESEARCH CENTER
Cleveland, Ohio

STAFFING SUMMARY

	72	73
Excepted	27	27
GS-16	34	33
GS-15	197	197
GS-14	355	365
Other GS	1898	1826
WB	1359	1327
Total Permanent	3870	3775

DIRECTOR'S OFFICE

	72	73
Excepted	2	2
GS-16	1	1
Other GS	2	2
Total	5	5

OFFICE OF RESOURCES MANAGEMENT

	72	73
Excepted	1	1
GS-14	6	6
Other GS	7	7
Total	14	14

OFFICE OF PUBLIC AFFAIRS

	72	73
Excepted	1	1
GS-15	2	2
GS-14	2	2
Other GS	16	15
Total	21	20

OFFICE OF RELIABILITY AND QUALITY ASSURANCE

	72	73
GS-15	1	1
GS-14	10	10
Other GS	6	6
Total	17	17

OFFICE OF OPERATIONS ANALYSIS AND PLANNING

	72	73
GS-16	1	1
GS-15	1	1
GS-14	2	2
Other GS	5	5
Total	9	9

AEROSPACE SAFETY RESEARCH AND DATA INSTITUTE

	72	73
Excepted	2	2
GS-15	3	3
GS-14	6	6
Other GS	14	14
Total	25	25

DIRECTOR OF ADVANCED RESEARCH

	72	73
Excepted	1	1
GS-15	1	1
Other GS	1	1
Total	3	3

RESEARCH INSTALLATIONS BRANCH

	72	73
GS-14	4	4
Other GS	18	16
Total	22	20

ELECTROMAGNETIC PROPULSION DIVISION

	72	73
Excepted	1	1
GS-16	1	1
GS-15	8	9
GS-14	12	13
Other GS	41	38
Total	63	62

PHYSICS AND CHEMISTRY DIVISION

	72	73
GS-16	2	2
GS-15	15	15
GS-14	20	20
Other GS	44	41
Total	81	78

INSTRUMENT AND COMPUTING DIVISION

	72	73
Excepted	1	1
GS-16	1	1
GS-15	8	8
GS-14	17	18
Other GS	137	134
WB	46	45
Total	210	207

DIRECTOR OF AERONAUTICS

	72	73
Excepted	1	1
Other GS	1	1
Total	2	2

AIRBREATHING ENGINES DIVISION

	72	73
Excepted	1	1
GS-16	1	1
GS-15	8	9
GS-14	26	27
Other GS	73	69
Total	109	107

WIND TUNNEL AND FLIGHT DIVISION

	72	73
GS-16	1	1
GS-15	6	6
GS-14	10	11
Other GS	56	55
Total	73	73

FLUID SYSTEM COMPONENTS DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	13	13
GS-14	18	19
Other GS	61	55
Total	96	91

V/STOL AND NOISE DIVISION

	72	73
Excepted	1	1
GS-16	1	1
GS-15	9	10
GS-14	13	14
Other GS	58	55
Total	82	81

DIRECTOR OF POWER AND MATERIALS

	72	73
Excepted	1	1
Other GS	1	1
Total	2	2

DIRECT ENERGY CONVERSION DIVISION

	72	73
GS-16	1	1
GS-15	8	8
GS-14	11	11
Other GS	48	46
Total	68	66

SPACE POWER SYSTEMS DIVISION

	72	73
GS-16	1	1
GS-15	7	8
GS-14	16	17
Other GS	53	50
Total	77	76

NUCLEAR SYSTEMS DIVISION

	72	73
Excepted	4	4
GS-16	10	9
GS-15	38	31
GS-14	38	39
Other GS	77	74
Total	167	157

MATERIALS AND STRUCTURES DIVISION

	72	73
Excepted	1	1
GS-16	3	3
GS-15	10	11
GS-14	19	20
Other GS	99	96
Total	132	131

DIRECTOR OF SPACE FLIGHT SYSTEMS

	72	73
Excepted	1	1
Other GS	1	1
Total	2	2

LAUNCH VEHICLES DIVISION

	72	73
GS-16	1	1
GS-15	10	10
GS-14	27	28
Other GS	88	83
Total	126	122

CHEMICAL PROPULSION DIVISION

	72	73
Excepted	1	1
GS-16	2	2
GS-15	7	8
GS-14	18	19
Other GS	85	80
Total	113	110

SPACECRAFT TECHNOLOGY DIVISION

	72	73
Excepted	2	2
GS-16	2	2
GS-15	12	13
GS-14	14	16
Other GS	87	83
Total	117	116

DIRECTOR OF TECHNICAL SERVICES

	72	73
Excepted	1	1
GS-15	1	1
Other GS	1	1
Total	3	3

SAFETY AND PROJECT PLANNING OFFICE

	72	73
Other GS	41	40
WB	7	5
Total	48	45

FACILITIES OPERATIONS DIVISION

	72	73
GS-14	1	1
Other GS	16	16
WB	227	221
Total	244	238

TEST INSTALLATIONS DIVISION

	72	73
Other GS	9	9
WB	495	490
Total	504	499

PLANT SERVICES DIVISION

	72	73
GS-14	1	1
Other GS	11	10
WB	65	62
Total	77	73

FABRICATION DIVISION

	72	73
GS-14	2	2
Other GS	25	24
WB	179	178
Total	206	204

EQUIPMENT AND SUPPLY DIVISION

	72	73
GS-14	1	1
Other GS	38	35
WB	80	78
Total	119	114

DIRECTOR OF ENGINEERING SERVICES

	72	73
GS-16	1	1
Other GS	1	1
Total	2	2

ENGINEERING DESIGN DIVISION

	72	73
GS-15	5	5
GS-14	12	12
Other GS	109	106
Total	126	123

FACILITIES ENGINEERING DIVISION

	72	73
GS-15	8	8
GS-14	9	9
Other GS	67	65
Total	84	82

CONSTRUCTION DIVISION

	72	73
GS-14	1	1
Other GS	11	10
Total	12	11

PERSONNEL DIVISION

	72	73
GS-15	1	1
GS-14	3	3
Other GS	33	32
Total	37	36

MANAGEMENT SERVICES DIVISION

	72	73
GS-14	1	1
Other GS	95	92
WB	12	12
Total	108	105

DIRECTOR OF ADMINISTRATION

	72	73
Excepted	1	1
Other GS	5	5
Total	6	6

CHIEF COUNSEL

	72	73
GS-15	1	1
GS-14	2	2
Other GS	3	3
Total	6	6

PATENT COUNSEL

	72	73
GS-15	1	1
GS-14	1	1
Other GS	3	3
Total	5	5

SECURITY OFFICE

	72	73
GS-14	1	1
Other GS	7	6
Total	8	7

OCCUPATIONAL MEDICINE

	72	73
GS-15	1	1
Other GS	3	3
Total	4	4

LABOR-MANAGEMENT RELATIONS

	72	73
Other GS	1	1
Total	1	1

FINANCE DIVISION

	72	73
GS-14	1	1
Other GS	56	55
Total	57	56

PROCUREMENT DIVISION

	72	73
Excepted	1	1
GS-14	5	5
Other GS	88	86
Total	94	92

DIRECTOR OF PLUM BROOK STATION

	72	73
Excepted	1	1
Other GS	4	4
Total	5	5

ROCKET SYSTEMS DIVISION

	72	73
GS-15	2	2
GS-14	7	7
Other GS	28	28
Total	37	37

REACTOR DIVISION

	72	73
GS-16	1	1
GS-15	6	6
GS-14	9	9
Other GS	68	67
Total	84	83

SPACE POWER FACILITY DIVISION

	72	73
GS-15	3	3
GS-14	5	6
Other GS	25	25
Total	33	34

ENGINEERING DIVISION

	72	73
GS-15	1	1
GS-14	3	3
Other GS	28	28
Total	32	32

ADMINISTRATION DIVISION

	72	73
Other GS	21	21
WB	4	4
Total	25	25

FACILITIES SERVICE DIVISION

	72	73
GS-14	1	1
Other GS	22	22
WB	244	232
Total	267	255

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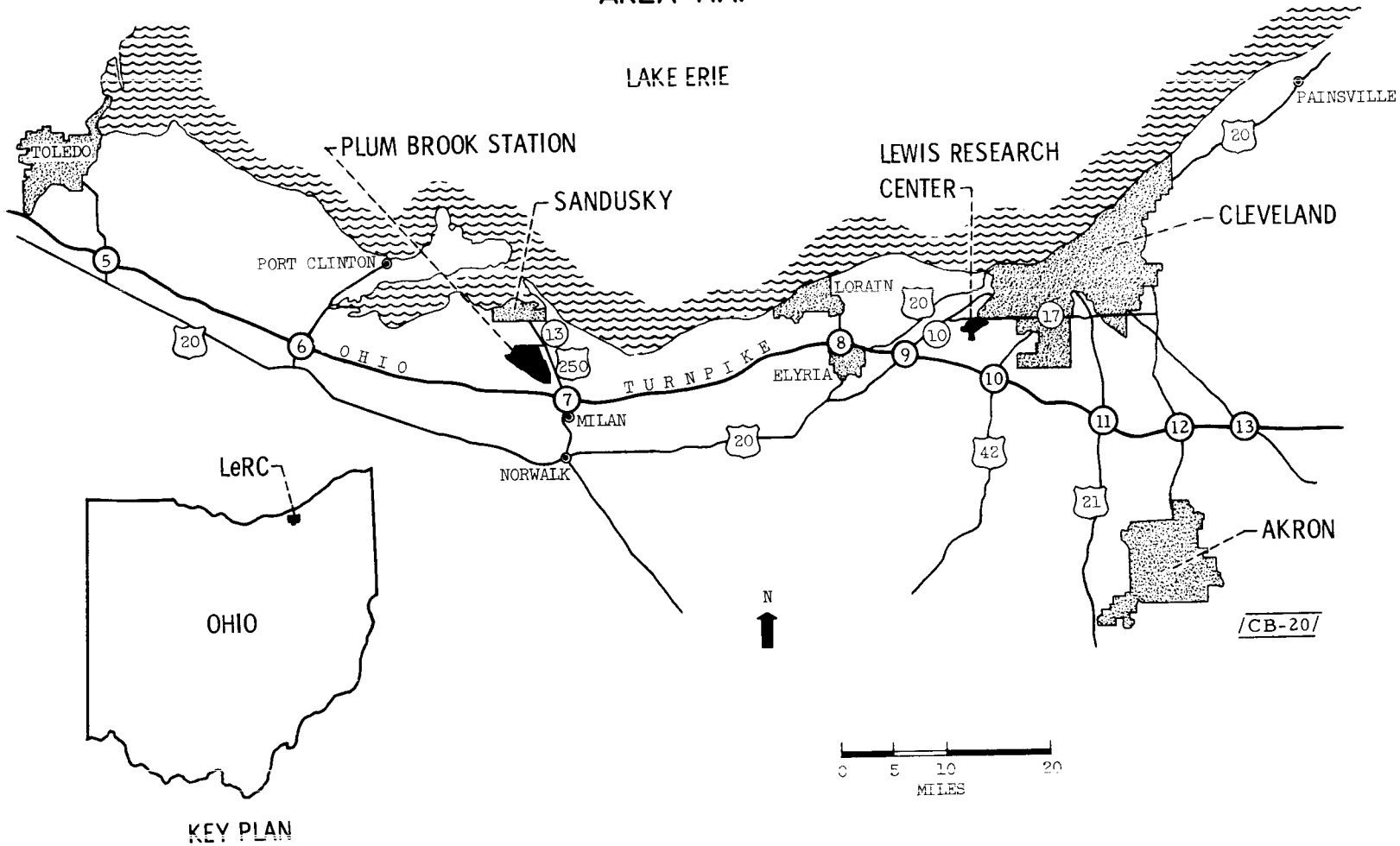
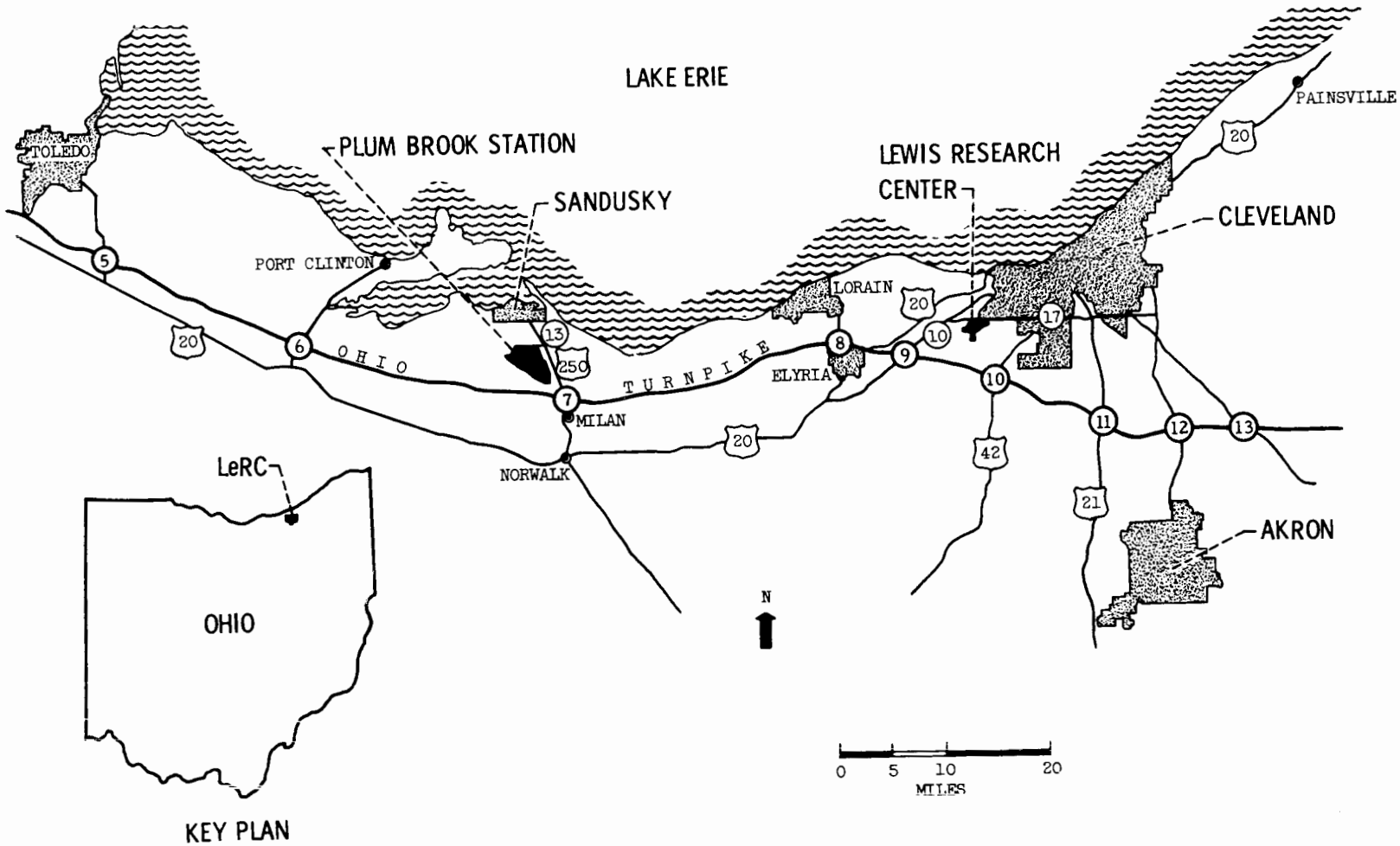
LEWIS RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

AREA MAP



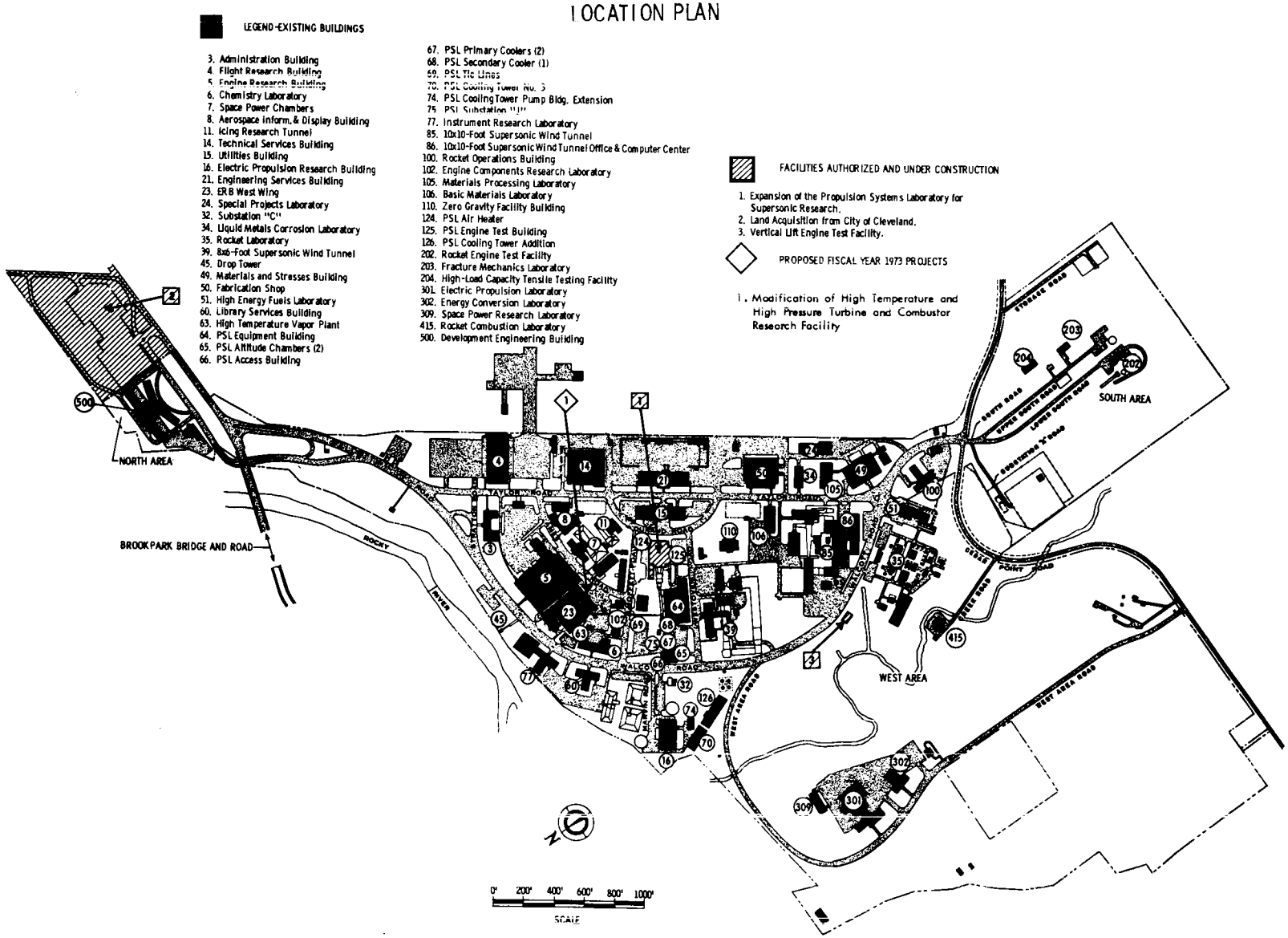
LEWIS RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

AREA MAP



LEWIS RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

LOCATION PLAN



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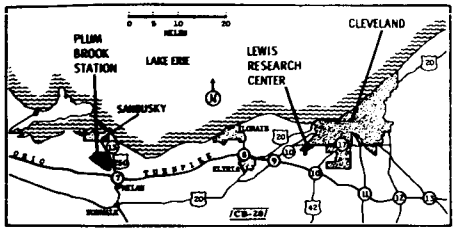
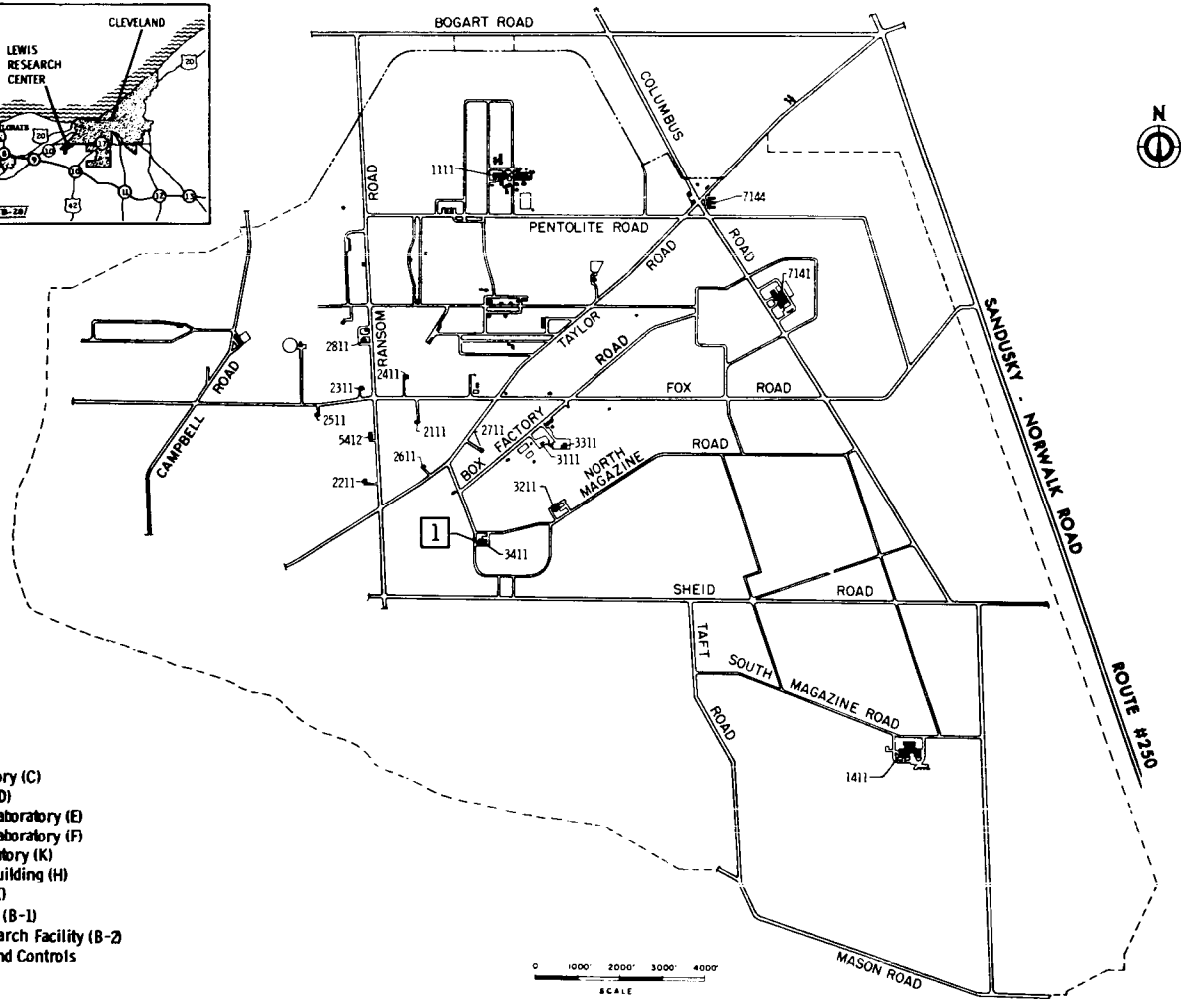
LEWIS RESEARCH CENTER
PLUM BROOK STATION
FISCAL YEAR 1973 ESTIMATES

LOCATION PLAN





LEGEND

EXISTING FACILITIES

1111 Reactor Facility Group
1411 Space Power Facility
7144 Administration Building
2111 Rocket Pump Laboratory (A)
2211 Rocket Turbo-pump Laboratory (C)
2311 Rocket Turbine Laboratory (D)
2411 Rocket Systems Dynamics Laboratory (E)
2511 Rocket Systems Hydraulic Laboratory (F)
2811 Cryogenic Propellant Laboratory (K)
5412 Central Control and Data Building (H)
2611 Fluorine Pump Laboratory (I)
3111 Altitude Rocket Test Facility (B-1)
3211 Spacecraft Propulsion Research Facility (B-2)
3311 Nuclear Rocket Dynamics and Controls Facility (B-3)
3411 Heat Transfer Facility
7141 Engineering Building

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LEWIS RESEARCH CENTER / CLEVELAND, OHIO

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LEWIS RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

CLEVELAND FACILITIES

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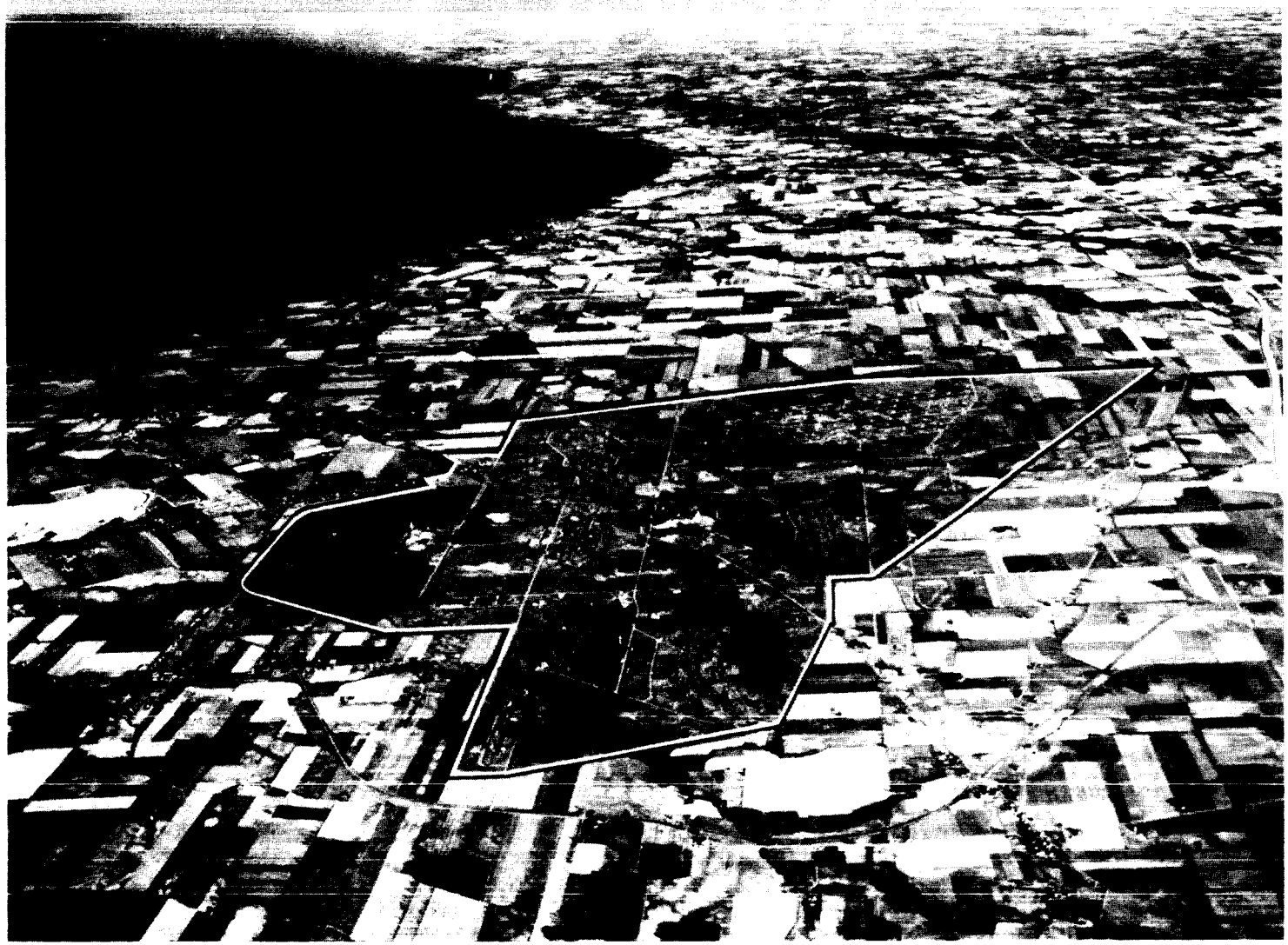
LEWIS RESEARCH CENTER
SANDUSKY, OHIO
PLUM BROOK STATION



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LEWIS RESEARCH CENTER
FISCAL YEAR 1973 ESTIMATES

PLUM BROOK FACILITIES

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RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

NASA HEADQUARTERS

MISSION

The mission of the National Aeronautics and Space Administration Headquarters is to plan and provide executive direction for the programs authorized by the Congress, and to implement the national objectives stated in the National Aeronautics and Space Act of 1958, as amended. The principal statutory functions are:

1. To conduct research into, and for the solution of, problems of flight within and outside the earth's atmosphere and to develop, construct, test, and operate aeronautical and space vehicles for research purposes.

2. To conduct activities required for the exploration of space with manned and unmanned vehicles.

3. To arrange for participation by the scientific community in planning scientific measurements and observations to be made through the use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations.

4. To provide for the widest practicable and appropriate dissemination of information concerning its activities and their results.

The following offices at Headquarters assist management in carrying out the technical aspects of this mission:

Office of Manned Space Flight - Responsible for all NASA activities directly involving manned space flight missions. Programs include:

Apollo - Based on the demonstrated national capability for manned space exploration, to conduct scientific exploration of the moon through lunar orbital and lunar surface operations.

Space Flight Operations - To expand capabilities to conduct scientific, technological and applied operations in space through flights of increasing duration and complexity, initially using Apollo hardware or derivatives of Apollo hardware; and development of a fully reusable space transportation system.

Advanced Missions - To plan a broad program of explorations which will achieve and maintain a balanced program of space operations and exploration for the United States.

The Office of Manned Space Flight has launch responsibility for major manned and unmanned missions. The three installations primarily concerned with the manned space flight programs are: the George C. Marshall Space Flight Center, including Mississippi Test Facility, Michoud Assembly Facility, and Slidell Computer Facility; the Manned Spacecraft Center, including NASA activities at the White Sands Test Facility; and the John F. Kennedy Space Center, including NASA activities at the Eastern and Western Test Ranges.

Office of Space Science - Responsible for the NASA automated space flight program directed toward scientific investigations of the solar system utilizing ground based, airborne, and space techniques including sounding rockets, earth satellites, and deep space probes; for scientific experiments to be conducted by man in space and for the scientific training of astronauts; and for the development, procurement and use of light and medium class launch vehicles.

The Office of Space Science has overall institutional responsibility for NASA installations primarily involved in space science programs. These are the Goddard Space Flight Center, Wallops Station, the Jet Propulsion Laboratory (a Government-owned facility operated for NASA by the California Institute of Technology), and the NASA Pasadena Office, a component field activity of Headquarters.

Office of Applications - Responsible for research and development activities leading to programs providing beneficial applications of space systems, the space environment, and space related or derived technology. Programs involved include earth observation, space communications, meteorology, geodesy, and related disciplines; use of the space environment for materials, sciences and processing; and the application of space developed technology to domestic problems.

Office of Aeronautics and Space Technology - Responsible for the planning, direction, execution, evaluation, documentation, and dissemination of the results of all NASA research and technology programs that are conducted primarily to demonstrate the feasibility of a concept, structure, component, or system and which may have general application to the nation's aeronautical and space objectives. This office is also responsible for coordinating NASA's total program of supporting research and technology related to carrying out specific flight missions in order to avoid unnecessary duplication and to insure an integrated and balanced agency research program.

In addition, this office has overall institutional responsibility for the research centers primarily involved in carrying out NASA's advanced research programs. These installations are: the Ames Research Center, the Flight Research Center, the Langley Research Center, and the Lewis Research Center.

Office of Tracking and Data Acquisition - Responsible for the development, implementation, and operation of tracking, data acquisition, command, communications, and data processing facilities, systems and services required for NASA flight missions. This office is also responsible for agency-wide coordination of the management of automatic data processing systems and services. In addition, this office provides for centralized planning and systems management for the administrative communications at NASA installations.

The NASA Pasadena Office, Pasadena, California, is a component field activity of the NASA Headquarters Office of Space Science. Its responsibilities are to negotiate and administer NASA contracts with the California Institute of Technology for the operation of the Jet Propulsion Laboratory; provide patent and technology utilization services as they relate to prime and subcontracts at the Jet Propulsion Laboratory; and perform such additional procurement, contract administration, communications, and other functions as may be assigned by the Associate Administrator for Space Science.

DESCRIPTION

The NASA Headquarters is located at 400 Maryland Avenue, S.W., Washington, D.C., and also occupies other buildings in the District of Columbia and nearby Virginia. Except for some office space leased in the District of Columbia and a storage area in Virginia, personnel occupy Government-owned buildings.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel.....	$43,726,000	$42,916,000	$41,495,000
Travel.....	2,552,000	2,666,000	2,557,000
Facilities services.....	1,096,000	317,000	374,000
Technical services.....	11,425,000	9,842,000	9,609,000
Administrative support.....	6,118,000	6,079,000	6,082,000
Total, fund requirements.....	$64,917,000	$61,820,000	$60,117,000

	1971	1972	1973	Change in 1973
I. PERSONNEL.....	$43,726,000	$42,916,000	$41,495,000	$-1,421,000

Basis of Fund Requirements

	1971	1972	1973
A. Compensation and Benefits:			
1. Compensation:			
a. Permanent positions.....	$37,091,000	$36,759,000	$35,414,000
b. Nonpermanent positions..	762,000	730,000	730,000
c. Reimbursable details....	432,000	458,000	476,000
d. Overtime and other compensation.....	208,000	228,000	222,000
Subtotal, Compensation..	$38,493,000	$38,175,000	$36,842,000
2. Benefits.....	4,407,000	3,921,000	3,951,000
Subtotal, Compensation and Benefits.....	$42,900,000	$42,096,000	$40,793,000
B. Supporting Costs:			
1. Transfer of personnel.....	$196,000	$214,000	$227,000
2. Civil Service Commission services.....	115,000	110,000	97,000
3. Personnel training.....	515,000	496,000	378,000
Subtotal, Supporting Costs	$826,000	$820,000	$702,000
Total, Personnel and Related Costs.....	$43,726,000	$42,916,000	$41,495,000
1. Compensation.....	$38,493,000	$38,175,000	$36,842,000
a. Permanent Positions.....	$37,091,000	$36,759,000	$35,414,000

The cost for permanent positions is the largest part of the personnel and related costs. The funds shown above will support 1,746 permanent positions in 1972 and 1,705 positions in 1973. This represents a reduction of 192 from 1971.

	1971	1972	1973
Permanent Positions by Program:			
Manned Space Flight			
Apollo	108	65	19
Space flight operations	173	180	219
Advanced missions	40	40	38
Space Science			
Lunar and planetary exploration	64	65	62
Physics and astronomy	49	46	46
Launch vehicle procurement	25	25	25
Space Applications	64	64	65
Aeronautics and Space Technology			
Aeronautical research and technology	85	82	79
Space research and technology	89	79	76
Tracking and Data Acquisition	53	50	49
Technology Utilization	19	19	19
Subtotal, positions by program	769	715	697
Indirect Positions			
Administrator and staff	263	236	232
Agency-wide management	667	608	593
Headquarters administration	198	187	183
Subtotal, indirect positions	1,128	1,031	1,008
Total, permanent positions	1,897	1,746	1,705
Other Than Permanent Positions	250	250	250
Total	2,147	1,996	1,955

The above table illustrates the use to which these positions are put. The distribution by occupation of these positions illustrates a significant

characteristic of the Headquarters workforce. Due to the nature of the Headquarters mission professional management positions in research and development administration in such activities as financial management, contracting, personnel, security, administration, and law, comprise approximately 40% of the Headquarters staff. Professional scientific and engineering positions make up another 26% of the Headquarters complement. The following table summarizes by occupational group the Headquarters workforce.

	1971		1972		1973	
Occupational Group	Number	Percent	Number	Percent	Number	Percent
Professional scientists and engineers.....	503	26.5	464	26.6	453	26.6
Technicians.....	2	.1	2	.1	2	.1
Wage board.....	16	.8	16	.9	16	.9
Professional administrative.....	758	40.0	705	40.4	688	40.4
Clerical.....	618	32.6	559	32.0	546	32.0
Total.....	1,897	100.0	1,746	100.0	1,705	100.0

Basis of Cost for Permanent Positions

The estimate for permanent compensation is based upon the position structure at the start of the year, as modified by the addition of new positions and abolishment of existing positions, within grade advances, career development, etc. After these modifications, the year-end position structure is established and the cost effect for the year is calculated based on the estimated period that these modifications are in effect:

In 1973 the cost of permanent positions will be $35,414,000, a decrease of $1,345,000 from 1972. This decrease results as follows:

Cost of permanent positions in 1972.....		$36,759,000
Cost of increases in 1973.....		872,000
Within grade advances and career development:		
Full year effect of 1972 actions.....	$409,000	
Partial year effect of 1973 actions.....	463,000	
Cost decreases in 1973.....		-2,217,000
Abolished positions:		
Full year effect of 1972 actions.....	-588,000	
Partial year effect of 1973 actions.....	-602,000	
Decrease in days paid in 1973.....	-280,000	
Turnover savings.....	-747,000	
Cost of permanent positions in 1973.....		$35,414,000

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Other Compensation Costs

	1971	1972	1973
b. Nonpermanent Personnel.....	$762,000	$730,000	$730,000

The 1972 and 1973 plans include 250 nonpermanent positions each year. These positions are required for a variety of programs, the largest of which is NASA summer employment. Headquarters hires college students and high school and college faculty members during the summer to give them exposure to NASA programs and government operations. NASA benefits from the employment of these highly skilled individuals, and the education and training they receive is an asset to themselves and to the nation.

A portion of the nonpermanent positions provides for Headquarters participation in the President's Youth Opportunity Campaign, which enables disadvantaged youths to work at unskilled summer jobs. Some of these positions are used during the school year as part of the President's Youth Opportunity Back to School Drive. During this phase, the youth's workweek may not exceed 16 hours.

As in the past, the Headquarters continued to provide significant training opportunities for technically oriented college students participating in the cooperative training program throughout the year. The student employed under a cooperative training agreement works for a term at Headquarters and then spends a term in regular study at his college or university. This work-study program combines practical experience with theory and has been a significant recruitment source.

Distribution of Nonpermanent Positions by Program

Co-ops.....	6	6	6
Summer Program (Excluding YOC).....	147	147	147
YOC Program.....	72	72	72
Other.....	25	25	25
Total.....	250	250	250

c. Reimbursable Details.....	$432,000	$458,000	$476,000

The services of a small group of military officers and civilian detailees from other government agencies are utilized by NASA Headquarters where such assignments are of mutual benefit. The number actually varies from 20 to

25, all of whom are assigned to program offices with the exception of 2 or 3 assigned to the Office of Facilities. The estimate for 1973 is to cover the cost of approximately 23 manyears.

The increase of $18,000 in costs is to cover the estimated cost of military salary increases.

	1971	1972	1973
d. Overtime and Other Compensation	$208,000	$228,000	$222,000

The reduction in overtime compensation planned for 1973 results from Headquarters' continued emphasis on reducing costs consistent with mission and legal requirements. However, a reduced staff has a tendency to increase the requirement for compensated overtime.

2. Benefits.....	$4,407,000	$3,921,000	$3,951,000

In addition to compensation, NASA makes an employer's contribution to personnel benefits as authorized and required by law. The following table indicates the costs of personnel benefits by the major categories:

Category of Cost			
Contribution to the Civil Service Retirement Fund.....	$2,579,000	$2,607,000	$2,509,000
Contribution for employee life insurance.....	137,000	139,000	137,000
Contribution to employee health insurance.....	210,000	282,000	275,000
FICA.....	28,000	29,000	33,000
Incentive awards.....	49,000	50,000	50,000
Workmen's compensation.....	711,000	742,000	939,000
Severance pay.....	693,000	72,000	8,000
Total.....	$4,407,000	$3,921,000	$3,951,000

A large part of personnel benefits and the only item showing a significant increase is Workmen's Compensation, for which Headquarters covers the entire agency. The amount shown for 1973 represents the amount for which NASA has been billed by the Labor Department pursuant to Section 35 of the Federal Employees' Compensation Act as amended by Public Law 86-767, which provides among other things that:

(a) The Secretary of Labor shall, prior to August 15 of each year, furnish each executive department or agency, having employees who are or may be entitled to compensation benefits, a statement showing total cost of benefits and other payments made from the Employees' Compensation Fund during the preceding fiscal year on account of the injury or death of employees or persons under the jurisdiction of such agency occurring after December 1, 1960.

(b) That each agency shall include in its annual budget estimates for the next fiscal year a request for an appropriation in an amount equal to such costs. Sums appropriated pursuant to such request shall, within thirty days after they become available, be deposited in the Treasury to the credit of the Employees' Compensation Fund.

	1971	1972	1973
B. Supporting Costs.....	$826,000	$820,000	$702,000

Supporting personnel costs provide for the expenses of moving employees to their initial duty station or reassignment; for security investigations and other recruitment costs; and for maintaining and expanding the skills of our employees. These costs are summarized as follows:

1. Transfer of personnel.....	$196,000	$214,000	$227,000

The estimated cost in 1973 is based on the number and historical average cost of relocations estimated at Headquarters. The slight increase over 1972 is attributable to the anticipated increase in authorized rates for the shipment and storage of household goods.

2. Civil Service Commission services.....	$115,000	$110,000	$97,000

Headquarters reimburses the Civil Service Commission for security investigations on new hires for all of NASA. The cost of security investigations is a function of two variables, the number of investigations to be conducted and the unit charge made by the Civil Service Commission. There is also a payment to the Commission for recruitment advertising, career-maturity surveys, and any requested investigation of formal discrimination complaints. The 1973 cost will be slightly less than for 1972 due to anticipated fewer new hires.

	1971	1972	1973
3. Personnel training.....	$515,000	$496,000	$378,000

The maintenance and expansion of the skills of personnel is essential in carrying out the agency's many complex technical programs. Such training is provided within the framework of the Government Employees Training Act of 1958. Part of the training consists of courses offered by other government agencies, usually for a fee. The remainder of the training is provided through nongovernmental sources; the cost is for tuition, fees and related costs for training at colleges, universities, technical institutes and related institutions; and for the cost of seminars and workshops in which groups of NASA employees receive training in subjects of agency-wide interest. Such training is used to maintain and expand employee skills. The estimate is based on a continuation of current training programs and the growing requirements to reorient skills of employees into channels compatible with the direction of the space program in the 1970's. The estimate for training in 1973 is less than for the prior 2 years, partially as a result of limited personnel accessions. The estimate provides for approximately 1,240 enrollments for training in the following categories: scientific, engineering and related professional training - 100; technical support and administrative skills training - 274; supervision, management and executive development - 538; secretarial, office support, safety and personnel skills - 328.

	1971	1972	1973	Change in 1973
II. TRAVEL.....	$2,552,000	$2,666,000	$2,557,000	$-109,000

Basis of Fund Requirements

Summary of Travel by Major Category

	1971	1972	1973
A. Program Related Travel			
1. Direction, coordination, and management of Research and Development and Construction of Facilities program activities	$814,000	$775,000	$765,000
2. Flight mission support.....	99,000	95,000	99,000
3. Overseas travel to launch and tracking sites.....	20,000	19,000	20,000
Subtotal.....	$933,000	$889,000	$884,000

	1971	1972	1973
B. Meetings and Technical Seminars			
1. Government-sponsored meetings....	$704,000	$736,000	$669,000
2. Other than government-sponsored meetings and technical seminars	318,000	303,000	315,000
Subtotal.....	$1,022,000	$1,039,000	$984,000
C. Administrative Travel.....	$597,000	$738,000	$689,000
Total, Travel.....	$2,552,000	$2,666,000	$2,557,000
A. Program Related Travel.....	$933,000	$889,000	$884,000

Program related travel is the travel most directly related to the NASA mission. It represents approximately 37% of the Headquarters travel request for 1973.

1. Direction, coordination, and management of programs.....	$814,000	$775,000	$765,000

The largest individual part of program related travel is for direction, coordination, and management of Research and Development and Construction of Facilities program activities. Because of the complexity of the programs and the distribution of contractor and subcontractor effort throughout the entire United States, coordination and management of activities require frequent examination by Headquarters personnel with program responsibility.

2. Flight mission support.....	$99,000	$95,000	$99,000

As projects reach the flight stage, support is required for pre-launch and post-launch activities. The amount of travel required for this purpose is directly related to both the number and complexity of the launches. The estimate for 1973 is in consonance with the planned launch schedule for 1973.

3. Overseas travel to launch and tracking sites.....	$20,000	$19,000	$20,000

Overseas travel to launch and tracking sites includes travel required for instrumentation of the tracking sites, and inspection of the sites prior to launch.

	1971	1972	1973
B. Meetings and Technical Seminars....	$1,022,000	$1,039,000	$984,000

Travel to meetings and technical seminars permits employees engaged in program activities to participate at both government-sponsored and nongovernment-sponsored meetings and technical seminars with other outstanding representatives of the aerospace community. This participation allows personnel to benefit from exposure to advances in the field which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates. Many of the government-sponsored meetings are made up of working panels convened to solve certain problems for the benefit of the government. Authorization to attend meetings of the types described is granted only after assurance that attendance will be in the best interest of NASA.

C. Administrative Travel.....	$597,000	$738,000	$689,000

Administrative travel includes travel for the direction and coordination of general management matters and travel by senior officials to review center requirements and operations. It includes travel by functional managers in such areas as personnel, financial management, and procurement to assure that agency policies and procedures are being implemented properly throughout the agency. This category also includes the cost of local travel, including bus and taxi services and rental of motor vehicles, and travel of unpaid members of research advisory committees.

The detail of the 1973 estimate is as follows: Direction and Coordination of Administrative Management Programs $355,000; Charter or lease of aircraft $42,000; Local transportation $32,000; Rental of Passenger Vehicles $12,000; Travel performed in accordance with the provisions of 31 USC 22a (Congressional Travel) $35,000; and other non-employee travel such as that of unpaid members of research advisory committees.

The estimates shown for each of the above travel categories are required for the NASA Headquarters to provide the necessary direction in carrying out the space program as authorized by Congress.

	1971	1972	1973	Change in 1973
III. FACILITIES SERVICES....	$1,096,000	$317,000	$374,000	$+57,000

Basis of Fund Requirements

Summary of Facilities Services

	1971	1972	1973
A. Acquisition of Facilities			
1. Rental of real property.....	$528,000	$43,000	$47,000
B. Maintenance and Related Services			
1. Maintenance of buildings and grounds.....	$370,000	$83,000	$170,000
2. Maintenance of equipment.....	4,000	5,000	5,000
3. Custodial services.....	193,000	186,000	152,000
Subtotal.....	$567,000	$274,000	$327,000
C. Operation of Facilities			
1. Supplies and equipment.....	$1,000	---	---
Total, Facilities Services.....	$1,096,000	$317,000	$374,000
A. Acquisition of Facilities.....	$528,000	$43,000	$47,000
1. Rental of real property.....	$528,000	$43,000	$47,000

This estimate represents $39,000 for the lease of a parking area for JPL employees; $4,000 for lease of hangar and workshop space at Burbank Airport for NASA-7, a NASA-owned administrative aircraft; and $4,000 for Headquarters' share of rental of the relocation site.

B. Maintenance and Related Services	$567,000	$274,000	$327,000
1. Maintenance of buildings and grounds.....	$370,000	$83,000	$170,000

This estimate includes alterations such as partition changes, telephone changes and general building maintenance. The lower 1972 amount results from work in 1972 being performed in conjunction with the moving of HEW offices into the Reporters Building and the relocation of NASA offices to other buildings. The cost of relocation of the NASA offices was borne by HEW in 1972.

2. Maintenance of equipment.....	$4,000	$5,000	$5,000

This estimate covers the maintenance and repair of the security alarm systems and equipment in the NASA Headquarters buildings.

3. Custodial services.....	$193,000	$186,000	$152,000

This estimate covers security guard service in the various Headquarters buildings. The decrease in 1973 is attributable to the reduction of space occupied by NASA in the Reporters Building, which will permit a reduction of the amount of guard service required.

	1971	1972	1973	Change in 1973
IV. TECHNICAL SERVICES...	$11,425,000	$9,842,000	$9,609,000	$-233,000

Basis of Fund Requirements

Summary of Technical Services

	1971	1972	1973
A. Automatic Data Processing			
1. Lease of equipment.....	$554,000	$593,000	$1,140,000
2. Purchase of equipment.....	27,000	---	10,000
3. Maintenance of equipment.....	79,000	68,000	67,000
Subtotal, equipment.....	$660,000	$661,000	$1,217,000
4. Programming and operation services.....	2,147,000	1,075,000	737,000
Subtotal.....	$2,807,000	$1,736,000	$1,954,000
B. Engineering Services.....	$10,000	$43,000	$41,000
C. Scientific and Technical Information and Educational Programs			
1. Operation of NASA Technical libraries.....	$45,000	$53,000	$36,000
2. Educational/information programs	2,634,000	2,135,000	2,001,000
3. Scientific and technical information.....	5,929,000	5,875,000	5,577,000
Subtotal.....	$8,608,000	$8,063,000	$7,614,000
Total, Technical Services.....	$11,425,000	$9,842,000	$9,609,000
A. Automatic Data Processing.....	$2,807,000	$1,736,000	$1,954,000

This estimate provides for the lease, purchase, maintenance, and programming and operations services of ADP equipment other than equipment dedicated to specific research or operational systems which is funded from the Research and Development appropriation. The increase of $218,000 is attributable to the lease of an IBM 360/50 system, which is partially offset by a reduction in the cost of programming and operating services.

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	1971	1972	1973
B. Engineering Services.....	$10,000	$43,000	$41,000

This estimate provides for occupational stress studies. Funding requirements remain essentially at the same level as for 1972.

C. Scientific and Technical Information and Educational Programs..	$8,608,000	$8,063,000	$7,614,000

Included in these programs are the costs of the technical libraries, educational/informational programs, and the scientific and technical information services. The funding required to finance these programs is $7,614,000 in 1973, a decrease of $449,000 from the 1972 level. The costs are summarized as follows:

1. Operation of technical libraries	$45,000	$53,000	$36,000

The cost of the operation of technical libraries will be about $17,000 less than in 1972.

2. Educational/informational programs.....	$2,634,000	$2,135,000	$2,001,000

The educational/informational programs provide for the gathering and dissemination of information about the agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of news worthy materials in support of their requests, and takes such forms as press kits, new releases, television and radio information tapes and clips, and feature material.

Research, development, and operational missions in aeronautics and space provide substantive knowledge and serve as an educational stimulus to students and teachers. NASA responds to expressed needs of students and teachers by developing curriculum supplements in space related areas such as physics, biology, chemistry, and math; assistance to over 1,000 teacher workshops and professional education meetings (with over 30,000 teachers participating); sponsorship of the Youth Science Congresses; and participation in science fairs. The largest single program is the Spacemobile, a touring space-science education lecture demonstration unit.

The cost for these programs in 1973 is estimated to be $2,001,000, a $134,000 reduction from 1972, and is related to the government-wide cutback in such programs.

	1971	1972	1973
3. Scientific and technical information.....	$5,929,000	$5,875,000	$5,577,000

The scientific and technical information activity includes the cost of the NASA Scientific and Technical Information Facility, documentation and publication services, systems development, and translation services. The largest requirement is the NASA Scientific and Technical Information Facility, which will cost $3.3 million in 1973. The level of cost for all other information services is estimated at $2.3 million. These costs are for the documentation of worldwide aerospace journal and report literature; monographs and technical reviews; analyzing, evaluating, and testing new methods and systems in the field of scientific communications to increase the effectiveness of the technical information program; and translating foreign language technical books, reports, and journal articles required to meet the needs of NASA and its contractor scientific personnel to keep abreast of world developments in the space sciences and related fields. The cost of scientific and technical information activities will be further reduced in 1973 by $298,000.

	1971	1972	1973	Change in 1973
V. ADMINISTRATIVE SUPPORT..	$6,118,000	$6,079,000	$6,082,000	$+3,000

Basis of Fund Requirements

Summary of Administrative Support

	1971	1972	1973
A. Communications			
1. Leased lines and long distance tolls.....	$621,000	$727,000	$660,000
2. Local telephone service.....	397,000	423,000	356,000
3. Other communications.....	1,359,000	2,196,000	2,340,000
Subtotal.....	$2,377,000	$3,346,000	$3,356,000
B. Administrative Printing.....	$417,000	$255,000	$247,000

	1971	1972	1973
C. Supplies, Materials, and Equipment	$659,000	$419,000	$326,000
D. Transportation			
Center operations	$198,000	$230,000	$229,000
Common carrier	41,000	30,000	20,000
Subtotal	$239,000	$260,000	$249,000
E. Administrative Support Services			
Installation support services	$2,226,000	$1,635,000	$1,740,000
Medical services	200,000	164,000	164,000
Subtotal	$2,426,000	$1,799,000	$1,904,000
Total, Administrative Support	$6,118,000	$6,079,000	$6,082,000
A. Communications	$2,377,000	$3,346,000	$3,356,000

Included in this estimate are the costs of leased lines, long distance tolls, telephone exchange services, and other communications, such as TWX and postage (Headquarters pays for the agency's postage). The estimate for communications shows an increase of $10,000. This increase is attributable to a rise in reimbursement to the Postal Service in the amount of $154,000 anticipated in 1973. The increase is almost entirely offset by reductions in other communication costs due to concerted effort to effect economies in this area. Estimates for leased lines and long distance tolls have been decreased by $67,000, local telephone services have been decreased by $67,000, and other communications have been decreased by $10,000.

B. Administrative Printing	$417,000	$255,000	$247,000

Estimates for administrative printing include funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating, including photostating, blueprinting, microfilming, and other photographic reproductions, are included. In 1973, the costs for printing are $8,000 less than in 1972.

	1971	1972	1973
C. Supplies, Materials and Equipment..	$659,000	$419,000	$326,000

Administrative supplies, materials, and equipment include those items of a general nature which service the entire Headquarters. Of the amount required in 1973, $152,000 is for supplies and materials, and $174,000 for purchased and rented equipment. The overall requirement decreases by $93,000.

D. Transportation.....	$239,000	$260,000	$249,000

Transportation services include rental of trucks, as well as the movement of supplies, materials, equipment and related items by common carrier. It also includes the maintenance and operation of the JPL-operated NASA-owned administrative aircraft. Overhaul and maintenance requirements vary from year to year depending on the maximum allowable flight hours on components before safety standards require replacement.

E. Administrative Support Services....	$2,426,000	$1,799,000	$1,904,000

Administrative support services include those services which support the Headquarters generally such as: chart and related art work, operation of photocopy equipment, maintenance and repair of office equipment and vehicles, motion picture services, and trucking and laboring services $631,000; medical services $164,000; patent services, international support services, contractor incentive awards, management improvement programs, administrator representation allowance, various improvement and feasibility studies and other related services $1,109,000. The requirement for 1973 shows an increase of $105,000 which is attributable to rate and/or salary increases in graphic services, photocopy equipment operation, photographic services, and NASA's share of costs for the emergency communication site and government-wide information centers.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ORGANIZATION AND STAFFING
NASA HEADQUARTERS

STAFFING SUMMARY

	FY 72	FY 73
Excepted	186	186
GS-16	68	64
GS-15	389	389
GS-14	274	269
All Other GS	813	781
Wage Board	16	16
Total Perm.	1,746	1,705

ADMINISTRATOR

	FY 72	FY 73
Excepted	11	11
GS-16	-	-
GS-15	3	3
GS-14	3	3
All Other GS	14	14
Wage Board	-	-
Total Perm.	31	31

GENERAL COUNSEL

	FY 72	FY 73
Excepted	6	6
GS-16	-	-
GS-15	15	14
GS-14	5	5
All Other GS	19	19
Wage Board	-	-
Total Perm.	45	44

PLANNING

	FY 72	FY 73
Excepted	6	6
GS-16	-	-
GS-15	6	6
GS-14	-	-
All Other GS	11	10
Wage Board	-	-
Total Perm.	23	22

POLICY & UNIVERSITY AFFAIRS

	FY 72	FY 73
Excepted	3	3
GS-16	1	1
GS-15	4	4
GS-14	3	3
All Other GS	13	12
Wage Board	-	-
Total Perm	24	23

EXECUTIVE SECRETARY

	FY 72	FY 73
Excepted	1	1
GS-16	-	-
GS-15	3	3
GS-14	3	2
All Other GS	28	28
Wage Board	2	2
Total Perm.	37	36

MANAGEMENT DEVELOPMENT

	FY 72	FY 73
Excepted	3	3
GS-16	-	-
GS-15	3	3
GS-14	-	-
All Other GS	3	3
Wage Board	-	-
Total Perm.	9	9

(AD HOC)

AEROSPACE SAFETY ADVISORY PANEL

	FY 72	FY 73
Excepted	-	-
GS-16	-	-
GS-15	-	-
GS-14	-	-
All Other GS	-	-
Wage Board	-	-
Total Perm.	-	-

(AD HOC)

PERSONNEL MANAGEMENT REVIEW COMMITTEE

	FY 72	FY 73
Excepted	-	-
GS-16	-	-
GS-15	-	-
GS-14	-	-
All Other GS	-	-
Wage Board	-	-
Total Perm.	-	-

ORGANIZATION & MANAGEMENT

	FY 72	FY 73
Excepted	12	12
GS-16	1	1
GS-15	28	29
GS-14	33	35
All Other GS	177	165
Wage Board	13	13
Total Perm.	264	255

ADMINISTRATION

	FY 72	FY 73
Excepted	13	13
GS-16	1	1
GS-15	32	32
GS-14	50	50
All Other GS	140	136
Wage Board	-	-
Total Perm.	236	232

INDUSTRY AFFAIRS AND TECHNOLOGY UTILIZATION

	FY 72	FY 73
Excepted	13	13
GS-16	-	-
GS-15	42	42
GS-14	62	59
All Other GS	87	86
Wage Board	-	-
Total Perm.	204	200

DOD AND INTERAGENCY AFFAIRS

	FY 72	FY 73
Excepted	5	5
GS-16	-	-
GS-15	3	3
GS-14	-	-
All Other GS	5	5
Wage Board	-	-
Total Perm.	13	13

INTERNATIONAL AFFAIRS

	FY 72	FY 73
Excepted	3	3
GS-16	-	-
GS-15	4	4
GS-14	3	3
All Other GS	18	18
Wage Board	-	-
Total Perm.	28	28

LEGISLATIVE AFFAIRS

	FY 72	FY 73
Excepted	3	3
GS-16	-	-
GS-15	5	5
GS-14	1	1
All Other GS	16	16
Wage Board	1	1
Total Perm.	26	26

PUBLIC AFFAIRS

	FY 72	FY 73
Excepted	3	3
GS-16	-	-
GS-15	17	17
GS-14	16	16
All Other GS	49	47
Wage Board	-	-
Total Perm.	85	83

MANNED SPACE FLIGHT

	FY 72	FY 73
Excepted	40	40
GS-16	15	14
GS-15	93	92
GS-14	52	50
All Other GS	83	78
Wage Board	-	-
Total Perm.	283	274

SPACE SCIENCE

	FY 72	FY 73
Excepted	21	21
GS-16	16	15
GS-15	39	39
GS-14	19	19
All Other GS	71	69
Wage Board	-	-
Total Perm.	166	163

APPLICATIONS

	FY 72	FY 73
Excepted	11	11
GS-16	10	9
GS-15	20	21
GS-14	5	5
All Other GS	17	17
Wage Board	-	-
Total Perm.	63	63

TRACKING & DATA ACQUISITION

	FY 72	FY 73
Excepted	6	6
GS-16	8	8
GS-15	19	19
GS-14	5	5
All Other GS	12	11
Wage Board	-	-
Total Perm.	50	49

AERONAUTICS & SPACE TECHNOLOGY

	FY 72	FY 73
Excepted	26	26
GS-16	16	15
GS-15	53	53
GS-14	14	13
All Other GS	50	47
Wage Board	-	-
Total Perm.	159	154

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RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1973 ESTIMATES

JET PROPULSION LABORATORY

MISSION

The Jet Propulsion Laboratory (JPL) is a Government-owned facility managed, staffed, and operated by the California Institute of Technology under a contract with NASA. The cost of operating the Laboratory is funded from the Research and Development appropriation, except for the lease or purchase of administrative aircraft and the purchase of passenger motor vehicles which are funded from the Research and Program Management appropriation and are included in the NASA Headquarters budget presentation. The Research and Program Management type costs are presented for purpose of comparison only and are not a part of the NASA Research and Program Management budget.

The Jet Propulsion Laboratory performs a variety of engineering, scientific, and management missions including:

1. Project management of complete automated spacecraft systems for planetary exploration.

2. Operation of the Deep Space Network including tracking and data acquisition activities required by planetary flights, as well as back-up to the Manned Space Flight Network.

3. A continuing program of supporting research and technology.

Specific examples of the Jet Propulsion Laboratory's activity in these areas are:

Planetary Exploration - The Mariner series of automated spacecraft was designed at the Jet Propulsion Laboratory. The Laboratory has been responsible for the project management of all Mariner missions including the integration, assembly, and testing of the spacecraft. Five of these spacecraft have been flown on successful flyby missions since 1962--two to Venus and three to Mars--providing a wealth of scientific information on these planets. In addition, the Mariner 9 spacecraft, launched in May 1971, was successfully placed in orbit about Mars on November 13, 1971 and is continuing to perform its functions satisfactorily.

An additional Mariner mission in this series, involving a single launch in 1973, is in the development phase. In this mission, the gravity-assist technique will be employed to perform flybys of both Venus and Mercury with one spacecraft.

The Viking mission, consisting of two 1975 launches to Mars, is a joint responsibility of JPL and the Langley Research Center.

Each spacecraft will consist of an orbiter and a lander. The Langley Research Center has responsibility for the overall Viking project management and development of the lander, while JPL has responsibility for development of the orbiter, spacecraft navigation, and tracking and data acquisition. The spacecraft will orbit Mars and separate a lander capsule which will enter the Martian atmosphere and soft land on the surface of the planet. Orbital, entry, and landed science data will be collected and transmitted to earth. The primary functions of the orbiter are to provide site surveillance data for use in selecting the exact landing site for the lander capsule, and to serve as a relay station to record and transmit to earth data received from the lander. At other times, the orbiter will conduct its own science observations and experiments, including the transmission of pictures of the Martian surface back to earth, infrared radiometry to determine surface temperatures, infrared spectrometry to detect water vapor, and radio experiments to obtain data to improve planetary navigation capabilities and provide measurements of radio propagation properties and Mars atmospheric data.

The Jet Propulsion Laboratory also has management responsibility for the Outer Planets program which will develop and fly automated spacecraft to gather scientific data on the Outer Planets (Jupiter and beyond), the planetary satellites and the interplanetary medium beyond Jupiter. Studies of the technology necessary for the success of these missions commenced in 1969 and have progressed to the point that mission feasibility is established. The particular missions to be used for Outer Planet exploration are currently under intensive study. One example of those being considered would include two 1977 launches to fly-by Jupiter and on to Saturn, using gravity-assisted trajectories.

Supporting Research and Technology - The Jet Propulsion Laboratory maintains a strong program of supporting research and technology, and advanced development. Much of the knowledge gained from active research in such areas as fluid physics, electrophysics, materials, applied mathematics, and guidance and control will continue to be applied to problems in space exploration.

Another activity of considerable importance is the development and fabrication of scientific experiments to be flown in vehicles other than Jet Propulsion Laboratory spacecraft. These include high-altitude balloons, Aerobee rockets, NASA aircraft, and space flight vehicles. The scientific teams involved in these experiments frequently include faculty members of various universities and staff members from NASA field installations.

Tracking and Data Acquisition - The Jet Propulsion Laboratory is responsible for the design and operation of NASA's worldwide Deep Space Network. The Deep Space Network is comprised of the Space Flight Operations Facility in Pasadena --the nerve center of the network--and tracking and data acquisition stations located in California, Spain. South Africa, and Australia. The Deep Space Network provides support to Jet Propulsion Laboratory managed flight missions, to all manned lunar missions, and to projects such as Pioneer and Helios which are managed by other NASA installations.

DESCRIPTION

The Jet Propulsion Laboratory is located in Pasadena, California, approximately 20 miles north of downtown Los Angeles. Subsidiary facilities are located at Goldstone, California (tracking and data acquisition), Edwards Air Force Base, California (propellant formulation and testing), and Table Mountain, California (open air testing and astronomy).

At Pasadena, the Laboratory occupies 175.8 acres of land of which 145.9 acres are owned by NASA and 29.9 acres are leased. At Goldstone, facilities are located on land occupied under permit from the Army. At Edwards Air Force Base, facilities are located on land occupied under permit from the Air Force. Facilities at Table Mountain are located on land occupied under permit from the Forest Service of the Department of Agriculture. The capital investment of the Jet Propulsion Laboratory, including the Deep Space Network, fixed assets in progress and contractor-held facilities, as of June 30, 1971, was $296,301,000.

SUMMARY OF RESOURCES REQUIREMENTS

FUNDS

Functions	1971	1972	1973
Personnel.....	$71,124,000	$77,051,000	$77,035,000
Travel.....	2,497,000	2,543,000	2,452,000
Facilities services.....	5,828,000	6,932,000	6,411,000
Technical services.....	1,607,000	1,820,000	1,681,000
Administrative support.....	2,681,000	2,741,000	2,910,000
Total, fund requirements....	$83,737,000	$91,087,000	$90,489,000

	1971	1972	1973
1. Permanent Positions by Program:			
Manned Space Flight			
Apollo.....	44	18	18
Space Flight Operations.	-	7	8
Space Science			
Physics and Astronomy....	19	24	26
Lunar and Planetary Exploration.....	982	1,076	1,002
Bioscience	26	-	-
Launch Vehicle Procurement	8	7	7

	1971	1972	1973
Space Applications.....	43	45	64
Aeronautics and Space Technology			
Aeronautical Research and Technology.....	10	17	17
Space Research and Technology.	311	230	219
Nuclear Power and Propulsion..	49	42	42
Tracking and Data Acquisition...	497	450	450
Subtotal, positions by program	1,989	1,916	1,853
Direct Support.....	850	830	820
2. Indirect Positions.....	1,361	1,326	1,317
Total, permanent positions.....	4,200	4,072	3,990

Basis of Fund Requirements

Function	1971	1972	1973	Change in 1973
I. Personnel.....	$71,124,000	$77,051,000	$77,035,000	$-16,000
Personnel Compensation	63,554,000	68,031,000	67,926,000	-105,000
Personnel Benefits....	7,161,000	8,536,000	8,625,000	+89,000
Supporting Personnel Costs.....	409,000	484,000	484,000	---

The decrease in this function is related to the 1973 personnel reduction of 82 positions, partially offset by an increase in benefits due to the full year's impact in 1973 of higher health insurance premium rates which took effect during 1972 as well as contributions to California state unemployment insurance which began in January 1972.

II. Travel.....	$2,497,000	$2,543,000	$2,452,000	$-91,000
Program Travel.....	2,201,000	2,249,000	2,166,000	-83,000
Administrative Travel..	296,000	294,000	286,000	-8,000

The reduction in travel costs is due primarily to the 1973 reduction in personnel as well as the phasing out of the Mariner Mars 1971 project.

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		1971	1972	1973	Change in 1973
III.	Facilities Services	$5,828,000	$6,932,000	$6,411,000	$-521,000
	Acquisition of Facilities.....	1,090,000	1,345,000	625,000	-720,000
	Maintenance and Related Services.	2,061,000	2,219,000	2,277,000	+58,000
	Operation of Facilities.....	2,677,000	3,368,000	3,509,000	+141,000

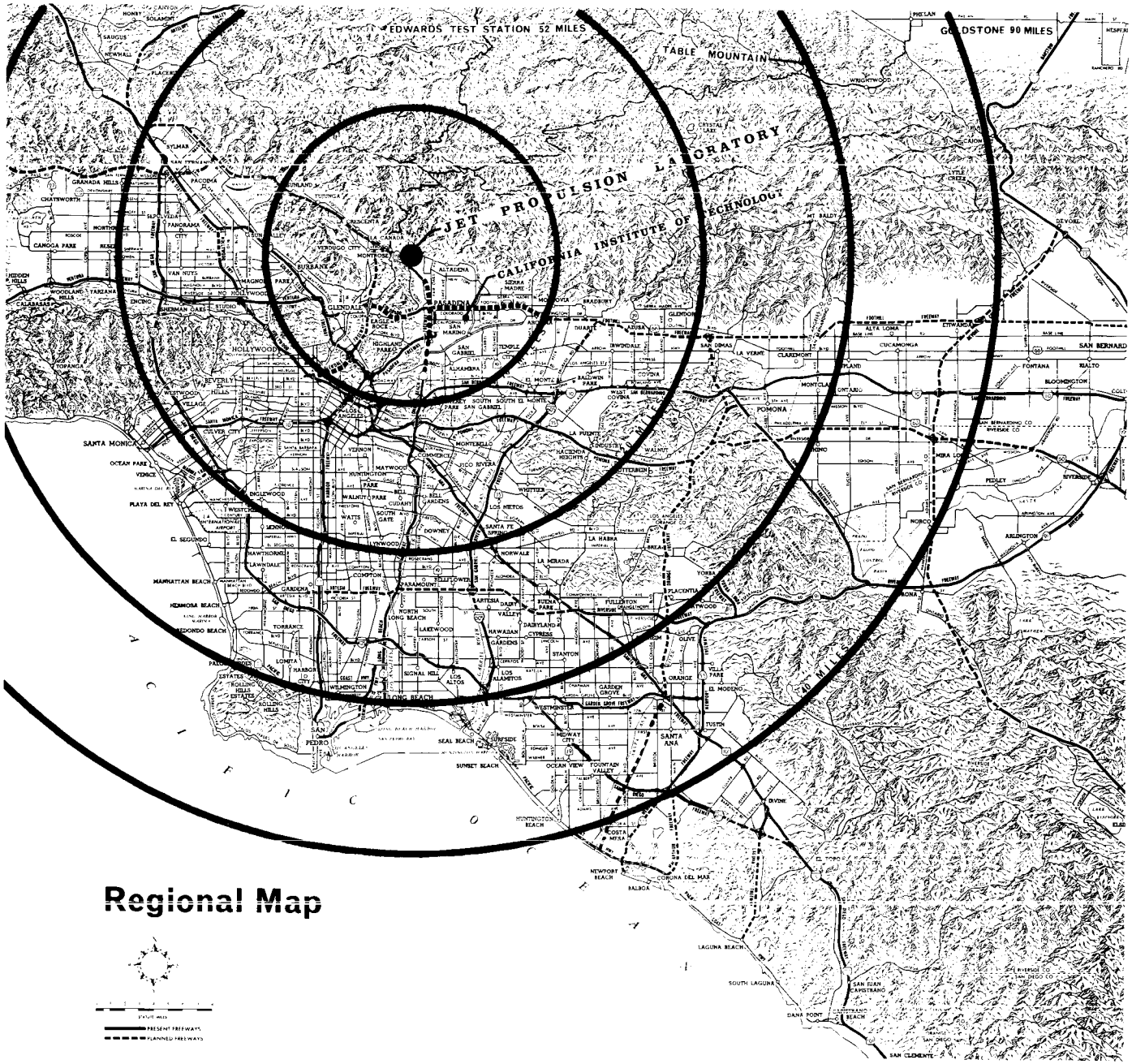
The decrease in Facilities Services is due to funding projects for minor construction in excess of $10,000 per project, and rehabilitation and modifications projects in excess of $25,000 per project in the Construction of Facilities appropriation in 1973. The only related items remaining in this budget are miscellaneous modifications under $25,000. The reduction is partially offset due to contractual wage increases for maintenance and janitorial services, purchase of replacement fabrication equipment and an increase in utility rates.

IV.	Technical Services.	$1,607,000	$1,820,000	$1,681,000	$-139,000
	ADP.....	835,000	1,031,000	866,000	-165,000
	Other.....	772,000	789,000	815,000	+26,000

The ADP subcategory includes costs for the Administrative Computing Section (ACS) only. The decrease is due primarily to a reduction in programming costs resulting from completion of the major portion of work on management systems programs. The ADP reduction is slightly offset by increased rates in the scientific and technical documentation service contracts.

V.	Administrative Support.....	$2,681,000	$2,741,000	$2,910,000	$+169,000
	Communications.....	1,291,000	1,406,000	1,461,000	+55,000
	Supplies and Equipment.....	758,000	745,000	857,000	+112,000
	Other.....	632,000	590,000	592,000	+2,000

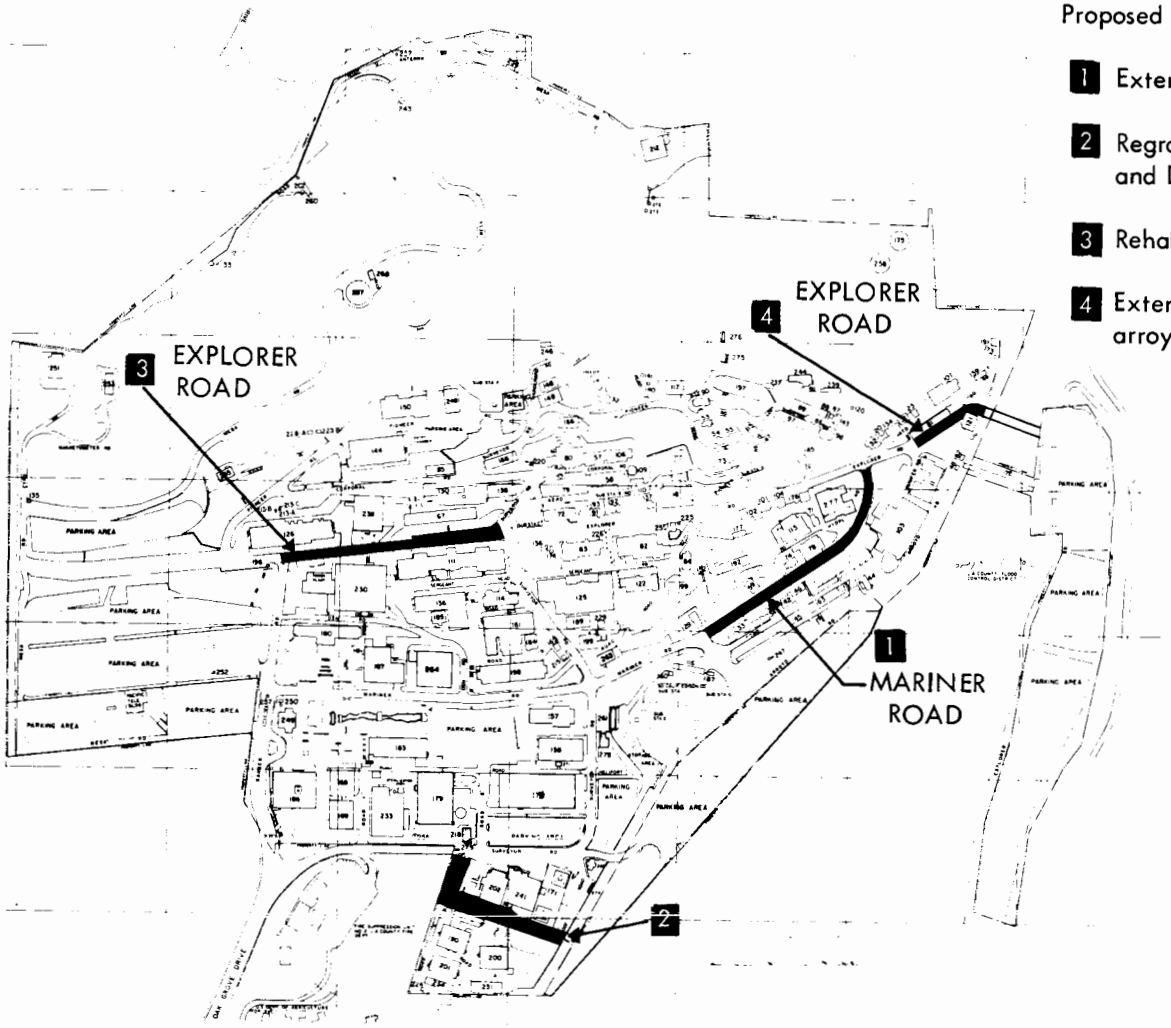
The increase in administrative support is due primarily to replacement of photographic equipment, general purpose motor vehicles, office equipment and an increase in telephone rates.



Regional Map

JET PROPULSION LABORATORY
FISCAL YEAR 1973 ESTIMATES

REHABILITATION AND MODIFICATION OF ROADWAY SYSTEM



Proposed Fiscal Year 1973 Projects

1. Extend Mariner Road
2. Regrade and repave Road "A" and Loop Road
3. Rehabilitate Explorer Road
4. Extend Explorer Road to new arroyo bridge

JET PROPULSION LABORATORY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1973 ESTIMATES

SUMMARY OF AERONAUTICAL RESEARCH AND TECHNOLOGY
OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY

Appropriation	(Millions of Dollars) 1971	1972	1973
Research and Development	$100.1	$110.0	$163.4
Construction of Facilities	1.9	6.5	12.9
Research and Program Management	107.9	118.9	118.9
Total	$209.9	$235.4	$295.2
Number of direct positions (end year) associated with Aeronautical Research and Technology	3,521	3,590	3,650

The FY 1973 budget request provides for a major increase in aeronautics research and technology effort aimed at maintaining U.S. leadership in aviation, meeting urgent domestic requirements, and supporting military aircraft development. A major effort will be focused on a short take-off and landing (STOL) experimental transport aircraft. Quiet engine work will be emphasized for the STOL aircraft and for conventional aircraft. Other areas of emphasis include noise reduction by improved flight procedures, advanced air-transport technology, and vertical take-off and landing (VTOL) research and test vehicles. These specific areas of emphasis will be supplemented by a strong technology program encompassing materials, structures, avionics, propulsion, aerodynamics, configuration studies, operating procedures, and life sciences.

The Construction of Facilities request includes funding for modification of the high temperature and high pressure turbine and combustor research facility at Lewis Research Center and for rehabilitation of wind tunnel facilities at Langley Research Center and Ames Research Center.

The Research and Program Management funding provides for the civil service salaries, travel, electric power for wind tunnel operations, and other general installation costs necessary to support the aeronautics program.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Automatic Data Processing Equipment

General Statement

NASA requirements for ADP are increasing across the full spectrum of uses. Our scientists and engineers are becoming more competent and qualified in the use of this very significant tool and are expanding our mathematical models to cover more areas of physical work. Some of these models will require capacity that is several orders of magnitude above our present technology. This will require computational speeds far in excess of our present ADP systems, and NASA will be using systems in the STAR and ILLIAC class. For the vast majority of our requirements, however, our present systems with reconfiguration changes will suffice. However, NASA is also continuing its automation of many of the functions of data collection, control and reduction that will require many smaller computers.

At the present moment, NASA owns over 92% of its automatic data processing equipment. As a result, our main emphasis will be on extension and improvement of these systems applying evolving techniques for computer system performance measurement and simulation. Some of our older, second generation equipment must be phased out as it becomes less efficient and unreliable. Newer equipment, with its lower cost to computing ratio, will be moving in to replace this old equipment and to further increase the efficiency of the third generation equipment.

Along with other federal agencies, the majority of acquisition of ADPE will be for mini computers. NASA has pioneered in the use of those computers in our physical instrumentation equipment. The mini computer equipment continues to become less expensive and more efficient and are now being used in the more general purpose field in greater quantity as well as in the automation of our facilities. Increasingly, a mini computer can be a peripheral controller, a remote input or output device or control element in displays. Also, we are finding that it is more economical to dedicate these smaller computers to individual tasks rather than combine many small tasks into a large central processing environment. This trend we expect to continue and increase in the future, with the end result being a leveling-off in the use of very large computing centers. Increased capacity will be accomplished through the use of the mini computer.

NASA uses of computers are divided into two categories: Category A - general purpose use and Category B - special purpose use. The Category A use is increasing at a steady rate and the primary areas that reflect

this increase are the increasing uses of computers by the scientists and engineers, the increasing quantity of data from satellites and laboratory facilities, and the trend toward real-time control of most satellites. In the Category B area, the trend to more automation of our laboratory facilities, our tracking networks, and automatic check-out of our spacecraft vehicle is increasing.

As a result of the system concept in the use of computers, the Federal Government has changed its inventory reporting structure to reflect the decreasing importance of the central processing unit as a major index of ADP uses. Most of our major computer installations now use multiprocessors as the main computing element and use small computers in the remote input/output devices of these systems. Our inventory of computers and our management procedures will now be tied to an overall system rather than an independent processor. This will allow a better assessment of the inventory at all levels of the Federal Government and certainly will give a better idea of the uses and costs of management of ADPE. All of our reporting will now be made on the system basis.

Figure 1 reflects the inventory of computer hardware systems as discussed above. For reference purposes the number of central processing units (CPU's) included within the hardware systems is shown as a one-line entry at the bottom. Figure 2 reflects the capital value of the ADP equipment which was installed as of June 30, 1971, indicating both the value of NASA-owned and leased equipment. Figure 3 reflects the average employment of ADP personnel, both Civil Service and contractor, at each installation.

Lease, maintenance, and purchase costs of ADP equipment by installation are shown in Figure 4. A brief narrative explanation of funding highlights follows.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Automatic Data Processing Equipment Funding Highlights

Manned Spacecraft Center

The administrative data processing functions are to be integrated into the primary scientific and engineering computer system early in FY 1973. This will allow the release of older less reliable peripheral equipment and will make possible the reassignment of ten to twelve operations personnel at no increase in net costs.

A mass data storage facility is being added to the MSC Real Time Computer Complex which allow experimenters the capability of querying near real-time data during Skylab missions.

Approximately twenty-five small Category B processors will be installed during FY 1972 and 1973, primarily serving laboratory automation functions.

Marshall Space Flight Center

The major UNIVAC 1108 Computer Systems are being augmented for support of Skylab Telemetry near-real-time analysis. The requirement for an additional large computer to support this function is currently under study.

Kennedy Space Center

No major changes are planned during FY 1972 and FY 1973.

Headquarters

A major upgrading of the Headquarters Administrative Data Processing System is planned for FY 1973 or FY 1974 but will not significantly impact FY 1973 funding.

Goddard Space Flight Center

Funds are required for a large computer to provide real time and near real-time processing of telemetry data from the atmospheric explorer satellite. Funds are also sought to procure the hardware necessary for the implementation of the TELOPS mass storage satellite data handling concept which will minimize the need for the multitude of telemetry data tapes now required. To accommodate the more advanced satellites, the updating of the tracking network begun in FY 1971 continues with the addition of 24 mini-computers to serve the satellite command functions.

Wallops Station

Funds are sought to expand the utility of the control computer system through the application of remote terminals and for minor augmentations of

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the various computers associated with the stations tracking activities.

Jet Propulsion Laboratory

Funds sought are primarily for additions to the Scientific Computer Facility and for the continuation of the program to modernize the Deep Space Tracking network. The additions to the Science Computer involves expansion of the internal memory plus the replacement of the currently leased external memory devices. The effort associated with the Deep Space Network involves the further application of mini computers to the tracking effort.

Ames Research Center

The central computation facility will be augmented to meet increased requirements for research data processing, computing, and peripheral processing for the ILLIAC. Additional funds are included for digital simulation equipment for their Flight Simulator for Advanced Aircraft and for additional equipment to meet increased mission support requirements in the Pioneer F&G Program.

Flight Research Center

The Center will install a large scale computer during FY 1973 to replace the existing general purpose system. Additional funds will be used for improvements to the Flight Range Telemetry Data Collection System.

Langley Research Center

Funds will be used for the planned expansion of their central computation facility and for a wind tunnel data collection and processing system. Incremental funding is included for a STAR computer to meet the Digital Simulation requirement. They plan to install additional small computers for equipment testing and automatic checkout for the Viking Project.

Lewis Research Center

Funds will be used to continue the planned expansion of their central computation system and for a peripheral processor for the Aerospace Safety Research Data Institute. They plan to install mini computers for research data collection and automation of Laboratory Test Facilities. Additional computer equipment will be installed for support to the CENTAUR Program.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

End of Fiscal Year
Inventory of Computer Hardware Systems
(General Purpose and Special Purpose)

	FY 1971	FY 1972	FY 1973
Office of Manned Space Flight	237	260	260
Kennedy Space Center	17	17	17
Manned Spacecraft Center	84	108	108
Marshall Space Flight Center	136	135	135
Office of Space Science	91	99	99
Goddard Space Flight Center	47	50	50
Jet Propulsion Laboratory	37	41	41
Wallops Station	7	8	8
Office of Aeronautics and Space Technology	39	42	43
Ames Research Center	15	16	16
Flight Research Center	5	6	6
Langley Research Center	9	10	10
Lewis Research Center	10	10	11
Headquarters	2	3	3
Total No. of Hardware Systems	369	404	405
Breakdown of Hardware Systems by Category:			
Category A (General Purpose) Systems	68	71	72
Category B (Special Purpose) Systems	301	333	333
Number of Computers (CPU) included within the Hardware Systems	814	971	1,012

Figure 1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Capital Value of Owned and Leased ADP Equipment
on Hand June 30, 1971
(In Thousands of Dollars)

	NASA-Owned Equipment	Leased Equipment	Total Capital Value
Office of Manned Space Flight	$145,646	$12,356	$158,002
Kennedy Space Center	14,183	1,695	15,878
Manned Spacecraft Center	73,054	10,197	83,251
Marshall Space Flight Center	58,409	464	58,873
Office of Space Science	$148,118	$12,864	$160,982
Goddard Space Flight Center	108,475	8,905	117,380
Jet Propulsion Laboratory	36,286	3,959	40,245
Wallops Station	3,357	-0-	3,357
Office of Aeronautics and Space Technology	$ 49,696	$ 3,135	$ 52,831
Ames Research Center	13,040	1,962	15,002
Flight Research Center	2,475	1,157	3,632
Langley Research Center	20,637	-0-	20,637
Lewis Research Center	13,544	16	13,560
Headquarters	$ 2,680	$ 1,672	$ 4,352
Total	$346,140	$30,027	$376,167

Figure 2

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Automatic Data Processing Personnel
(Average Employment for the Fiscal Year)

	FY 1971		FY 1972		FY 1973	
	Civil Service	Contractor	Civil Service	Contractor	Civil Service	Contractor
Office of Manned Space Flight	411	2,011	408	2,017	408	2,001
Kennedy Space Center	68	323	68	330	68	333
Manned Spacecraft Center	181	1,026	185	1,059	185	1,033
Marshall Space Flight Center	162	662	155	628	155	635
Office of Space Science	803	1,276	817	1,397	841	1,438
Goddard Space Flight Center	456	953	456	1,091	456	1,168
Jet Propulsion Laboratory	319 a/	269	333 a/	257	357 a/	234
Wallops Station	28	54	28	49	28	36
Office of Aeronautics and Space Technology	336	419	353	535	356	518
Ames Research Center	63	144	78	182	82	167
Flight Research Center	18	20	18	15	17	14
Langley Research Center	128	237	119	307	119	325
Lewis Research Center	127	18	138	31	138	12
Headquarters	25	110	23	109	24	112
Total	1,575	3,816	1,601	4,058	1,629	4,069

a/ Employees of JPL.

Figure 3

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Summary of Automatic Data Processing Equipment Funding
(In Thousands of Dollars)

	FY 1971				FY 1972				FY 1973			
	Lease	Maint.	Purch.	Total	Lease	Maint.	Purch.	Total	Lease	Maint.	Purch.	Total
Office of Manned Space Flight	$6.991	$4.702	$4.905	$16.598	$4,477	$6,350	$5,508	$16,335	$4,182	$6,823	$4,315	$15,320
Kennedy Space Center	888	564	1,966	3,418	25	750	661	1,436	25	750	425	1,200
Manned Spacecraft Center	5,528	2,615	2,583	10,726	4,006	3,012	3,805	10,823	3,743	4,014	1,515	9,272
Marshall Space Flight Center	575	1,523	356	2,454	446	2,588	1,042	4,076	414	2,059	2,375	4,848
Office of Space Science	8,142	5,054	23,402	36,598	5,836	6,150	15,631	27,617	5,986	6,639	15,678	28,303
Goddard Space Flight Center	4,874	3,898	13,130	21,902	3,731	4,462	8,367	16,560	4,308	4,923	13,492	22,723
Jet Propulsion Laboratory	3,253	1,039	10,002	14,294	2,086	1,493	7,158	10,737	1,659	1,491	2,015	5,165
Wallops Station	15	117	270	402	19	195	106	320	19	225	171	415
Office of Aeronautics and Space Technology	1,594	1,777	9,513	12,884	2,838	2,374	11,802	17,014	2,768	2,562	7,032	12,362
Ames Research Center	766	621	1,230	2,617	1,254	814	2,604	4,672	950	842	1,122	2,914
Flight Research Center	435	47	375	857	530	43	118	691	680	28	---	708
Langley Research Center	306	908	2,298	3,512	720	1,238	4,962	6,920	949	1,413	5,410	7,772
Lewis Research Center	87	201	5,610	5,898	334	279	4,118	4,731	189	279	500	968
Headquarters	554	79	27	660	593	68	---	661	1,140	67	10	1,217
Total	$17,281	$11,612	$37,847	$66,740	$13,744	$14,942	$32,941	$61,627	$14,076	$16,091	$27,035	$57,202
Breakdown by Appropriation:												
Research and Development	8,514	10,611	35,919	55,044	8,699	13,222	31,204	53,125	9,736	14,630	26,265	50,631
Research and Program Mgt.	8,767	1,001	1,928	11,696	5,045	1,720	1,737	8,502	4,340	1,461	770	6,571
Breakdown by Category of Equip:												
Category A	14,514	6,539	19,896	40,949	10,721	8,619	15,383	34,723	12,146	8,931	14,885	35,962
Category B	2,767	5,073	17,951	25,791	3,023	6,323	17,558	26,904	1,930	7,160	12,150	21,240

Figure 4

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