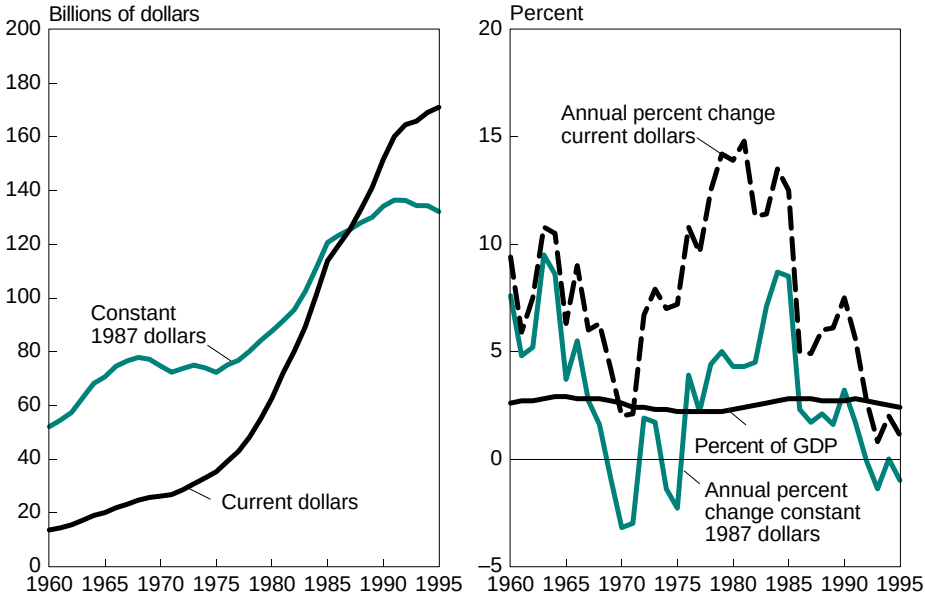
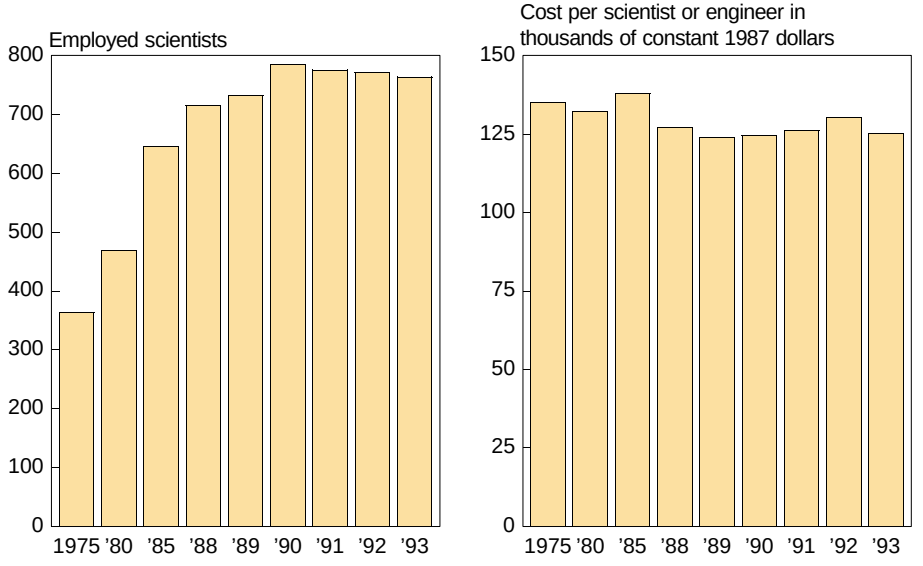
Figure 20.1
Research and Development Expenditures: 1960 to 1995



Source: Chart prepared by U.S. Bureau of the Census. For data, see table 957.

Figure 20.2
Research and Development Scientists and Engineers in Private Industry: 1975 to 1993



Source: Chart prepared by U.S. Bureau of the Census. For data, see table 969.

Science and Technology

This section presents statistics on scientific, engineering, and technological resources, with emphasis on patterns of research and development (R&D) funding and on scientific, engineering, and technical personnel, education, and employment. Also included are statistics on space program outlays and accomplishments. Principal sources of these data are the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA).

NSF gathers data chiefly through recurring surveys. Current NSF publications containing data on funds for research and development and on scientific and engineering personnel include the *Science Resources Studies Highlights* summaries series; Detailed Statistical Tables; and annual, biennial, triennial, and special reports. Titles or the areas of coverage of these reports include the following: *Science and Engineering Indicators; National Patterns of R&D Resources; Science and Engineering Personnel—A National Overview; Women and Minorities in Science and Engineering;* science and technology data presented in chart and tabular form in a pocket-size publication; *International Science and Technology Data Update;* profiles on human resources and funding in individual fields of science and engineering; *Federal Funds for Research and Development; Federal R&D Funding by Budget Function; Federal Support to Universities, Colleges, and Selected Nonprofit Institutions; Scientific and Engineering Facilities at Universities and Colleges; Geographic Distribution of Industrial R&D Expenditures; Research and Development in Industry;* R&D funds and graduate enrollment and support in academic science and engineering; characteristics of doctoral scientists and engineers and of recent graduates in the United States; *U.S. Scientists and Engineers;* and scientists, engineers, and technicians in manufacturing, nonmanufacturing, and trade and regulated industries. Statistical surveys in these areas pose problems of concept and definition and the data should, therefore, be regarded as broad estimates rather than precise quantitative statements. See sources for details.

In Brief

R&D expenditures in constant (1987) dollars:

1970	*74.6 bil.*
1980	*87.6 bil.*
1995	*132.1 bil.*

Federal outlays for space and technologies in constant 1987 dollars:

1970	*11.0 bil.*
1980	*6.3 bil.*
1990	*10.3 bil.*
1996	*9.5 bil.*

The National Science Board's biennial *Science and Engineering Indicators* contains data and analyses of international and domestic science and technology, including measures of inputs and outputs. *The Budget of the United States Government,* published by the U.S. Office of Management and Budget, contains summary financial data on Federal R&D programs.

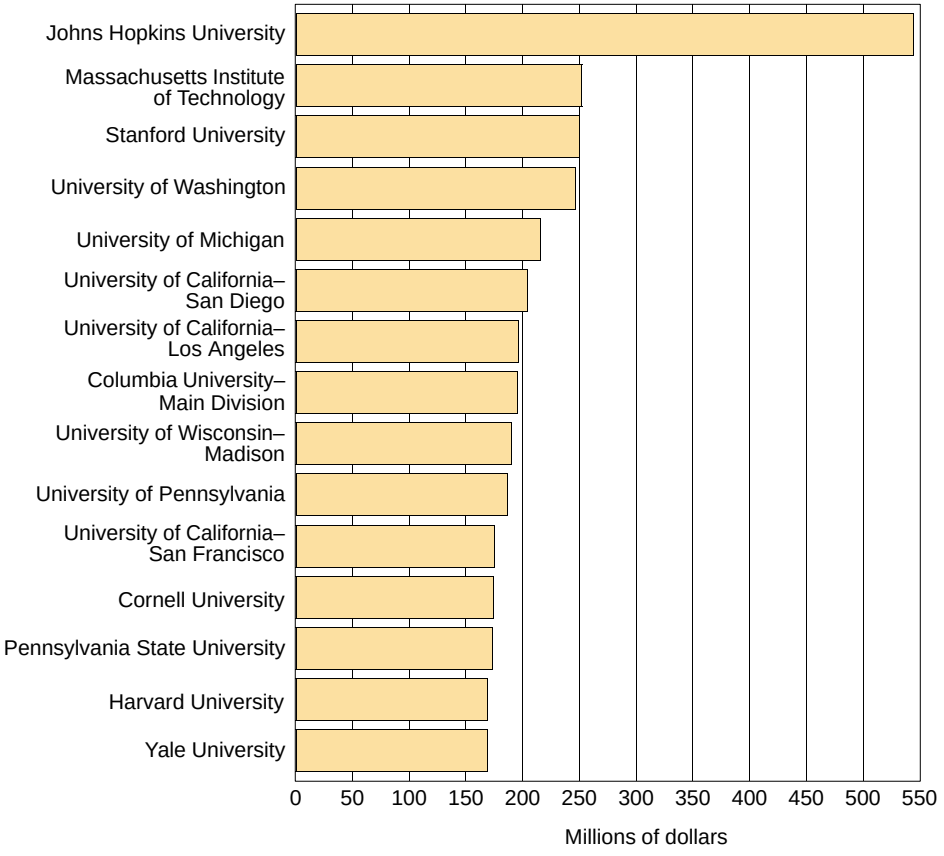
Research and development outlays—NSF defines research as a "systematic and intensive study directed toward a fuller knowledge of the subject studied" and development as "the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, methods, or processes." National coverage of R&D expenditures is developed primarily from periodic surveys in four principal economic sectors: (1) *Government,* made up primarily of Federal executive agencies; (2) *industry,* consisting of manufacturing and nonmanufacturing firms and the federally funded research and development centers (FFRDC's) they administer; (3) *universities and colleges,* composed of universities, colleges, and their affiliated institutions, agricultural experiment stations, and associated schools of agriculture, and FFRDC's administered by educational institutions; and (4) *other nonprofit institutions,* consisting of such

organizations as private philanthropic foundations, nonprofit research institutes, voluntary health agencies, and FFRDC's administered by nonprofit organizations. The R&D funds reported consist of current operating costs, including planning and administration costs, except as otherwise noted. They exclude funds for routine testing, mapping and surveying, collection of general-purpose data, dissemination of scientific information, and training of scientific personnel.

Scientists, engineers, and technicians—Scientists and engineers are defined as persons engaged in scientific and engineering work at a level requiring a knowledge of sciences equivalent at least to that acquired through completion of a 4-year college course. Technicians are defined as persons engaged in technical work at a level requiring knowledge acquired through a technical institute, junior college, or other type of training less extensive than 4-year college training. Craftsmen and skilled workers are excluded.

Historical statistics—Tabular headnotes provide cross-references, where applicable, to *Historical Statistics of the United States, Colonial Times to 1970.* See Appendix IV.

Figure 20.3
Top 15 Universities—Federal Research and Development Obligations: 1993



Source: Chart prepared by U.S. Bureau of the Census. For data, see table 965.

No. 956. R&D Expenditures: 1960 to 1995

[Includes basic research, applied research, and development. Defense-related outlays comprise all research and development spending by Dept. of Defense, including space activities, and a portion of Department of Energy funds. Space-related outlays are those of the National Aeronautics and Space Administration; they exclude space activities of other Federal agencies, estimated at less than 5 percent of all space research and development spending. Minus sign (-) indicates decrease]

YEAR	CURRENT DOLLARS (bil. dol.)			CONSTANT (1987) DOLLARS [1]		ANNUAL PERCENT CHANGE [3]		PERCENT OF TOTAL R&D OUTLAYS				
								Federally funded defense/space-related			Other outlays	
	Total	Defense space related	Other	Total (bil. dol.)	Percent of GDP [2]	Current dollars	Constant dollars	Total	Defense	Space	Non-Federal	Federal
1960	13.5	7.5	6.0	52.0	2.6	9.4	7.6	55	52	3	35	9
1965	20.0	10.8	9.3	70.6	2.9	6.3	3.7	54	33	21	35	11
1970	26.1	11.4	14.7	74.6	2.6	2.0	-3.2	44	33	10	43	13
1973	30.7	11.9	18.9	74.9	2.3	7.9	1.7	39	32	7	47	15
1974	32.9	11.8	21.1	73.9	2.3	7.0	-1.4	36	29	7	49	15
1975	35.2	12.3	23.0	72.2	2.2	7.2	-2.3	35	27	7	49	17
1976	39.0	13.4	25.6	75.0	2.2	10.8	3.9	34	27	8	49	17
1977	42.8	14.3	28.5	76.7	2.2	9.6	2.2	33	27	7	50	17
1978	48.1	15.3	32.8	80.1	2.2	12.5	4.4	32	26	6	50	18
1979	54.9	16.6	38.4	84.1	2.2	14.2	5.0	30	25	6	51	19
1980	62.6	18.4	44.2	87.6	2.3	13.9	4.3	29	24	5	53	18
1981	71.9	21.2	50.6	91.4	2.4	14.8	4.3	30	24	5	54	17
1982	80.0	24.6	55.4	95.5	2.5	11.3	4.5	31	26	5	54	15
1983	89.1	28.3	60.9	102.3	2.6	11.4	7.1	32	27	4	54	14
1984	101.2	31.8	69.3	111.2	2.7	13.5	8.7	31	28	3	55	14
1985	113.8	37.5	76.3	120.6	2.8	12.5	8.5	33	30	3	54	13
1986	119.6	40.5	79.1	123.3	2.8	5.0	2.3	34	31	3	55	12
1987	125.4	43.2	82.2	125.4	2.8	4.9	1.7	34	31	3	54	12
1988	132.9	43.7	89.2	128.0	2.7	6.0	2.1	33	30	3	55	12
1989	141.0	43.4	97.6	130.0	2.7	6.1	1.6	31	27	4	58	12
1990	151.5	44.4	107.1	134.1	2.7	7.5	3.2	29	25	4	59	11
1991	160.1	42.9	117.2	136.4	2.8	5.6	1.7	27	22	4	62	11
1992	164.5	41.1	123.4	136.3	2.7	2.7	-0.1	25	21	4	63	12
1993	165.8	40.6	125.2	134.4	2.6	0.8	-1.4	25	21	4	64	12
1994, prel.	169.1	41.3	127.8	134.3	2.5	2.0	-0.0	24	20	4	64	12
1995, est.	171.0	41.0	130.0	132.1	2.4	1.1	-1.6	24	20	4	65	11

[1] Based on GDP implicit price deflator. [2] GDP = Gross Domestic Product. [3] Change from immediate prior year.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* annual.

No. 957. R&D Source of Funds and Performance Sector: 1970 to 1995

[**In millions of dollars.** See headnote, table 958]

YEAR	Total	SOURCE OF FUNDS				PERFORMANCE SECTOR				
		Federal Govt.	Industry	Univ., colleges	Other [1]	Federal Govt.	Industry	Univ., colleges	Associated FFRDC's [2]	Other [1]
Current dollars:										
1970	26,134	14,891	10,444	462	337	4,079	18,067	2,335	737	916
1975	35,213	18,109	15,820	749	535	5,354	24,187	3,409	987	1,276
1980	62,596	29,455	30,912	1,326	903	7,632	44,505	6,063	2,246	2,150
1985	113,818	52,127	57,978	2,369	1,344	12,945	84,239	9,686	3,523	3,425
1987	125,376	57,913	62,643	3,192	1,628	13,413	92,155	12,152	4,206	3,450
1988	132,889	59,546	68,044	3,463	1,836	14,281	97,015	13,462	4,531	3,600
1989	140,981	59,893	75,046	3,921	2,121	15,121	102,055	14,975	4,730	4,100
1990	151,544	61,493	83,380	4,329	2,342	16,002	109,727	16,283	4,832	4,700
1991	160,096	60,219	92,485	4,835	2,557	15,238	116,952	17,577	5,079	5,250
1993	165,849	60,224	97,645	5,111	2,869	16,556	118,334	19,911	5,298	5,750
1994, prel.	169,100	61,050	99,650	5,350	3,050	17,200	119,700	20,950	5,250	6,000
1995, est.	171,000	60,700	101,650	5,500	3,150	16,700	121,400	21,600	5,300	6,000
Constant (1987) dollars: [3]										
1970	74,597	42,622	29,673	1,335	966	11,789	51,327	6,749	2,130	2,602
1975	72,237	37,396	32,162	1,574	1,105	11,248	49,161	7,162	2,074	2,593
1980	87,649	41,385	43,118	1,878	1,268	10,810	62,071	8,588	3,181	2,999
1985	120,599	55,245	61,418	2,512	1,425	13,727	89,236	10,271	3,736	3,628
1987	125,376	57,913	62,643	3,192	1,628	13,413	92,155	12,152	4,206	3,450
1988	127,991	57,386	65,492	3,343	1,770	13,785	93,373	12,994	4,374	3,465
1989	130,025	55,275	69,169	3,624	1,958	13,975	94,060	13,840	4,372	3,779
1990	134,135	54,587	73,604	3,865	2,079	14,288	96,846	14,538	4,314	4,148
1991	136,385	51,407	78,652	4,143	2,183	13,057	99,449	15,062	4,352	4,464
1993	134,428	48,876	79,069	4,155	2,328	13,460	95,817	16,188	4,307	4,656
1994, prel.	134,292	48,569	79,031	4,266	2,426	13,716	94,925	16,707	4,187	4,758
1995, est.	132,078	46,989	78,381	4,270	2,437	12,966	93,601	16,770	4,115	4,626

[1] Nonprofit institutions. [2] University associated federally-funded R&D centers. [3] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* annual.

No. 958. R&D Funds, by Performance Sector: 1980 to 1995

[**In millions of dollars, except percent.** Data primarily on calendar year basis—calendar year data for industry and other nonprofit institutions combined with Federal and university fiscal year data. Data refer, in general, to natural sciences including engineering, and to social sciences in all but industry sector. Excludes capital expenditures data. Expenditures at associated federally funded research and development centers administered by industry and other nonprofit institutions included in totals of respective sectors. See also *Historical Statistics, Colonial Times to 1970,* series W 109-125]

PERFORMANCE SECTOR	1980	1985	1990	1991	1992	1993	1994, prel.	1995, est.
Total R&D [1]	**62,596**	**113,818**	**151,544**	**160,096**	**164,493**	**165,849**	**169,100**	**171,000**
In 1987 dollars [2]	87,649	120,599	134,135	136,385	136,276	134,428	134,292	132,078
Percent Federal as source	47.1	45.8	40.6	37.6	36.7	36.3	36.1	35.5
Percent of gross domestic product	2.3	2.8	2.7	2.8	2.7	2.6	2.5	2.4
Federal Government	7,632	12,945	16,002	15,238	15,690	16,556	17,200	16,700
Industry	44,505	84,239	109,727	116,952	119,110	118,334	119,700	121,400
Federal funds	14,029	27,196	28,125	26,372	24,722	22,813	22,300	22,100
Industry funds	30,476	57,043	81,602	90,580	94,388	95,521	97,400	99,300
Universities and colleges	6,063	9,686	16,283	17,577	18,794	19,911	20,950	21,600
Federal funds	4,098	6,063	9,634	10,230	11,090	11,957	12,600	13,000
Industry funds	236	560	1,128	1,205	1,291	1,374	1,450	1,500
University and college funds [3]	1,326	2,369	4,329	4,835	5,018	5,111	5,350	5,500
Other nonprofit institutions funds [3]	403	694	1,192	1,307	1,395	1,469	1,550	1,600
Universities and colleges, associated federally funded R&D centers	2,246	3,523	4,832	5,079	5,249	5,298	5,250	5,300
Other nonprofit institutions	2,150	3,425	4,700	5,250	5,650	5,750	6,000	6,000
Federal funds	1,450	2,400	2,900	3,300	3,550	3,600	3,700	3,600
Industry funds	200	375	650	700	750	750	800	850
Other [4]	500	650	1,150	1,250	1,350	1,400	1,500	1,550
Total research, basic and applied	**22,045**	**39,537**	**57,144**	**65,030**	**65,133**	**66,263**	**68,260**	**69,310**
In 1987 dollars [2]	30,981	41,901	50,682	55,469	54,026	53,751	54,268	53,608
Percent Federal as source	54.8	50.8	47.9	44.8	44.7	45.7	45.6	45.4
Federal Government	3,666	5,056	5,953	6,539	6,616	7,360	7,600	7,600
Industry	9,775	21,117	29,913	35,283	33,680	32,803	33,500	33,800
Federal funds	2,190	5,836	7,721	7,733	6,468	5,892	5,900	5,800
Industry funds	7,585	15,281	22,192	27,550	27,212	26,911	27,600	28,000
Universities and colleges	5,566	8,973	14,986	16,079	17,218	18,277	19,290	19,950
Federal funds	3,739	5,604	8,802	9,245	10,053	10,880	11,520	11,960
Industry funds	219	521	1,049	1,121	1,201	1,278	1,350	1,390
University and college funds [3]	1,233	2,203	4,026	4,497	4,667	4,753	4,980	5,110
Other nonprofit institutions funds [3]	375	645	1,109	1,216	1,297	1,366	1,440	1,490
Universities and colleges, associated federally funded R&D centers	1,553	2,351	3,052	3,519	3,779	3,903	3,840	3,850
Other nonprofit institutions	1,485	2,040	3,240	3,610	3,840	3,920	4,030	4,110
Federal funds	930	1,250	1,850	2,100	2,200	2,250	2,250	2,250
Industry funds	160	300	520	560	610	610	640	680
Other [4]	395	490	870	950	1,030	1,060	1,140	1,180
Total basic research	**8,435**	**14,210**	**22,322**	**26,399**	**26,860**	**28,902**	**29,170**	**29,560**
In 1987 dollars [2]	11,902	15,064	19,860	22,557	22,314	23,464	23,220	22,900
Percent of total R&D	13.5	12.5	14.7	16.5	16.3	17.4	17.3	17.3
Percent Federal as source	70.1	64.7	61.9	56.7	57.0	56.0	57.6	57.7
Federal Government	1,182	1,923	2,366	2,446	2,397	2,605	2,700	2,700
Industry	1,325	2,862	5,128	7,837	7,075	7,926	7,200	7,150
Federal funds	290	489	1,368	1,712	1,210	1,000	1,000	950
Industry funds	1,035	2,373	3,760	6,125	5,865	6,926	6,200	6,200
Universities and colleges	4,036	6,555	10,640	11,601	12,504	13,270	14,100	14,500
Federal funds	2,861	4,342	6,645	7,123	7,713	8,379	8,900	9,200
Industry funds	141	342	678	734	803	845	900	900
University and college funds [3]	793	1,447	2,601	2,947	3,120	3,143	3,350	3,400
Other nonprofit institutions funds [3]	241	424	716	797	868	903	950	1,000
Universities and colleges, associated federally funded R&D centers	1,132	1,765	2,428	2,595	2,844	2,941	3,000	3,000
Other nonprofit institutions	760	1,105	1,760	1,920	2,040	2,160	2,170	2,210
Federal funds	450	675	1,000	1,100	1,150	1,250	1,200	1,200
Industry funds	95	170	300	320	350	350	370	390
Other [4]	215	260	460	500	540	560	600	620
Total development	**40,551**	**74,281**	**94,400**	**95,066**	**99,360**	**99,586**	**100,840**	**101,690**
In 1987 dollars [2]	56,669	78,698	83,453	80,916	82,250	80,677	80,024	78,470
Percent of total R&D	64.8	65.3	62.3	59.4	60.4	60.0	59.6	59.5
Percent Federal as source	42.9	43.1	36.1	32.7	31.4	30.1	29.7	28.8

[1] Basic research, applied research, and development. [2] Based on gross domestic product implicit price deflator. [3] Includes State and local government funds received by these institutions and used for research and development. [4] Includes estimates for independent nonprofit hospitals and voluntary health agencies.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* annual.

No. 959. Funds for R&D—Performance Sector, by State: 1991

[**In millions of dollars.** See headnote, table 958. Data shown here are unrevised]

STATE	Total	Federal government [1]	Industry	Universities and colleges [2]	Other nonprofit [3]	STATE	Total	Federal government [1]	Industry	Universities and colleges [2]	Other nonprofit [3]
U.S.	**145,385**	**15,238**	**102,246**	**22,701**	**5,200**	MO	(NA)	71	(7)	306	22
						MT	(NA)	26	(6)	38	1
AL	1,503	701	521	245	36	NE	211	22	59	124	6
AK	146	59	18	67	2	NV	261	109	83	67	3
AZ	1,399	132	944	311	11	NH	(NA)	88	(9)	79	-
AR	198	35	106	55	2	NJ	8,768	513	7,810	433	12
CA	28,337	1,885	21,279	4,700	473	NM	2,582	393	1,064	1,111	15
CO	(NA)	275	(4)	340	106	NY	10,363	174	8,268	1,751	170
CT	1,913	47	1,535	317	15	NC	1,965	151	1,285	502	27
DE	(NA)	9	(5)	45	3	ND	(NA)	24	(7)	31	1
DC	1,737	1,433	40	118	145	OH	5,975	689	4,726	504	57
FL	3,700	658	2,599	438	5	OK	604	41	392	153	18
GA	1,479	121	868	484	6	OR	600	47	349	179	24
HI	145	45	11	78	11	PA	7,621	315	6,262	906	138
ID	(NA)	37	(6)	42	1	RI	485	226	152	88	18
IL	6,417	68	5,027	1,275	47	SC	595	14	419	151	10
IN	2,347	92	1,988	262	4	SD	32	9	5	16	2
IA	777	27	461	286	3	TN	1,139	124	737	251	28
KS	(NA)	12	(7)	124	5	TX	6,635	405	4,755	1,218	257
KY	317	62	154	98	2	UT	665	103	356	202	4
LA	457	43	172	240	2	VT	(NA)	5	(8)	47	5
ME	(NA)	14	(8)	27	16	VA	2,771	1,107	1,115	366	182
MD	5,864	3,432	1,203	1,078	151	WA	3,890	133	3,215	350	193
MA	8,561	278	6,335	1,338	610	WV	(NA)	76	(10)	73	5
MI	8,851	92	8,116	601	42	WI	1,573	32	1,140	388	13
MN	2,228	41	1,810	332	46	WY	41	9	2	23	7
MS	299	157	41	97	4	Other [11]	3,835	577	675	349	2,234

- Represents or rounds to zero. NA Not available. [1] Total funds used by Federal government from Federal sources. [2] Distribution by States includes R&D performed in only doctoral degree granting institutions; U.S. total includes R&D performed in all institutions. [3] For other sector, funds distributed by State include only Federal obligations to organizations in the nonprofit sector. Nonprofit R&D performance using non-Federal funds are undistributed. [4] Between $1,751 and $2,593 million. [5] Between $863 and $995 million. [6] Under $95 million. [7] Under $1,963 million. [8] Under $284 million. [9] Between $102 and $120 million. [10] Between $69 and $201 million. [11] Includes unknown.

Source: U.S. National Science Foundation, *Science and Engineering Indicators,* 1993.

No. 960. Federal Obligations for R&D, by Agency: 1975 to 1995

[**In millions of dollars. For fiscal years ending in year shown;** see text, section 9. Includes those agencies with obligations of $1 billion or more in 1995. See *Historical Statistics, Colonial Times to 1970,* series W 142, for total R&D expenditures]

AGENCY	1975	1980	1985	1990	1991	1992	1993	1994	1995, est.
CURRENT DOLLARS									
Obligations, total [1]	**19,039**	**29,830**	**48,360**	**63,668**	**61,295**	**65,593**	**67,314**	**69,594**	**69,366**
Dept. of Defense	9,013	13,981	29,792	37,268	32,135	36,130	35,849	35,650	34,927
Dept. of Health and Human Services	2,281	3,780	5,451	8,406	9,756	8,988	10,349	11,031	11,481
National Aeronautics and Space Administration	3,064	3,234	3,327	6,533	7,280	7,658	8,020	8,766	8,585
Dept. of Energy	2,047	4,754	4,966	5,631	5,983	6,172	6,262	6,530	6,370
National Science Foundation	595	882	1,346	1,690	1,785	1,868	1,882	2,031	2,219
Dept. of Agriculture	420	688	943	1,108	1,237	1,327	1,328	1,388	1,397
CONSTANT (1987) DOLLARS [2]									
Obligations, total [1]	**39,998**	**42,253**	**51,283**	**56,846**	**52,524**	**54,615**	**54,727**	**55,498**	**53,856**
Dept. of Defense	18,935	19,803	31,592	33,275	27,536	30,083	29,146	28,429	27,117
Dept. of Health and Human Services	4,792	5,354	5,780	7,505	8,360	7,484	8,414	8,797	8,914
National Aeronautics and Space Administration	6,437	4,581	3,528	5,833	6,238	6,376	6,520	6,990	6,665
Dept. of Energy	4,300	6,733	5,266	5,028	5,127	5,139	5,691	5,207	4,946
National Science Foundation	1,250	1,249	1,427	1,509	1,530	1,555	1,530	1,620	1,723
Dept. of Agriculture	882	974	1,000	989	1,060	1,105	1,080	1,107	1,085

[1] Includes other agencies, not shown separately. [2] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal Funds for Research and Development,* annual.

No. 961. Federal Funding for R&D, by Selected Budget Functions: 1970 to 1996

[**In millions of dollars. For fiscal years ending in year shown;** see text, section 9. Excludes R&D plant. Represents budget authority. Functions shown are those for which $1 billion or more was authorized for 1996. See *Historical Statistics, Colonial Times to 1970,* series W 126, for total obligations]

FUNCTION	1970	1980	1985	1990	1992	1993	1994	1995	1996, est.
CURRENT DOLLARS									
Total [1]	**15,339**	**29,739**	**49,887**	**63,781**	**68,398**	**69,884**	**68,331**	**70,309**	**70,503**
Eight functions, percent of total	96.6	96.5	98.3	98.0	98.0	98.1	97.9	97.5	97.4
National defense	7,981	14,946	33,698	39,925	40,083	41,249	37,764	39	37,571
Health	1,084	3,694	5,418	8,308	10,055	10,280	10,993	11,356	11,785
Space research and technology	3,606	2,738	2,725	5,765	6,744	6,988	7,414	7,874	7,863
Energy	574	3,603	2,389	2,715	3,099	2,677	2,873	2,856	3,069
General science	452	1,233	1,862	2,410	2,659	2,691	2,712	2,843	3,011
Natural resources and environment	340	999	1,059	1,386	1,688	1,802	2,062	2,067	2,208
Transportation	535	887	1,030	1,045	1,523	1,703	1,888	1,865	1,984
Agriculture	238	585	836	950	1,155	1,152	1,193	1,179	1,187
CONSTANT (1987) DOLLARS [2]									
Total [1]	**44,332**	**42,123**	**52,902**	**56,947**	**56,951**	**56,816**	**54,490**	**54,588**	**53,170**
National defense	23,066	21,170	35,735	35,647	33,375	33,536	30,115	29,905	28,334
Health	3,133	5,232	5,745	7,418	8,372	8,358	8,766	8,817	8,888
Space research and technology	10,422	3,878	2,890	5,147	5,615	5,681	5,912	6,113	5,930
Energy	1,659	5,103	2,533	2,424	2,580	2,176	2,291	2,217	2,314
General science	1,306	1,746	1,975	2,152	2,214	2,188	2,163	2,207	2,271
Natural resources and environment	983	1,415	1,123	1,238	1,405	1,465	1,644	1,605	1,665
Transportation	1,546	1,256	1,092	933	1,268	1,385	1,506	1,448	1,496
Agriculture	688	829	887	848	962	937	951	915	895

[1] Includes other functions, not shown separately. [2] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal R&D Funding by Budget Function,* annual.

No. 962. National R&D Expenditures as a Percent of Gross Domestic Product, by Country: 1975 to 1993

YEAR	TOTAL R&D						NONDEFENSE R&D [1]					
	United States	Japan	Unified Germany	France	United Kingdom	Italy	United States	Japan	Unified Germany	France	United Kingdom	Italy
1975	2.22	1.91	2.24	1.79	2.05	0.84	1.61	1.90	2.10	1.44	1.42	0.83
1980	2.31	2.01	2.45	1.82	(NA)	0.75	1.76	2.00	2.33	1.41	(NA)	0.74
1985	2.82	2.58	2.72	2.25	2.27	1.13	1.98	2.56	2.58	1.78	1.68	1.06
1990	2.73	2.89	2.75	2.42	2.19	1.30	2.01	2.87	2.61	1.85	1.81	1.25
1991	2.80	2.87	2.65	2.42	2.13	1.32	2.11	2.84	2.53	1.92	1.73	1.26
1992	2.77	2.80	2.53	2.36	2.12	1.38	2.10	2.77	2.42	1.92	1.71	1.33
1993	2.67	(NA)	(NA)	(NA)	(NA)	1.40	2.02	(NA)	(NA)	(NA)	(NA)	1.35

NA Not available. [1] Estimated.

Source: National Science Foundation, *National Patterns of R&D Resources,* annual; and Organization for Economic Co-operation and Development.

No. 963. R&D Expenditures in Science and Engineering at Universities and Colleges: 1981 to 1994

[**In millions of dollars**]

CHARACTERISTIC	1981	1990	1994	CHARACTERISTIC	1981	1990	1994
CURRENT DOLLARS				CONSTANT (1987) DOLLARS [1]			
Total	**6,846**	**16,334**	**21,081**	**Total**	**8,799**	**14,493**	**16,811**
Basic research	4,593	10,680	14,095	Basic research	5,904	9,476	11,240
Applied R&D	2,253	5,654	6,986	Applied R&D	2,896	5,017	5,571
Source of funds:				Source of funds:			
All governments	5,115	10,976	14,223	All governments	6,575	9,739	11,342
Institutions' own funds	1,004	3,033	3,838	Institutions' own funds	1,290	2,691	3,061
Industry	292	1,130	1,430	Industry	375	1,003	1,140
Other	435	1,195	1,590	Other	559	1,060	1,268
Fields:				Fields:			
Physical sciences	765	1,809	2,171	Physical sciences	983	1,605	1,731
Environmental sciences	550	1,080	1,426	Environmental sciences	707	958	1,137
Mathematical sciences	87	221	279	Mathematical sciences	112	196	222
Computer sciences	144	514	660	Computer sciences	185	456	526
Life sciences	3,695	8,748	11,521	Life sciences	4,749	7,762	9,187
Psychology	127	258	359	Psychology	163	229	286
Social sciences	366	706	951	Social sciences	470	626	758
Other sciences	145	335	392	Other sciences	186	297	313
Engineering	967	2,663	3,324	Engineering	1,243	2,363	2,651

[1] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Survey of Scientific and Engineering Expenditures at Universities and Colleges,* annual.

No. 964. Federal Obligations to Universities and Colleges: 1970 to 1993

[**In millions of dollars, except percent. For fiscal years ending in year shown;** see text, section 9. Minus sign (-) indicates decrease]

ITEM	1970	1980	1985	1989	1990	1991	1992	1993
CURRENT DOLLARS								
Federal obligations, total	**3,237**	**8,299**	**10,972**	**15,504**	**15,198**	**17,554**	**19,056**	**(NA)**
Annual percent change [1]	-6.5	9.1	9.3	10.2	-2.0	15.5	8.6	(NA)
Academic science/engineering obligations	2,188	4,791	7,258	10,075	10,443	11,831	12,739	12,725
Percent of total	67.6	57.7	66.2	65.0	68.7	67.4	66.9	(NA)
Research and development	1,447	4,161	6,246	8,523	9,006	10,027	10,859	10,940
Research and development plant	45	38	114	237	125	152	205	259
Other science/engineering activities	696	593	898	1,315	1,312	1,652	1,676	1,525
Nonscience/engineering activities	1,049	3,508	3,714	5,429	4,755	5,722	6,317	(NA)
CONSTANT (1987) DOLLARS [2]								
Federal obligations, total	**9,355**	**11,755**	**11,635**	**14,329**	**13,570**	**15,042**	**15,867**	**(NA)**
Annual percent change [1]	-11.4	-	5.4	5.5	-5.9	10.8	5.5	(NA)
Academic science/engineering obligations	6,324	6,786	7,697	9,311	9,324	10,138	10,607	10,345
Percent of total	67.6	57.7	66.2	65.0	68.7	67.4	66.9	(NA)
Research and development	4,182	5,894	6,624	7,877	8,041	8,592	9,042	8,894
Research and development plant	130	54	121	219	111	130	170	211
Other science/engineering activities	2,012	840	952	1,215	1,172	1,416	1,395	1,240
Nonscience/engineering activities	3,032	4,969	3,938	5,018	4,245	4,903	5,260	(NA)

- Represents or rounds to zero. NA Not available. [1] Percent change from immediate prior year. [2] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Survey of Federal Support to Universities, Colleges, and Nonprofit Institutions,* annual.

No. 965. Federal R&D Obligations to Selected Universities and Colleges: 1981 to 1993

[**For fiscal years ending in year shown;** see text, section 9. For the top 45 institutions receiving Federal R&D funds in 1993. Awards to the administrative offices of university systems are excluded from totals for individual institutions because that allocation of funds is unknown, but those awards are included in "total all institutions"]

MAJOR INSTITUTION RANKED BY TOTAL **1993** FEDERAL R&D OBLIGATIONS	OBLIGATIONS ($1,000)			RANK		
	1981	1985	1993	1981	1985	1993
Total, all institutions [1]	**4,410,931**	**6,246,181**	**10,940,124**	**(X)**	**(X)**	**(X)**
45 institutions, percent of total	62.6	61.3	58.6	(X)	(X)	(X)
Johns Hopkins University	363,429	297,374	543,873	1	1	1
Massachusetts Institute of Technology	146,035	189,558	251,845	2	2	2
Stanford University	106,073	174,961	249,575	3	3	3
University of Washington	99,965	146,179	246,013	4	4	4
University of Michigan	73,999	108,035	214,612	11	11	5
University of California—San Diego	91,403	103,633	204,063	6	13	6
University of California—Los Angeles	94,945	128,211	195,788	5	5	7
Columbia University—Main Division	83,659	127,331	194,910	9	6	8
University of Wisconsin—Madison	86,918	124,604	190,469	8	7	9
University of Pennsylvania	76,136	103,119	186,002	10	15	10
University of California—San Francisco	64,814	98,536	175,388	15	16	11
Cornell University	72,671	119,966	174,226	13	8	12
Pennsylvania State University	47,099	76,726	173,070	21	19	13
Harvard University	87,830	109,414	169,173	7	9	14
Yale University	73,526	109,227	169,151	12	10	15
University of Minnesota	72,001	103,272	168,675	14	14	16
University of Colorado	46,146	71,424	145,497	22	23	17
Duke University	44,287	69,169	138,839	23	26	18
University of Pittsburgh	38,512	58,620	136,780	29	28	19
University of California—Berkeley	64,065	106,710	133,232	16	12	20
Washington University	54,170	71,978	133,210	17	22	21
University of North Carolina at Chapel Hill	38,447	63,105	129,071	30	27	22
University Southern California	49,221	89,706	125,297	20	17	23
University of Texas at Austin	43,756	72,379	117,225	24	21	24
University of Illinois—Urbana Champaign	53,583	83,122	116,116	19	18	25
University of Arizona	36,308	49,740	107,819	33	37	26
Boston University	27,019	46,152	102,642	51	43	27
University of Chicago	53,992	71,194	99,378	18	24	28
University of Rochester	42,983	70,379	98,935	25	25	29
University of Alabama—Birmingham	29,970	44,093	90,737	44	46	30
Case Western Reserve University	33,744	47,994	89,608	38	40	31
Baylor Col of Medicine	35,062	45,837	88,276	35	45	32
University of Iowa	35,300	55,117	87,875	34	31	33
California Inst of Tech	32,959	55,083	87,702	40	32	34
University of California—Davis	31,757	43,156	84,495	42	47	35
Ohio State University	42,899	56,065	84,121	26	30	36
Northwestern University	32,446	48,260	82,636	47	39	37
Vanderbilt University	27,426	39,909	82,091	49	48	38
Indiana University	29,276	39,118	81,374	45	49	39
University of Virginia	24,333	37,415	79,221	52	52	40
New York University	40,636	74,577	77,694	28	20	41
University of Utah	38,163	50,938	77,407	31	36	42
University of Florida	30,845	47,716	77,341	43	41	43
University of Maryland— College Park	27,313	51,073	76,300	50	35	44
Purdue University	36,549	51,544	74,920	32	34	45

X Not applicable. [1] Includes other institutions, not shown separately.

Source: U.S. National Science Foundation, *Federal Support to Universities and Colleges and Nonprofit Institutions,* annual.

No. 966. Funds for Performance of Industrial R&D, by Source of Funds and Selected Industries: 1980 to 1993

[**In millions of dollars. For calendar years.** Covers basic research, applied research, and development. See also *Historical Statistics, Colonial Times to 1970,* series W 144-160]

INDUSTRY	1987 SIC [1] code	1980	1985	1990	1991	1992	1993
CURRENT DOLLARS							
Total funds	(X)	44,505	84,239	109,727	116,952	119,110	118,334
Chemicals and allied products	28	4,636	8,540	13,291	14,648	15,381	(D)
Petroleum refining and extraction	13,29	1,552	(D)	2,306	2,498	2,277	2,117
Machinery	35	5,901	12,216	14,446	14,775	14,938	8,270
Electrical equipment	36	9,175	14,432	13,400	13,415	13,360	12,686
Motor vehicles and motor vehicles equipment	371	4,955	6,984	(D)	(D)	(D)	(D)
Aircraft and missiles	372,376	9,198	22,231	20,635	16,629	17,158	15,615
Professional and scientific instruments	38	3,029	5,013	7,055	8,705	9,542	10,288
All other [2]	(X)	6,059	(D)	(D)	(D)	(D)	(D)
Company funds	(X)	30,476	57,043	81,602	90,580	94,388	95,521
Chemicals and allied products	28	4,264	8,310	13,168	14,439	15,091	16,747
Petroleum refining and extraction	13,29	1,401	2,194	2,289	2,487	2,268	2,103
Machinery	35	5,254	10,721	13,575	13,720	13,903	8,182
Electrical equipment	36	5,431	9,271	9,267	8,865	9,516	11,285
Motor vehicles and motor vehicles equipment	371	4,300	6,164	8,594	9,063	9,132	10,652
Aircraft and missiles	372,376	2,570	5,649	5,387	5,533	6,871	6,246
Professional and scientific instruments	38	2,456	4,622	6,318	6,840	7,321	7,521
All other [2]	(X)	4,800	10,132	23,004	29,633	30,286	32,785
CONSTANT (1987) DOLLARS [3]							
Total funds	(X)	62,071	89,236	96,846	99,449	98,519	95,817
Chemicals and allied products	28	6,466	9,047	11,730	12,455	12,722	(D)
Petroleum refining and extraction	13,29	2,165	(D)	2,035	2,124	1,883	1,714
Machinery	35	8,230	12,941	12,750	12,563	12,355	6,696
Electrical equipment	36	12,796	15,288	11,827	11,407	11,050	10,272
Motor vehicles and motor vehicles equipment	371	6,911	7,398	(D)	(D)	(D)	(D)
Aircraft and missiles	372,376	12,828	23,550	18,212	14,140	14,191	12,643
Professional and scientific instruments	38	4,225	5,310	6,226	7,402	7,892	8,330
All other [2]	(X)	8,450	(D)	(D)	(D)	(D)	(D)
Company funds	(X)	42,505	60,427	72,022	77,023	78,071	77,344
Chemicals and allied products	28	5,947	8,803	11,622	12,278	12,482	13,560
Petroleum refining and extraction	13,29	1,954	2,324	2,020	2,114	1,875	1,702
Machinery	35	7,328	11,357	11,981	11,666	11,499	6,625
Electrical equipment	36	7,575	9,821	8,179	7,538	7,871	9,137
Motor vehicles and motor vehicles equipment	371	5,997	6,530	7,585	7,706	7,553	8,625
Aircraft and missiles	372,376	3,584	5,984	4,754	4,704	5,683	5,057
Professional and scientific instruments	38	3,425	4,896	5,576	5,816	6,055	6,089
All other [2]	(X)	6,695	10,733	20,303	25,198	25,050	26,546

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable.
[1] Prior to 1992, 1972 Standard Industrial Classification; beginning 1992, 1987 Standard Industrial Classification; see text, section 13. [2] All other manufacturing and nonmanufacturing. [3] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Research and Development in Industry,* annual.

No. 967. R&D Funds in R&D-Performing Manufacturing Companies, by Industry: 1980 to 1993

INDUSTRY	1987 SIC [1] code	TOTAL R&D FUNDS AS A PERCENT OF NET SALES					COMPANY R&D FUNDS AS A PERCENT OF NET SALES				
		1980	1985	1990	1992	1993	1980	1985	1990	1992	1993
Total [2]	(X)	3.0	4.4	4.2	4.2	3.8	2.1	3.0	3.1	3.3	3.1
Food and kindred products [3]	20	0.4	(D)	(D)	0.5	0.4	(D)	0.6	0.5	0.5	0.4
Paper and allied products	26	1.0	(D)	1.0	(D)	(D)	1.0	0.8	1.0	1.0	1.1
Chemicals and allied products	28	3.6	5.0	5.3	5.5	(D)	3.3	4.9	5.3	5.4	5.8
Petroleum refining and extraction	13,29	0.6	(D)	0.9	0.9	0.9	0.5	0.9	0.9	0.9	0.8
Rubber products	30	2.2	(D)	(D)	(D)	(D)	(D)	1.8	2.1	2.3	2.1
Stone, clay, and glass products	32	1.4	(D)	(D)	(D)	(D)	1.3	2.3	1.7	1.6	1.5
Primary metals	33	0.7	(D)	0.8	0.6	0.7	0.5	0.9	0.8	0.6	0.7
Fabricated metal products	34	1.4	1.5	1.4	1.5	(D)	1.2	1.4	1.1	1.1	1.1
Machinery	35	5.0	7.6	7.7	7.8	4.5	4.5	6.7	7.2	7.3	4.5
Electrical equipment	36	6.6	7.6	6.5	5.6	5.8	3.9	4.8	4.5	4.0	5.1
Motor vehicles and motor vehicle equipment	371	4.9	3.8	(D)	(D)	(D)	4.2	3.1	3.7	4.0	3.6
Aircraft and missiles	372,376	13.7	14.9	11.8	11.8	13.2	3.8	3.9	3.1	4.7	5.2
Professional and scientific instruments	38	7.5	8.9	8.0	9.4	9.6	6.1	8.3	7.1	7.2	7.0

D Figure withheld to avoid disclosure of information pertaining to a specific organization or individual. X Not applicable.
[1] Prior to 1992, 1972 Standard Industrial Classification; beginning 1992, 1987 Standard Industrial Classification; see text, section 13. [2] Includes all manufacturing industries. [3] Includes tobacco products (SIC 21) beginning 1985.

Source: U.S. National Science Foundation, *Research and Development in Industry,* annual.

No. 968. Federal Obligations for Research, by Field of Science: 1980 to 1995

[**In millions of dollars. For fiscal years ending in year shown;** see text, section 9. Excludes R&D plant]

FIELD	1980	1985	1988	1990	1991	1992	1993	1994	1995, est.
CURRENT DOLLARS									
Research, total	**11,597**	**16,133**	**20,766**	**21,731**	**23,968**	**24,491**	**26,890**	**28,034**	**28,161**
Basic	4,674	7,819	10,602	11,286	12,171	12,490	13,399	14,043	14,201
Applied	6,923	8,315	10,164	10,446	11,798	12,001	13,491	13,990	13,960
Life sciences	4,192	6,363	8,495	8,830	9,622	9,910	10,772	11,350	11,609
Psychology	199	327	422	449	482	298	551	569	574
Physical sciences	2,001	3,046	3,705	3,809	4,235	4,439	4,427	4,449	4,379
Environmental sciences	1,261	1,404	1,773	2,174	2,150	2,208	2,608	2,832	2,690
Mathematics and computer sciences	241	575	735	841	904	1,160	1,225	1,410	1,526
Engineering	2,830	3,618	4,442	4,335	4,945	4,977	5,499	5,701	5,629
Social sciences	524	460	551	630	727	690	675	708	699
Other sciences, n.e.c. [1]	350	342	642	664	903	808	1,133	1,014	1,055
CONSTANT (1987) DOLLARS [2]									
Research, total	**16,427**	**17,109**	**19,192**	**19,403**	**20,538**	**20,392**	**21,862**	**22,356**	**21,864**
Basic	6,621	8,291	9,799	10,077	10,429	10,400	10,893	11,199	11,026
Applied	9,806	8,817	9,394	9,327	10,110	9,993	10,968	11,156	10,839
Life sciences	5,938	6,747	7,851	7,884	8,245	8,251	8,758	9,051	9,013
Psychology	282	347	390	401	413	248	448	454	446
Physical sciences	2,834	3,230	3,424	3,401	3,629	3,696	3,599	3,548	3,400
Environmental sciences	1,786	1,489	1,639	1,941	1,842	1,838	2,120	2,258	2,089
Mathematics and computer sciences	341	610	679	751	775	966	996	1,124	1,185
Engineering	4,009	3,836	4,105	3,871	4,237	4,144	4,471	4,546	4,370
Social sciences	742	488	509	563	623	575	549	565	543
Other sciences, n.e.c. [1]	495	362	593	593	774	673	921	809	819

[1] N.e.c. = Not elsewhere classified. [2] Based on gross domestic product implicit price deflator.

Source: U.S. National Science Foundation, *Federal Funds for Research and Development,* annual.

No. 969. R&D Scientists and Engineers— Employment and Cost, by Industry: 1975 to 1993

[Data are estimates; on average full-time-equivalent (FTE) basis. See *Historical Statistics, Colonial Times to 1970,* series W 167, for total cost per scientist or engineer]

INDUSTRY	1987 SIC [1] code	1975	1980	1985	1988	1989	1990	1991	1992	1993
EMPLOYED SCIENTISTS										
Average FTE of scientists and engineers (1,000) [2] [3]	**(X)**	**363.9**	**469.2**	**646.8**	**715.6**	**733.1**	**758.5**	**776.4**	**772.0**	**764.5**
Chemicals [4]	28	44.8	53.1	73.5	77.1	79.4	81.0	83.6	86.1	90.7
Machinery	35	54.3	65.7	85.7	99.4	106.9	111.5	104.5	98.4	83.3
Electrical equipment [5]	36	81.5	100.7	115.6	127.5	113.9	100.6	93.9	90.6	90.8
Motor vehicles	371	25.7	36.7	31.3	46.6	47.6	47.4	44.9	44.8	48.1
Aircraft and missiles	372,376	67.2	90.6	137.5	135.6	125.1	107.8	96.6	95.4	85.2
CONSTANT (1987) DOLLARS [6]										
Cost per scientist or engineer ($1,000) [3] [7]	**(X)**	**135.2**	**132.3**	**138.0**	**127.3**	**124.0**	**124.7**	**126.4**	**130.6**	**125.4**
Chemicals [4]	28	123.8	121.9	123.2	134.2	137.3	140.3	142.5	151.8	162.4
Machinery	35	119.7	125.4	151.0	(D)	119.8	122.2	125.7	126.4	80.4
Electrical equipment [5]	36	127.5	127.0	132.4	119.4	122.0	126.0	125.1	124.2	113.1
Motor vehicles	371	185.2	188.5	236.4	(D)	(D)	(D)	(D)	184.4	197.2
Aircraft and missiles	372,376	173.0	141.7	171.3	186.0	191.1	188.6	150.5	149.3	148.5

D Withheld to avoid disclosure. X Not applicable. [1] Prior to 1992, 1972 Standard Industrial Classification; beginning 1992, 1987 Standard Industrial Classification; see text, section 13. [2] The mean number of FTE R&D scientists and engineers employed in January of the year shown and the following January. [3] Includes industries not shown separately. [4] Includes allied products. [5] Includes communication. [6] Based on gross domestic product implicit price deflator. [7] Represents the arithmetic mean of the numbers of R&D scientists and engineers reported in each industry for January in 2 consecutive years divided into total R&D expenditures in each industry.

Source: U.S. National Science Foundation, *Research and Development in Industry,* annual.

No. 970. Scientists and Engineers Employed in R&D: 1970 to 1993

[**For full-time equivalent employees.** Data are estimates. Yearly averages for industry sector only. Excludes those employed by State and local government agencies]

SECTOR	1970	1980	1983	1984	1985	1987	1989	1991	1993
Total [1] (1,000)	**543.8**	**651.1**	**751.6**	**797.6**	**801.9**	**877.8**	**924.2**	**960.4**	**962.7**
PERCENT DISTRIBUTION									
Industry (excl. social scientists)	69.1	72.1	74.8	75.6	80.9	80.0	79.3	80.8	79.4
Federal Government	12.4	9.0	8.2	7.8	6.5	6.2	6.4	6.1	6.2
Other [2]	18.5	18.9	17.0	16.6	12.6	13.8	14.3	13.1	14.3

[1] Due to change in methodology, data beginning 1985 are not comparable with data for previous years. [2] Includes professional R&D personnel employed at universities and colleges, other nonprofit institutions, and federally funded R&D centers administered by organizations in these sectors and graduate students engaged in R&D at universities and colleges.

Source: U.S. National Science Foundation, *National Patterns of R&D Resources,* annual.

No. 971. Civilian Employment of Scientists, Engineers, and Technicians, by Occupation and Industry: 1994

[**In thousands.** Based on sample and subject to sampling error. For details, see source]

OCCUPATION	Total [1]	WAGE AND SALARY WORKERS								Self employed
		Mining [2]	Construction	Manufacturing	Transportation [3]	Trade	FIRE [4]	Services	Government	
Scientists and engineers	**2,822.7**	**36.6**	**31.5**	**866.0**	**116.7**	**96.5**	**109.7**	**891.1**	**480.6**	**185.0**
Scientists	1,495.3	16.3	2.4	261.1	46.9	60.3	98.7	554.8	300.0	146.0
Physical scientists	209.2	10.4	0.3	58.1	3.0	2.3	0.7	76.0	46.3	12.0
Life scientists	185.9	0.2	0.1	28.1	1.3	1.3	0.6	61.4	75.2	10.0
Mathematical scientists	14.0	(NA)	(NA)	1.5	0.4	(NA)	3.0	4.1	5.0	-
Social scientists	258.7	1.5	(NA)	(NA)	0.8	(NA)	7.6	105.0	68.9	75.0
Computer systems analysts, engineers and scientists	827.5	4.1	2.0	173.4	41.3	56.7	86.9	308.3	104.7	49.0
Engineers [5]	1,327.4	20.3	29.1	604.9	69.9	36.2	11.0	336.3	180.6	39.0
Civil engineers	184.4	0.6	10.4	7.7	5.5	0.4	0.5	79.5	70.8	9.0
Electrical/electronics	348.6	0.6	8.5	156.7	35.2	12.4	1.3	86.4	37.5	10.0
Mechanical engineers	230.5	1.7	4.8	134.5	4.4	6.7	1.1	56.2	13.1	8.0
Engineering and science technicians	1,219.6	16.8	27.2	441.8	67.8	84.8	4.4	385.2	161.9	25.0
Electrical/electronics technicians	314.0	1.0	7.1	122.9	21.4	64.0	1.5	62.4	26.6	7.0
Engineering technicians	371.1	5.3	4.0	128.9	25.8	10.6	0.3	96.3	92.8	7.0
Drafters	303.6	2.1	15.7	102.2	17.1	6.6	1.3	137.2	10.2	9.0
Science technicians	230.9	8.4	0.4	87.7	3.5	3.5	1.3	89.3	32.3	2.0
Surveyors	95.5	2.5	2.5	(NA)	3.0	(NA)	0.8	57.5	22.2	7.0
Computer programmers	536.7	2.7	1.5	77.8	22.1	38.3	78.6	254.8	35.1	26.0

- Represents or rounds to zero. NA Not available. [1] Includes agriculture, forestry, and fishing not shown separately. [2] Includes oil and gas extraction. [3] Includes communications and public utilities. [4] Finance, insurance, and real estate. [5] Includes kinds of engineers and technicians not shown separately.

Source: U.S. Bureau of Labor Statistics, unpublished data.

No. 972. Graduate Science/Engineering Students in Doctorate-Granting Colleges: 1985 to 1992

[As of **fall.** Includes outlying areas]

FIELD OF SCIENCE OR ENGINEERING	TOTAL (1,000)			PERCENT—							
				Female			Foreign		Part-time		
	1985	1990	1992	1985	1990	1992	1990	1992	1985	1990	1992
Total, all surveyed fields	**353.8**	**394.8**	**427.8**	**34.5**	**37.5**	**38.6**	**25.6**	**25.1**	**32.2**	**30.7**	**29.9**
Science/engineering	314.8	347.4	374.8	29.4	32.2	33.2	27.9	27.5	30.4	28.5	27.7
Engineering, total	89.7	99.1	108.3	11.5	13.6	14.4	36.7	36.3	39.5	35.6	33.7
Sciences, total	225.1	248.2	266.5	36.6	39.6	40.8	24.3	23.9	26.8	25.6	25.3
Physical sciences	29.4	32.4	33.6	20.5	23.4	24.5	37.1	36.8	11.7	11.2	10.7
Environmental	14.3	13.0	14.0	25.4	29.2	31.0	20.1	21.0	23.9	23.6	24.3
Mathematical sciences	15.2	17.2	17.9	29.1	30.4	31.2	36.1	33.9	26.9	23.4	22.4
Computer sciences	23.4	27.4	29.0	24.9	22.8	21.8	33.2	35.0	48.0	46.6	46.4
Agricultural sciences	10.7	10.4	10.9	25.6	29.2	31.5	29.1	27.8	18.2	17.7	18.2
Biological sciences	42.1	46.2	50.2	42.4	45.5	46.3	24.2	24.9	16.0	14.6	14.8
Psychology	30.4	34.7	37.7	59.7	65.5	67.3	4.6	4.7	30.1	28.4	27.9
Social sciences	59.6	66.8	73.2	39.7	42.9	44.1	21.9	20.4	34.1	32.4	31.3
Health fields, total	39.0	47.4	53.0	75.5	76.6	76.4	8.6	8.1	46.2	47.1	45.7

Source: U.S. National Science Foundation, *Survey of Graduate Science Engineering Students and Postdocturates,* annual.

No. 973. Science and Engineering Degree Recipients in 1991 and 1992: 1993

[Based on survey and subject to sampling error; see source for details]

DEGREE AND FIELD	Graduates 1991 and 1992 (1,000)	1993 [1]—PERCENT DISTRIBUTION				Median salary [4] ($1,000)
		In school [2]	Employed		Not employed or FT students	
			In S&E [3]	In other		
Bachelor's recipients	**639.4**	**22**	**22**	**50**	**6**	**24.0**
All science fields	521.1	24	13	57	6	22.1
Computer and mathematical sciences	77.6	11	32	51	5	28.5
Life and related sciences	99.7	38	14	43	6	21.0
Physical and related sciences	33.8	39	28	29	4	26.0
Social and related sciences	310.0	21	6	66	6	21.0
All engineering fields	118.4	15	60	20	5	33.8
Aerospace and related engineering	7.3	23	35	37	6	29.0
Chemical engineering	6.7	16	70	10	4	40.0
Civil and architectural engineering	15.6	12	69	15	4	31.0
Electrical, electronics, computer and communications engineering	41.8	16	59	18	7	35.0
Industrial engineering	7.7	7	59	30	3	33.0
Mechanical engineering	25.1	13	65	19	3	35.0
Other engineering	14.1	17	53	25	5	33.0
Master's recipients	**115.6**	**23**	**48**	**24**	**5**	**38.1**
All science fields	74.6	26	37	31	5	33.8
Computer and mathematical sciences	24.1	16	48	31	5	40.0
Life and related sciences	13.2	28	35	31	6	29.0
Physical and related sciences	10.6	38	46	13	4	34.0
Social and related sciences	26.7	31	24	39	6	28.0
All engineering fields	41.0	17	68	11	4	42.9
Aerospace and related engineering	1.9	26	56	16	3	40.0
Chemical engineering	1.7	33	56	7	4	44.0
Civil and architectural engineering	4.9	15	74	7	5	38.8
Electrical, electronics, computer and communications engineering	15.7	15	71	10	4	44.0
Industrial engineering	2.6	13	63	20	4	42.5
Mechanical engineering	6.4	17	72	6	4	42.0
Other engineering	7.9	18	61	18	3	43.0

[1] As of April. [2] Full-time graduate students. [3] In science and engineering. [4] Excludes students and the self-employed.
Source: National Science Foundation/SRS, *National Survey of Recent College Graduates: 1993.*

No. 974. Doctorates Conferred, by Recipients' Characteristics: 1980 and 1994

[**In percent, except as indicated**]

CHARACTERISTIC	1980, total	1994									
		All fields [1]	Engineering	Physical sciences [2]	Earth sciences	Mathematics	Computer sciences	Biological sciences [3]	Agricultural	Social sciences [4]	Psychology
Total conferred (number)	**31,020**	**41,011**	**5,826**	**3,975**	**824**	**1,118**	**904**	**5,197**	**1,078**	**3,900**	**3,389**
Male	69.7	61.5	89.1	79.2	77.8	78.9	84.8	59.5	76.9	63.0	37.8
Female	30.3	38.5	10.9	20.8	22.2	21.1	15.2	40.5	23.1	37.0	62.2
Median age [5]	32.2	34.1	31.7	31	33.7	31.2	32.1	31.5	34.5	35.2	33.1
CITIZENSHIP [6]											
Total conferred (number)	**30,156**	**4,239**	**5,706**	**3,893**	**808**	**1,084**	**887**	**5,139**	**1,069**	**3,799**	**3,296**
U.S. citizen	83.6	67.4	38.7	56.4	62.6	45.8	48.0	66.5	48.6	61.1	92.8
Foreign citizen	16.4	32.6	61.3	43.6	37.4	54.2	52.0	33.5	51.4	38.9	7.2
RACE/ETHNICITY [7]											
Total conferred (number)	**26,512**	**3,846**	**3,050**	**2,785**	**612**	**647**	**543**	**4,083**	**616**	**2,690**	**3,145**
White [8]	84.7	79.6	66.1	72.6	82.2	72.8	73.8	76.1	79.1	79.3	87.1
Black [8]	4.2	4.1	1.8	1.7	1.0	1.7	1.8	1.8	3.6	5.5	3.9
Asian/Pacific [8]	4.2	11.5	28.5	21.5	14.5	21.8	21.5	17.6	11.7	10.1	3.5
Indian/Alaskan [8]	0.3	0.5	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.7	0.4
Hispanic	1.8	3.3	2.2	3.2	1.3	2.0	1.3	3.2	4.1	2.8	4.2
Other/unknown	4.9	1.0	1.2	0.8	0.8	1.4	1.4	0.9	1.3	1.6	0.9

[1] Includes other fields, not shown separately. [2] Astronomy, physics, and chemistry. [3] Biochemistry, botany, microbiology, physiology, zoology, and related fields. [4] Anthropology, sociology, political science, economics, international relations and related fields. [5] For definition of median, see Guide to Tabular Presentation. [6] For those with known citizenship. Includes those with temporary visas. [7] Excludes those with temporary visas. [8] Non-Hispanic.

Source: U.S. National Science Foundation, Division of Science Resources Studies, Survey of Earned Doctorates, *Selected Data on Science and Engineering Doctorate Awards,* annual.

No. 975. Space Vehicle Systems—Net Sales and Backlog Orders: 1965 to 1994

[**In millions of dollars.** Backlog orders as of Dec. 31. Based on data from major companies engaged in manufacture of aerospace products. Includes parts but excludes engines and propulsion units]

YEAR	NET SALES			BACKLOG ORDERS			YEAR	NET SALES			BACKLOG ORDERS		
	Total	Military	Non-military	Total	Military	Non-military		Total	Military	Non-military	Total	Military	Non-military
1965	2,449	602	1,847	2,203	503	1,700	1986	6,304	4,579	[1]1,725	8,063	6,028	[1]2,035
1970	1,956	1,025	931	1,184	786	398	1987	8,051	5,248	[1]2,803	12,393	9,460	[1]2,933
1975	2,119	1,096	1,023	1,304	1,019	285	1988	8,622	6,190	[1]2,432	10,838	7,880	[1]2,958
1980	3,483	1,461	2,022	1,814	951	863	1989	9,758	6,457	[1]3,301	13,356	9,192	[1]4,164
1981	3,856	1,736	2,120	3,174	2,164	1,010	1990	9,691	6,556	[1]3,135	12,462	8,130	[1]4,332
1982	4,749	2,606	2,143	4,337	2,403	1,934	1991	10,515	6,770	[1]3,745	11,664	6,221	[1]5,443
1983	4,940	2,420	2,520	4,865	2,733	2,132	1992	9,266	5,887	[1]3,379	12,809	7,622	[1]5,187
1984	5,225	3,019	2,206	4,624	3,099	1,525	1993	8,309	4,175	[1]4,133	15,203	8,332	[1]6,871
1985	6,300	4,241	2,059	6,707	4,941	1,766	1994	10,284	5,360	[1]4,924	13,139	7,079	6,059

[1] Includes data for nonmilitary missile systems and parts.

Source: U.S. Bureau of the Census, *Current Industrial Reports,* MA-37D, *Aerospace Industry (Orders, Sales, and Backlog).*

No. 976. Federal Outlays for General Science, Space, and Other Technology: 1970 to 1996

[**In billions of dollars. For fiscal years ending in year shown;** see text, section 9]

YEAR	CURRENT DOLLARS			CONSTANT (1987) DOLLARS		
	Total	General science/basic research	Space and other technologies	Total	General science/basic research	Space and other technologies
1970	4.5	0.9	3.6	13.9	2.9	11.0
1975	4.0	1.0	3.0	8.2	2.1	6.0
1980	5.8	1.4	4.4	8.2	1.9	6.3
1982	7.2	1.6	5.6	8.5	1.9	6.6
1983	7.9	1.6	6.3	8.9	1.8	7.1
1984	8.3	1.8	6.5	9.0	2.0	7.0
1985	8.6	2.0	6.6	9.1	2.1	6.9
1986	9.0	2.2	6.8	9.2	2.3	6.9
1987	9.2	2.2	7.0	9.2	2.2	7.0
1988	10.8	2.4	8.4	10.5	2.3	8.2
1989	12.8	2.6	10.2	11.9	2.4	9.5
1990	14.4	2.8	11.6	12.8	2.5	10.3
1991	16.1	3.1	13.0	13.7	2.7	11.0
1992	16.4	3.5	12.8	13.7	3.0	10.7
1993	17.0	3.9	13.1	13.9	3.2	10.7
1994	16.2	3.8	12.4	12.7	3.0	9.7
1995, est.	16.9	4.1	12.8	13.0	3.2	9.8
1996, est.	16.8	4.0	12.8	12.5	3.0	9.5

Source: U.S. Office of Management and Budget, *Budget of the United States,* annual.

No. 977. NASA Financial Summary: 1970 to 1994

[**In millions of dollars. For fiscal year ending in year shown;** see text, section 9]

YEAR	TOTAL		R&D		COMMUNICATIONS [1]		FACILITIES CONSTRUCTION		RESEARCH AND PROGRAM DEVELOPMENT	
	Appropriations	Outlays	Appropriations	Outlays	Appropriations	Outlays	Appropriations	Outlays	Appropriations	Outlays
1970	3,749	3,753	3,006	2,992	-	-	53	54	690	707
1975	3,231	3,267	2,331	2,420	-	-	140	85	760	761
1980	5,243	4,852	4,091	3,701	-	-	156	140	996	1,010
1985	7,552	7,318	2,468	2,118	3,602	3,707	150	170	1,332	1,323
1986	7,764	7,404	2,638	2,615	3,689	3,267	133	189	1,303	1,332
1987	10,621	7,592	3,166	2,436	5,561	3,597	469	149	1,425	1,409
1988	9,002	9,092	3,414	2,916	3,908	4,362	178	166	1,501	1,648
1989 [2]	10,898	11,051	4,267	3,922	4,464	5,030	305	190	1,862	1,908
1990 [2]	12,296	12,428	5,221	5,094	4,555	5,117	588	218	1,923	1,991
1991 [2]	15,078	13,877	6,024	5,766	6,334	5,590	498	326	2,212	2,185
1992 [2]	14,302	13,818	6,396	6,261	5,124	5,311	525	448	2,242	1,784
1993, est. [2]	14330	(NA)	7089	(NA)	5,086	(NA)	525	(NA)	1,615	(NA)
1994, est. [2]	14,551	(NA)	7,529	(NA)	4,854	(NA)	518	(NA)	1,636	(NA)

- Represents zero. NA Not available. [1] Space flight, control, and data communications. [2] Include appropriations and outlays for the Inspector General, not shown separately.

Source: U.S. National Aeronautics and Space Administration, *1995 Budget Summary.*

No. 978. National Aeronautics and Space Administration—Budget Summary: 1995 to 1997

[In millions of dollars. Data represent budget authority for fiscal years]

ITEM	1995	1996	1997
Total	[1]14,463.7	13,820.7	13,804.2
Human space flight	5,514.9	5,456.6	5,362.9
Space station	1,889.6	1,863.6	1,802.0
Russian cooperation	150.1	129.2	138.2
Space shuttle	3,155.1	3,148.8	3,150.9
Payload and utilization operations	320.1	315.0	271.8
Science, aeronautics and technology	5,943.6	5,845.9	5,862.1
Space science	2,012.6	2,032.6	1,857.3
Life and microgravity sciences and applications	483.1	488.5	498.5
Mission to planet earth	1,340.1	1,289.4	1,402.1
Space access and technology	642.4	641.3	725.0
Aeronautical research and technology	882.0	845.9	857.8
Mission communication services	481.2	441.3	420.6
Academic programs	102.2	106.9	100.8
Mission support	2,589.2	2,502.2	2,562.2
Safety, reliability and quality assurance	38.7	37.6	36.7
Space communication services	226.5	269.4	291.4
Research and program management	2,189.0	2,052.8	2,078.8
Construction of facilities	135.0	142.4	155.3
Inspector General	16.0	16.0	17.0

[1] Includes $400 million for national aeronautical facilities.

Source: U.S. National Aeronautics and Space Administration, *Budget Summary, 1996* and *1997*.

No. 979. U.S. Commercial Space Revenues: 1990 to 1995

[In millions of dollars. For calendar years]

INDUSTRY	1990	1991	1992	1993	1994	1995 [1]
Total	3,385	4,370	4,860	5,295	6,640	7,850
Commercial satellites delivered	1,000	1,300	1,300	1,100	1,400	1,550
Satellite services	800	1,200	1,500	1,850	2,330	2,740
Fixed	735	1,115	1,275	1,600	1,980	2,340
Mobile	65	85	225	250	350	400
Satellite ground equipment	860	1,300	1,400	1,600	1,970	2,570
Mobile-equipment	145	280	350	420	480	510
Commercial launches	570	380	450	465	580	600
Remote sensing data and services	155	190	210	250	300	330
Commercial R&D infrastructure	-	-	-	30	60	60

- Represents zero. [1] Forecast.

Source: U.S. Department of Commerce, International Trade Administration, *U.S. Industrial Outlook, 1994*; and unpublished data.

No. 980. NASA Space Shuttle Operations Expenditures: 1993 to 1995

[In millions of dollars. Data are funding requirements fiscal years shown]

OPERATION	1993	1994	1995
Total	2,857.2	2,570.6	2,420.1
Orbiter	477.0	364.1	292.8
System integration	200.6	211.2	190.5
External tank	300.2	305.3	379.6
Space shuttle main engine	239.9	191.8	144.4
Redesigned solid rocket	409.4	368.9	373.1
Solid rocket booster	172.0	156.4	144.9
Launch and landing operations	697.1	650.1	596.4
Mission and crew operations	361.0	322.8	298.4

Source: U.S. National Aeronautics and Space Administration, *1995 Budget Summary*.

No. 981. Space Shuttle Flights—Summary: 1981 to March 1996

FLIGHT NUMBER	Date	Mission/ Orbiter name	Crew size	Days duration	FLIGHT NUMBER	Date	Mission/ Orbiter name	Crew size	Days duration
1	4/12/81	Columbia	2	2	39	4/28/91	Discovery	7	8
4	6/27/81	Columbia	2	7	37	4/5/91	Atlantis	5	6
2	11/12/81	Columbia	2	2	40	6/5/91	Columbia	7	9
3	3/22/82	Columbia	2	8	43	8/2/91	Atlantis	5	9
5	11/11/82	Columbia	4	5	44	11/24/91	Atlantis	6	7
6	4/4/83	Challenger	4	5	42	1/22/92	Discovery	7	8
7	6/18/83	Challenger	5	6	45	3/24/92	Atlantis	7	8
8	8/30/83	Challenger	5	6	49	5/7/92	Endeavour	7	8
9	11/28/83	Columbia	6	10	50	6/25/92	Columbia	7	13
10	2/3/84	Challenger	5	8	46	7/31/92	Atlantis	7	7
11	4/6/84	Challenger	5	7	47	9/12/92	Endeavour	7	7
12	8/30/84	Discovery	6	6	52	10/22/92	Columbia	6	9
13	10/5/84	Challenger	7	8	53	12/2/92	Discovery	5	7
14	11/8/84	Discovery	5	8	54	1/13/93	Endeavour	5	6
15	1/24/85	Discovery	5	3	56	4/8/93	Discovery	5	9
16	4/12/85	Discovery	7	7	55	4/26/93	Columbia	7	10
17	4/29/85	Challenger	7	7	57	6/21/93	Endeavour	6	10
18	6/17/85	Discovery	7	7	51	9/12/93	Discovery	5	10
19	7/29/85	Challenger	7	8	58	10/18/93	Columbia	7	14
20	8/27/85	Discovery	5	7	61	12/2/93	Endeavour	7	11
21	10/3/85	Atlantis	5	4	60	2/3/94	Discovery	6	8
22	10/30/85	Challenger	8	7	62	3/4/94	Columbia	5	14
23	11/26/85	Atlantis	7	7	59	4/9/94	Endeavour	6	11
24	1/12/86	Columbia	7	6	65	7/8/94	Columbia	7	14
25	1/28/86	Challenger	7	-	64	9/9/94	Discovery	6	10
26	9/29/88	Discovery	5	4	68	9/30/94	Endeavour	6	11
27	12/2/88	Atlantis	4	4	66	11/3/94	Atlantis	6	10
29	3/13/89	Discovery	5	5	63	2/3/95	Discovery	6	8
30	5/4/89	Atlantis	5	4	67	3/2/95	Endeavour	7	16
28	8/8/89	Columbia	5	5	71	6/27/95	Atlantis	10	9
34	10/18/89	Atlantis	5	5	70	7/13/95	Discovery	5	8
33	11/22/89	Discovery	5	5	69	9/7/95	Endeavour	5	10
32	1/9/90	Columbia	5	10	73	10/20/95	Columbia	7	15
36	2/28/90	Atlantis	5	5	74	11/12/95	Atlantis	9	8
31	4/24/90	Discovery	5	6	72	1/11/96	Endeavour	6	8
41	10/6/90	Discovery	5	4	75	2/22/96	Columbia	7	15
38	11/15/90	Atlantis	5	4	76	3/22/96	Atlantis	6	9
35	12/2/90	Columbia	7	9					

- Represents zero.
Source: Rockwell, Media Relations, Downey, CA, *Reporter's Space Flight Note Pad,* May, 1996.

No. 982. World-Wide Successful Space Launches: 1957 to 1995

[Criterion of success is attainment of Earth orbit or Earth escape]

COUNTRY	Total	1957-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990	1991	1992	1993	1994	1995
Total	**3,733**	**289**	**586**	**555**	**607**	**605**	**550**	**116**	**88**	**94**	**79**	**89**	**75**
Soviet Union/CIS [1]	2,495	82	302	405	461	483	447	75	59	54	47	48	32
United States	1,054	207	279	139	126	93	61	27	18	28	23	26	27
Japan	49	-	-	5	10	12	11	3	2	1	1	2	2
ESA [2]	74	-	-	-	1	8	21	5	8	7	7	6	11
China	40	-	-	2	6	6	9	5	1	3	1	5	2
France	10	-	4	3	3	-	-	-	-	-	-	-	-
India	6	-	-	-	-	3	-	-	-	1	-	2	-
Israel	3	-	-	-	-	-	1	1	-	-	-	-	1
Australia	1	-	1	-	-	-	-	-	-	-	-	-	-
United Kingdom	1	-	-	1	-	-	-	-	-	-	-	-	-

- Represents zero. [1] Commonwealth of Independent States. [2] European Space Agency.
Source: Library of Congress, Congressional Research Service, Science Policy Research Division, *Space Activities of the United States, CIS, and Other Launching Countries/Organizations 1957-1994,* July 31, 1995; and forthcoming report.

No. 983. Nobel Prize Laureates in Chemistry, Physics, and Physiology/ Medicine—Selected Countries: 1901 to 1994

[Presented by location of award-winning research and by date of award]

COUNTRY	1901-1994				1901-1930	1931-1945	1946-1960	1961-1975	1976-1990	1991-1994
	Total	Physics	Chemistry	Physiology/ Medicine						
Total	**425**	**146**	**120**	**159**	**93**	**49**	**74**	**92**	**98**	**19**
United States	174	60	39	75	6	14	38	41	63	12
United Kingdom	69	21	24	24	15	11	14	20	9	-
Germany [1]	59	17	28	14	27	11	4	8	7	2
France	24	10	7	7	13	2	-	5	2	2
Soviet Union	10	7	1	2	2	-	4	3	1	-
Japan	4	3	1	-	-	-	1	2	1	-
Other countries	85	28	20	37	30	11	13	13	15	3

- Represents zero. [1] Between 1946 and 1991, data are for the former West Germany only.
Source: U.S. National Science Foundation, unpublished data.