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IDENTIFIERS	National Science Foundation

ABSTRACT

Science and technology (S&T) data are presented in 36 charts, graphs, or tables. These data are organized into three major categories, namely, research and development (R&D) funding, human resources, and international S&T indicators. R&D funding is subdivided into national, federal, industry, and academic categories, with data reflecting, when applicable, funding, obligations, and/or expenditures by source, performer, and character of work. Human resources is subdivided into categories of utilization (with data on employed scientists and engineers by field, sector, primary work activity, highest degree and field, data on women and racial minorities, and retention rates from fifth grade through receipt of doctorate, 1965-1984) and supply (with data on bachelor's, master's and doctoral degrees awarded in science and engineering (S/E) fields, full-time S/E graduate students in doctorate-granting institutions by source of major support, and other data). International S&T indicators includes data on scientists and engineers engaged in R&D per 10,000 labor force by country, R&D/gross national produce (GNP) ratios by country, nondefense R&D/GNP by country, U.S. patents granted to U.S. and foreign inventors by year of application, U.S. scientific and technical publications (S/T) as a percent of all S/T publications (1982), and other data. (JN)

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Division of Science Resources Studies
National Science Foundation
Washington, D.C. 20550

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Suggested Citation

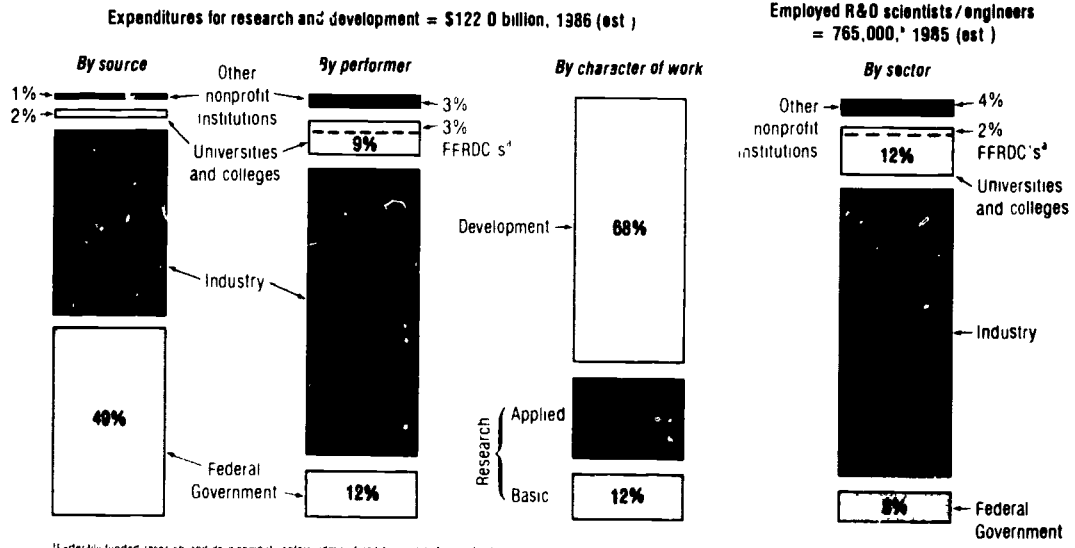
Science and Technology Data Book (NSF 85-323) (Washington, D.C., 1985).

Contents

R&D FUNDING

Figure 1

The national R&D effort



[1] Federally funded research and development centers administered by universities and colleges.

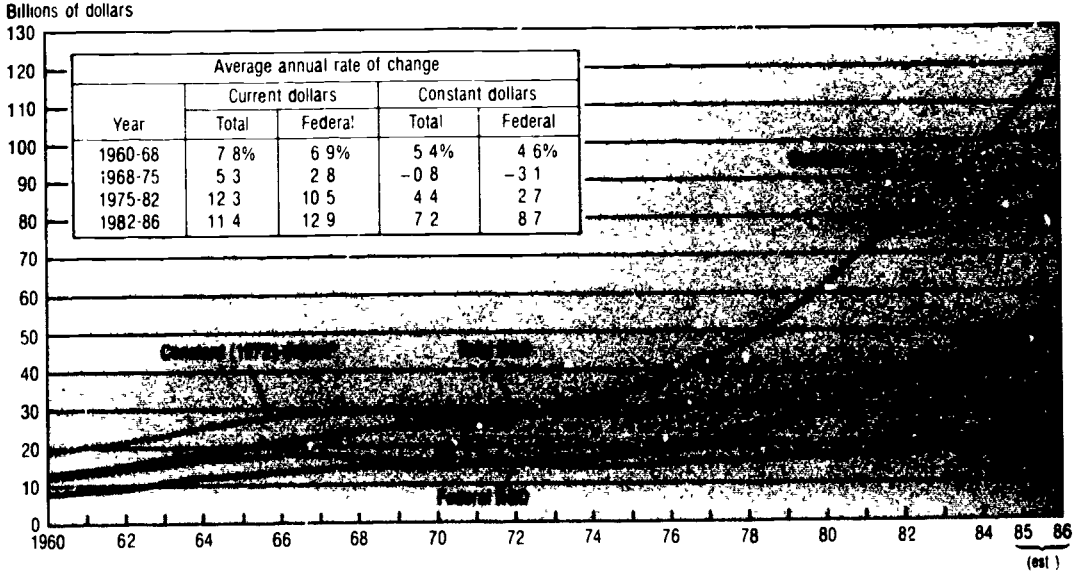
[2] Full-time equivalents.

National Science Foundation.

Data may be obtained from: John R. Churchillo, SRS. Phone: (202) 634-4625.

Figure 2

National R&D funding by source



Average annual rate of change				
	Current dollars		Constant dollars	
Year	Total	Federal	Total	Federal
1960-68	7.8%	6.9%	5.4%	4.6%
1968-75	5.3	2.8	-0.8	-3.1
1975-82	12.3	10.5	4.4	2.7
1982-86	11.4	12.9	7.2	8.7

GNP implicit price deflator
National Science Foundation
Data may be obtained from John R. Chirichiello, SRS. Phone (202) 634-4625

Figure 3

National R&D funding by performer

[Dollars in millions]

Year	Current Dollars					Constant (1972) dollars[a]				
	Total	Federal Government	Industry	Universities/colleges	Other performers	Total	Federal Government	Industry	Universities/colleges	Other performers
1960	$ 13,523	$ 1,726	$10,5[illegible]	$ [illegible]	$ [illegible]	$ 18,[illegible]	$ 2,[illegible]	$[illegible]	$ [illegible]	$ [illegible]
1968	24,605	3,404	17,429	[illegible]	1,[illegible]	[illegible]	4,[illegible]	[illegible]	[illegible]	[illegible]
1975	35,213	5,364	24,107	3,4[illegible]	2,[illegible]	[illegible]	[illegible]	[illegible]	2,[illegible]	[illegible]
1982	79,328	9,141	57,[illegible]	7,[illegible]	4,[illegible]	[illegible]	4,[illegible]	[illegible]	[illegible]	[illegible]
1985 (est.)	109,250	13,150	[illegible]	[illegible]	[illegible]	47,[illegible]	[illegible]	[illegible]	4,[illegible]	[illegible]
1986 (est.)	122,000	14,500	[illegible]	10,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,[illegible]	[illegible]

Year	Average annual rate of change									
	Current Dollars					Constant (1972) dollars				
	Total	Federal Government	Industry	Universities/colleges	Other performers	Total	Federal Government	Industry	Universities/colleges	Other performers
1960-68	7.8%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1968-75	5.3	[illegible]	4.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1975-82	12.3	7.9	13.3	11.5	11.7	4.4	0.1	[illegible]	[illegible]	[illegible]
1982-86	11.4	12.2	11.6	9.8	[illegible]	7.2	[illegible]	7.5	[illegible]	[illegible]

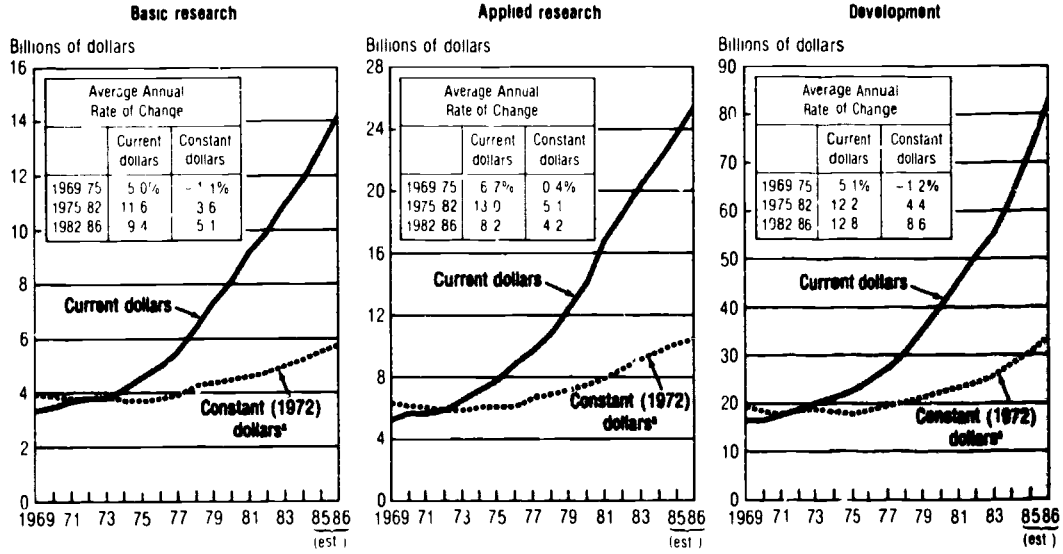
[a]Based on GNP implicit price deflator

[illegible] Science Foundation

[illegible] ly be obtained from John R. Chirichiello SRS Phone (202) 634-4625

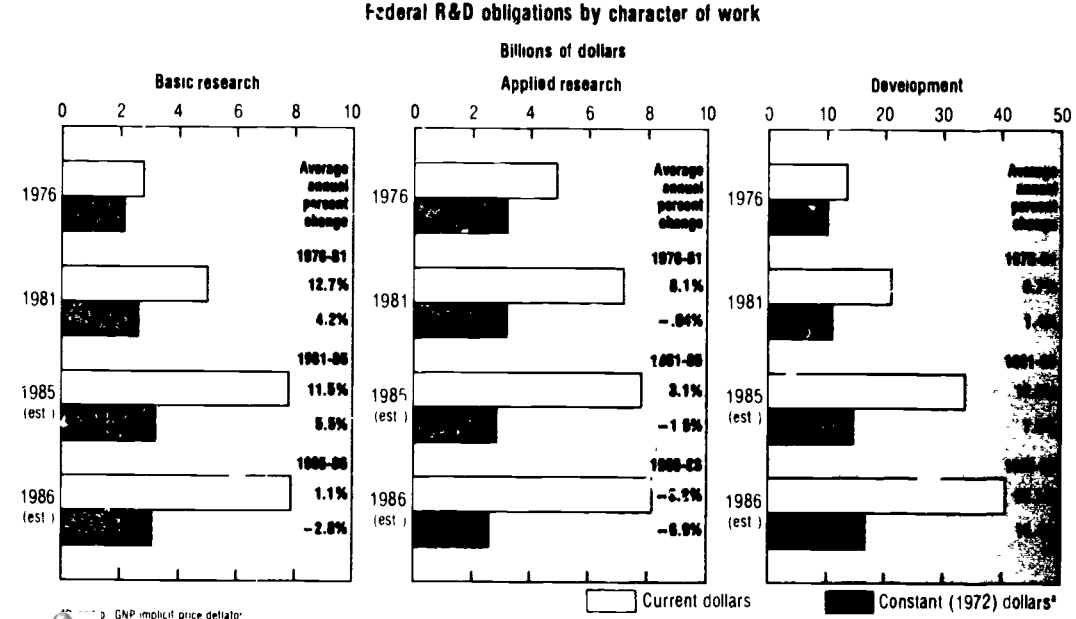
Figure 4

National R&D spending by character of work



[a] ...implicit price deflato...
...ional Science Foundation
...a may be obtained from John R. Churchillo, SRS. Phone: 202/634-4625

Figure 5



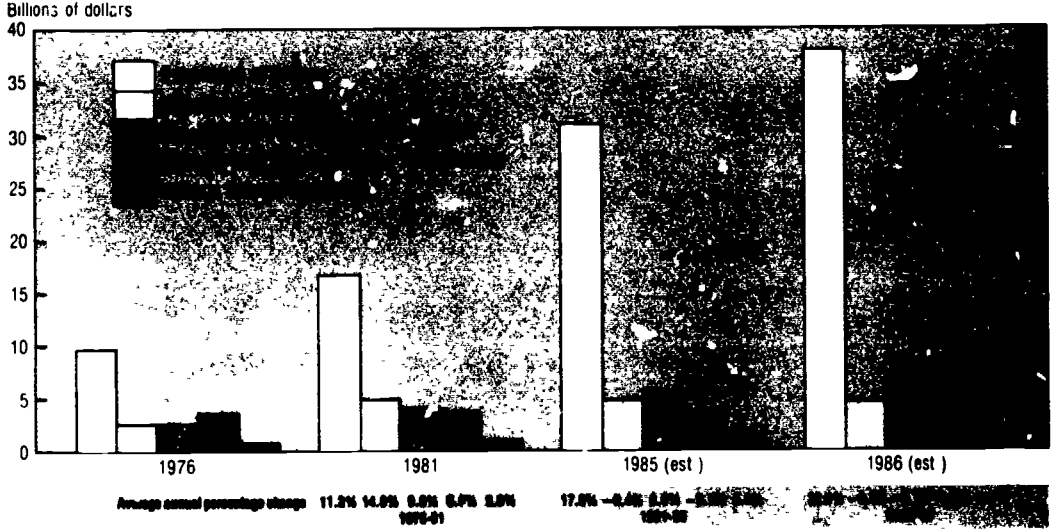
GNP implicit price deflator

National Science Foundation

Additional data may be obtained from Gerard R. Glaser, Jr., SRS, Phone (202) 634-4636

Figure 6

Federal R&D obligations by agency



ERDA in 1976

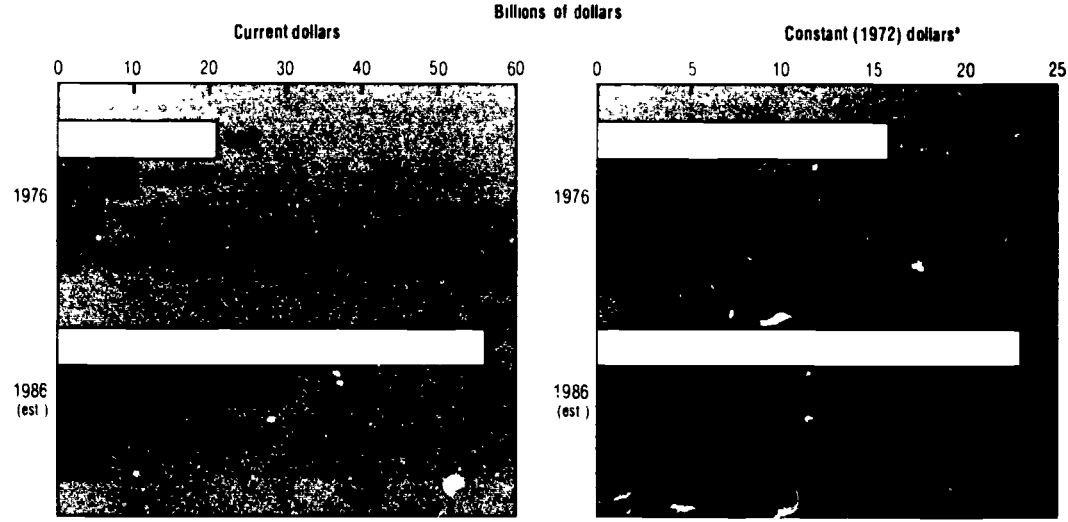
6 adjusted to reflect only health and human services programs (without education)

tional Science Foundation

ta may be obtained from Gerard R Glaser Jr S95 Phone (202) 634 4636

Figure 7

Federal R&D obligations by major performer



*Based on GNP implicit price deflator

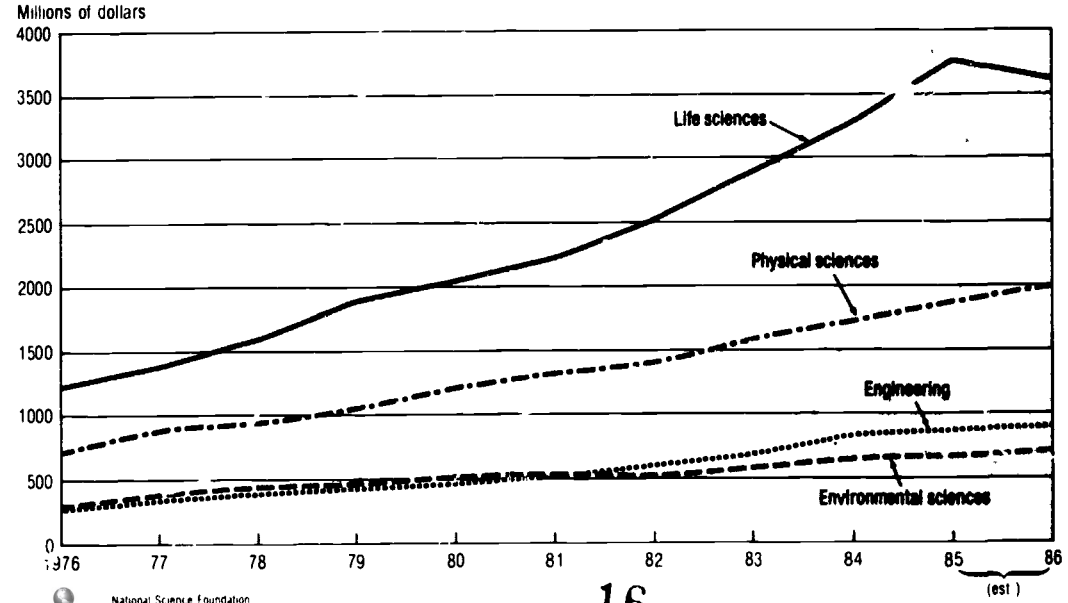
Includes federally funded research and development centers

E National Science Foundation

...nal data may be obtained from Gerard R Glaser Jr SRS Phone (202) 634 4636

Figure 8

Federal obligations for basic research by major field of science / engineering



National Science Foundation
Data may be obtained from Gerard R. Glaser, Jr., SRS. Phone: (202) 634-4636

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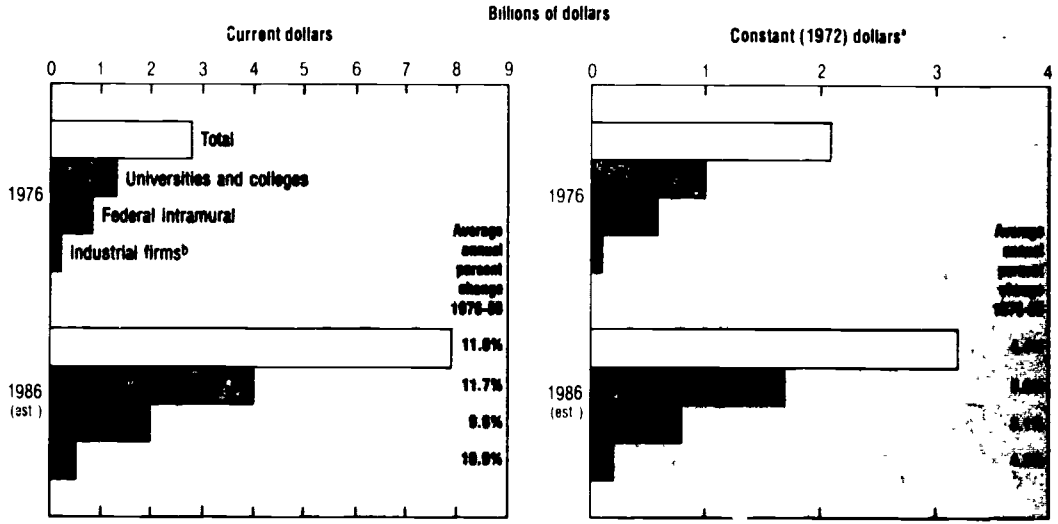
Figure 9

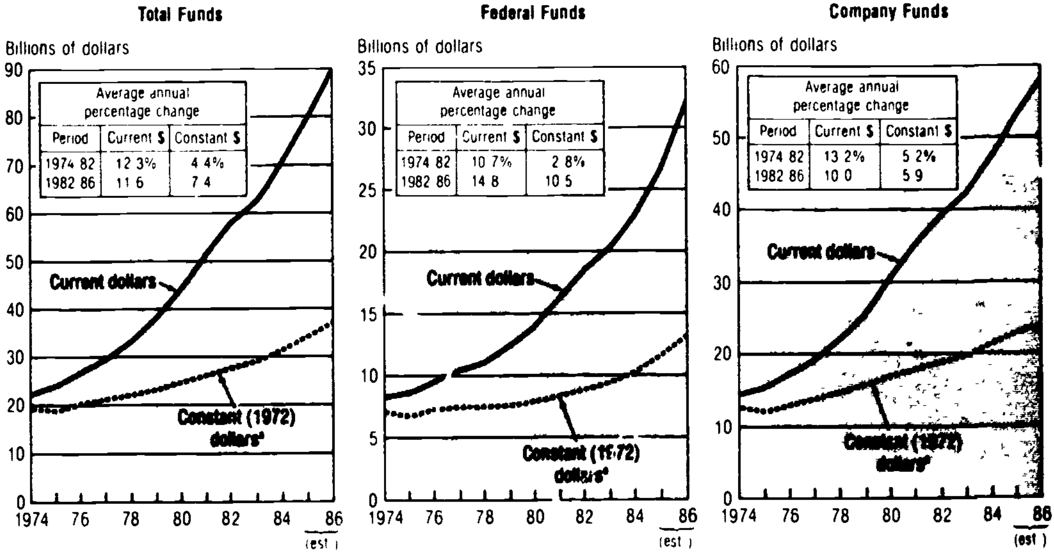
Federal obligations for basic research by major performer



[a]Based on GNP implicit price deflator
[b]Includes federally funded research and development centers
National Science Foundation
data may be obtained from Gerard R. Glaser, Jr., SRS, Phone (202) 634-4636

Figure 10

Industrial R&D expenditures by source of funds



GNP implicit price deflator
National Science Foundation
data may be obtained from Thomas Hogan, SRS, Phone (202) 634-4648

Figure 11

Industrial R&D expenditures by character of work

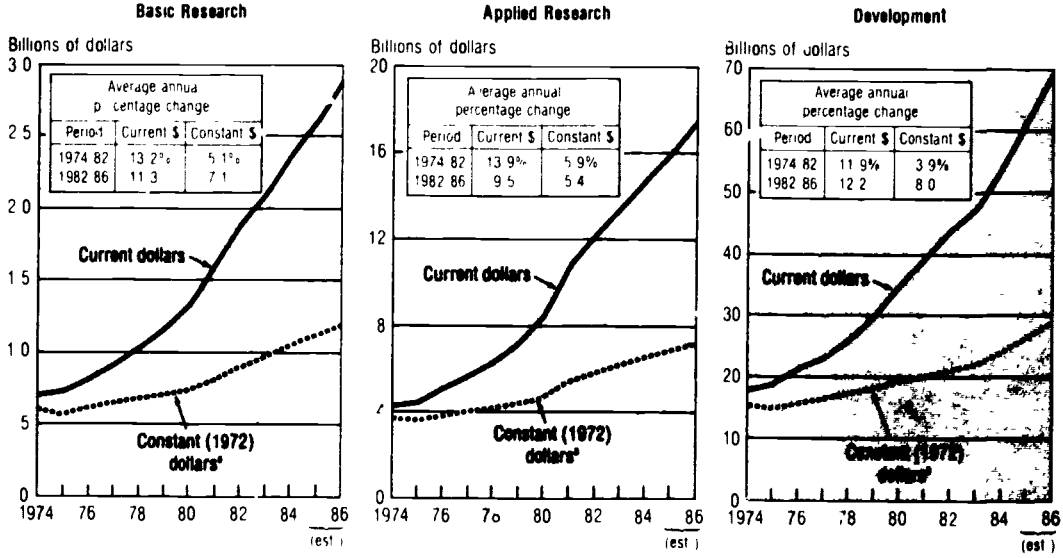
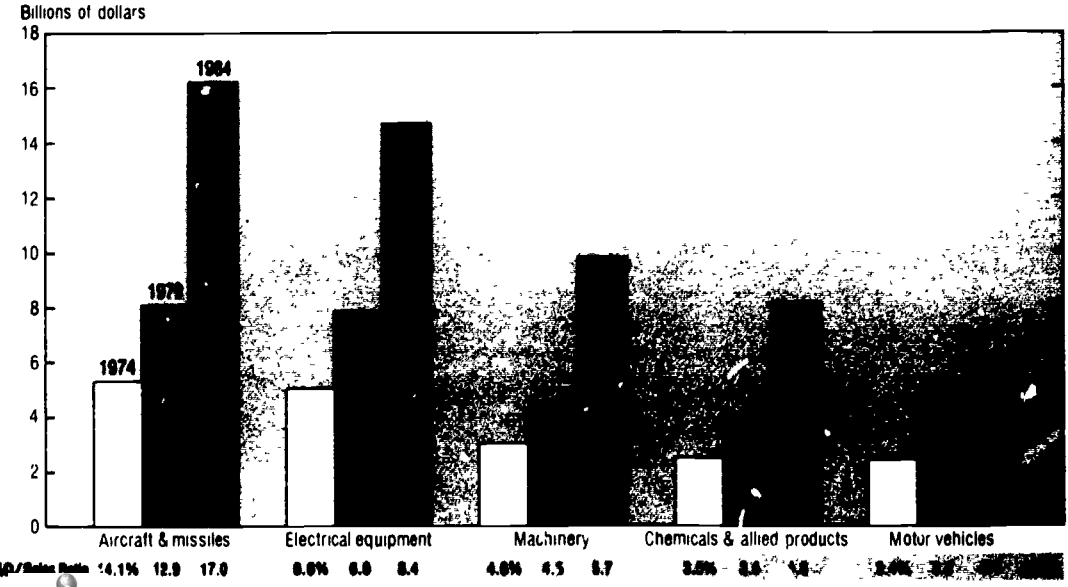


Figure 12

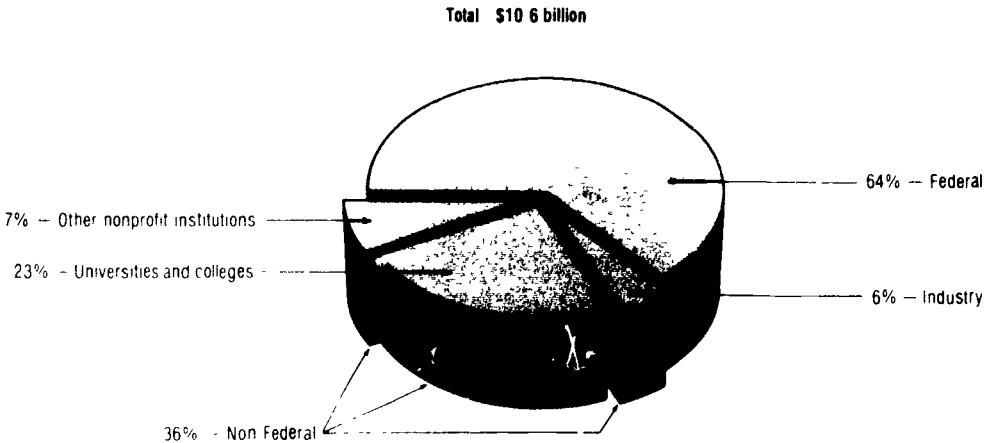
Total R&D expenditures and R&D/Sales Ratio of five leading industries



ational Science Foundation
ata may be obtained from Thomas J Hogan SRS Phone (202) 634 4648

Figure 13

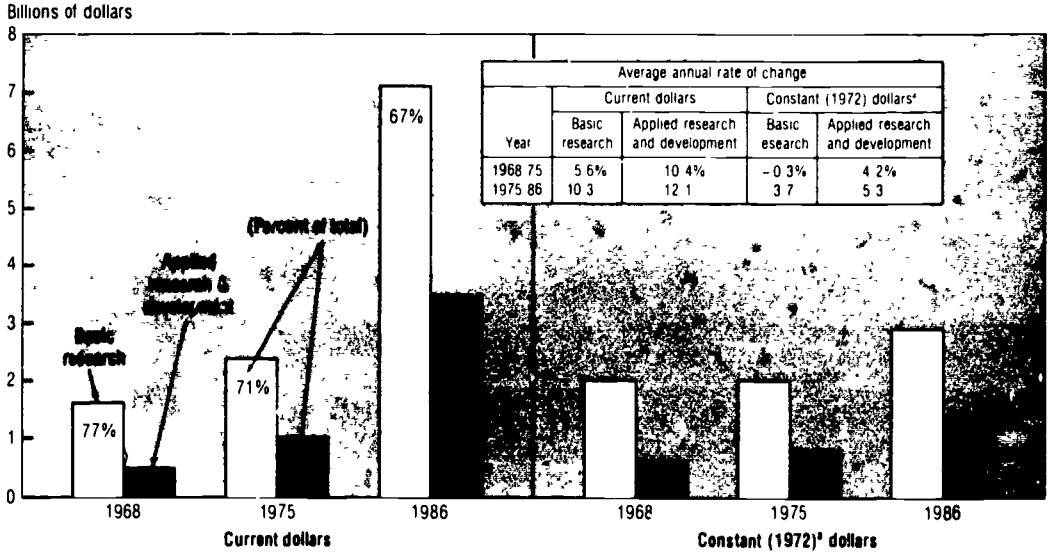
Academic R&D expenditures by source: FY 1986



NOTE: [illegible]
SOURCE: National Science Foundation
[illegible] may be obtained from [illegible] (202) 634-4624

Figure 14

Academic R&D expenditures by character of work



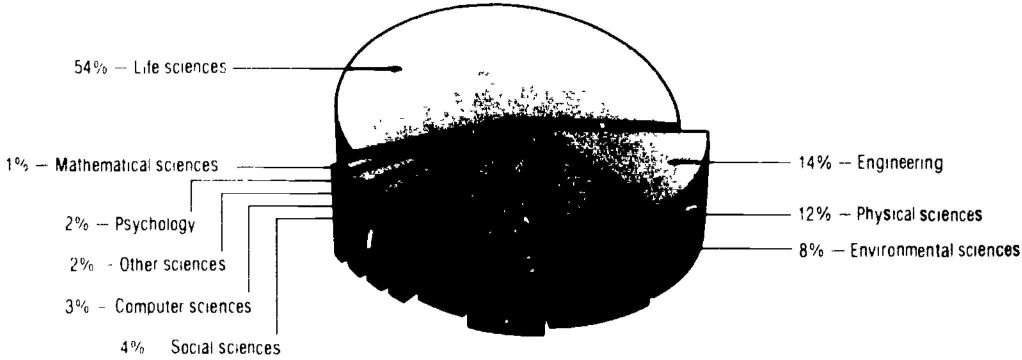
Average annual rate of change				
	Current dollars		Constant (1972) dollars[a]	
Year	Basic research	Applied research and development	Basic esearch	Applied research and development
1968 75	5 6%	10 4%	– 0 3%	4 2%
1975 86	10 3	12 1	3 7	5 3

[a] ...2 implicit price deflator
...onal Science Foundation
...may be obtained from: John H. Churchill, SRS. Phone: (202) 634-4625

Figure 15

Acrdemic R&D expenditures by field: FY 1984

Total $8 5 billion



[illegible] R&D expenditure [illegible] FY 1986 w[illegible] entially the same as in FY 1984
[illegible] Science Foundation
[illegible] may be obtained from Penny F. Foster SRS Phone (202) 634 4629

Figure 16

Federal obligations to universities and colleges by type of activity[1]

(Dollars in millions)

Fiscal year[2]	Total obligations	Academic science/engineering					Non-science/engineering
		Total	Research and development[3]	R&D plant	Fellowships, traineeships, and training grants	All other	
1963	$1,413	$1,329	$830	$108	[4]	$393	$85
1967	3,318	2,324	1,301	111	447	464	994
1975	4,547	2,806	2,246	45	201	314	1,741
1980	8,298	4,803	4,180	98	223	383	3,495
1984	10,100	6,441	5,823	90	259	510	3,659
Average annual rates of change (Current dollars)							
1963-67	23.8%	15.0%	11.9%	1.3%	N/A	4.2%	85.2%
1967-75	4.0	2.4	7.1	−10.8	−9.5	−4.8	7.3
1975-80	12.8	11.4	13.1	−3.3	2.1	4.1	14.9
1980-84	5.0	7.6	7.8	7.1	3.8	7.4	1.2
(Constant dollars)							
1963-67	21.0%	12.4%	9.4%	−1.0%	N/A	1.9%	81.0%
1967-75	−1.5	−3.1	1.3	−15.5	−14.3	−9.9	1.5
1975-80	4.8	3.5	5.1	−10.2	−5.1	−3.3	6.8
1980-84	−1.1	1.3	1.5	0.9	−2.3	1.2	−4.7

Detail may not add to total because of rounding.
[1]Academic research and development is estimated at $6.4 billion for both 1985 and 1986. Separate data for the other components of academic science engineering and non science engineering are not available.
[2]Total obligations for the years 1961 through 1983 have been estimated by NSF based on revised data on student aid provided by the Department of Education.
[3]Separate data were unavailable for this component before 1966.
SOURCE: National Science Foundation.
Additional data may be obtained from: Penny D. Foster, SRS. Phone: (202) 634-4629.

HUMAN RESOURCES

Figure 17

Employed scientists/engineers by field 1984

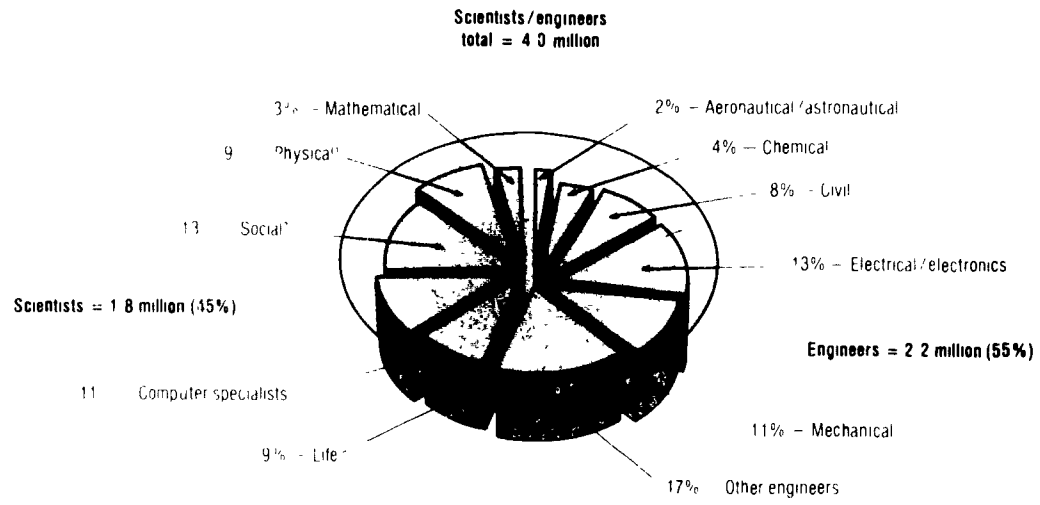
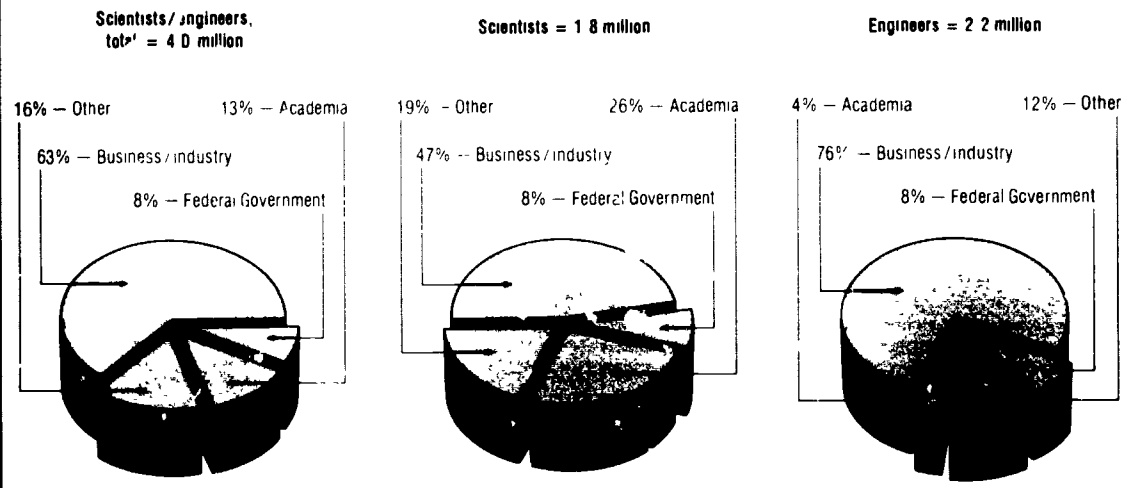


Figure 18

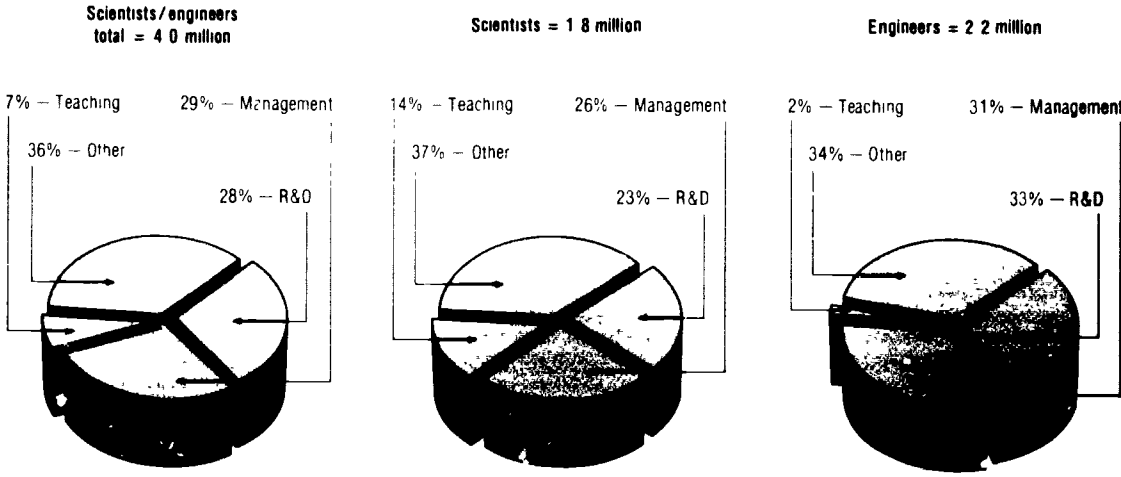
Employed scientists and engineers by sector: 1984



SOU ...nce Foundation
Add ...obtained from: Michael F. Crowley, SRS, Phone (202) 634-4664

Figure 19

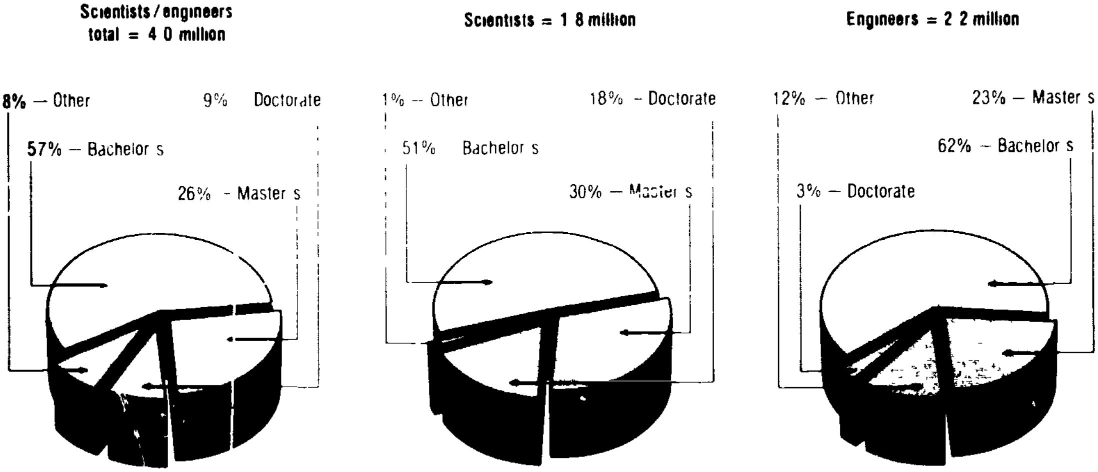
Employed scientists and engineers by primary work activity: 1984



tional Science Foundation
ta may be obtained from Michael F Crowley SRS Phone (202) 634 4664

Figure 20

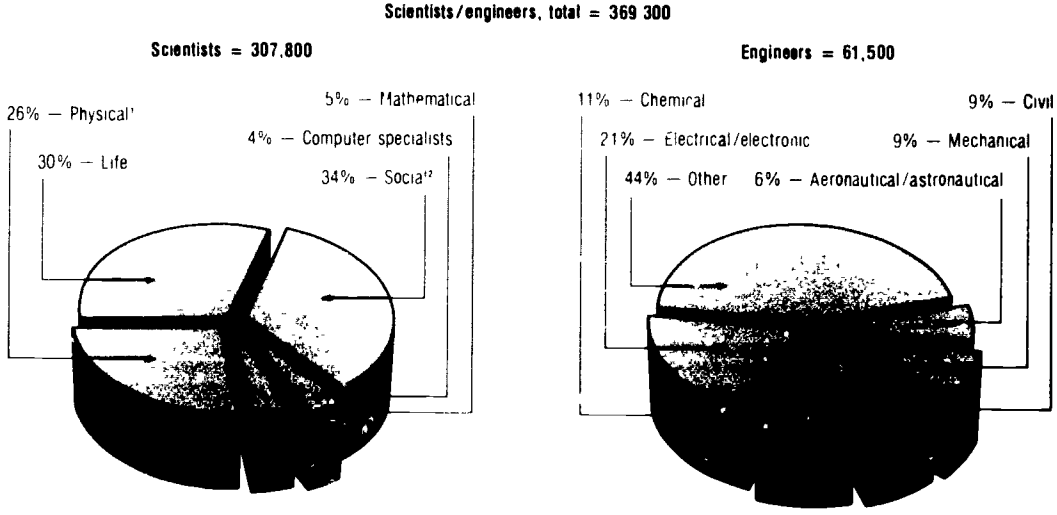
Employed scientists and engineers by highest degree: 1984



NO... dd up to 100 because of rounding
SO... nce Foundation
Ad... obtained from Michael F Crowley SRS Phone (202) 634 4664

Figure 21

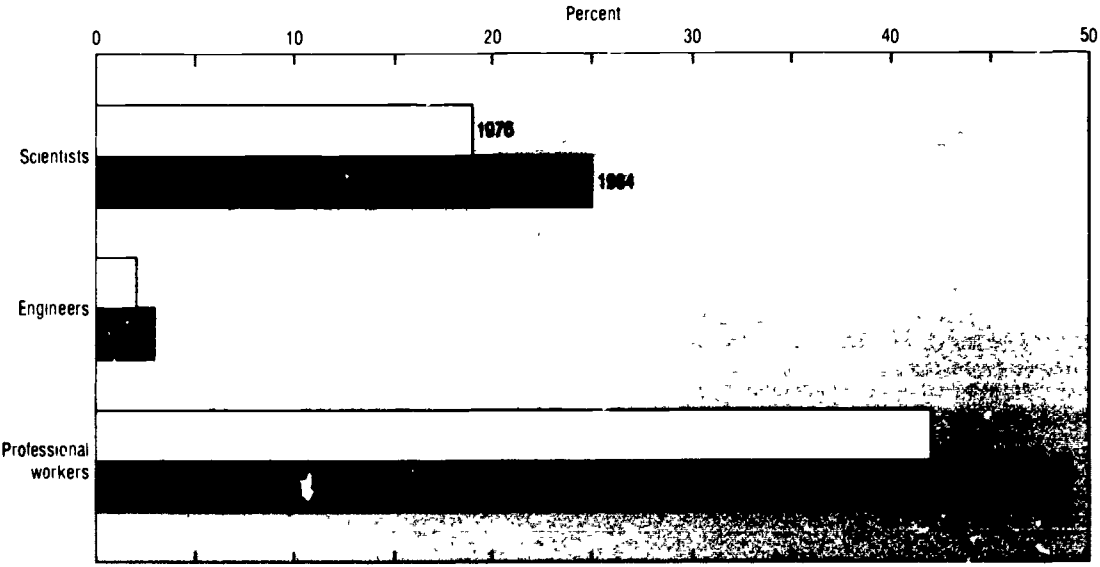
Employed doctorates in science and engineering by field: 1983



[1] Includes environmental scientists, 5 percent of total scientists.
[2] Includes psychologists, 15 percent of total scientists.
NOTE: Total may not add up to 100 because of rounding.
SOURCE: National Science Foundation.
Additional data may be obtained from: Michael F. Crowley, SRS. Phone: (202) 634-4664.

Figure 22

Wome as a proportion of all employed scientists, engineers, and professional workers



ICES National Science Foundation and Department of Labor
ional data may be obtained from Michael F Crowley SRS Phone (202) 634 4664

Figure 23

Racial minorities as a percent of technical work force

Technical work force	1976 Black (Percent of total)	1976 Asian (Percent of total)	1984 Black (Percent of total)	1984 Asian (Percent of total)
Professional workers	NA	NA	6	NA
Total scientists and engineers	2	5	2	5
Scientists	2	5	3	4
Engineers . . .	1	4	2	5

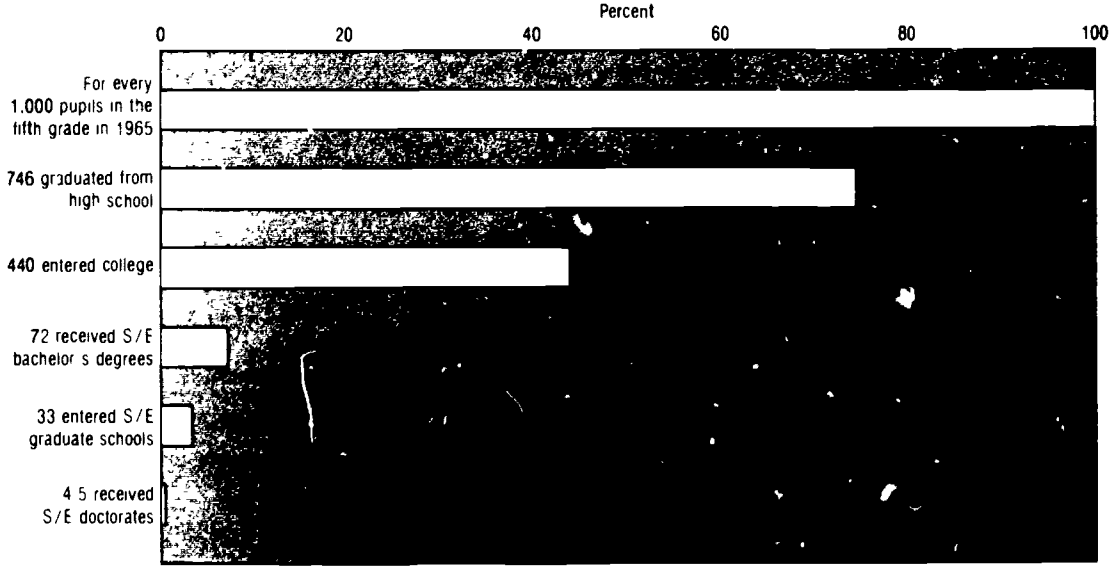
NOTE: NA = not available

SOURCE: National Science Foundation

Additional data may be obtained from Michael [illegible] owley, SRS. Phone [illegible] 634-4664

Figure 24

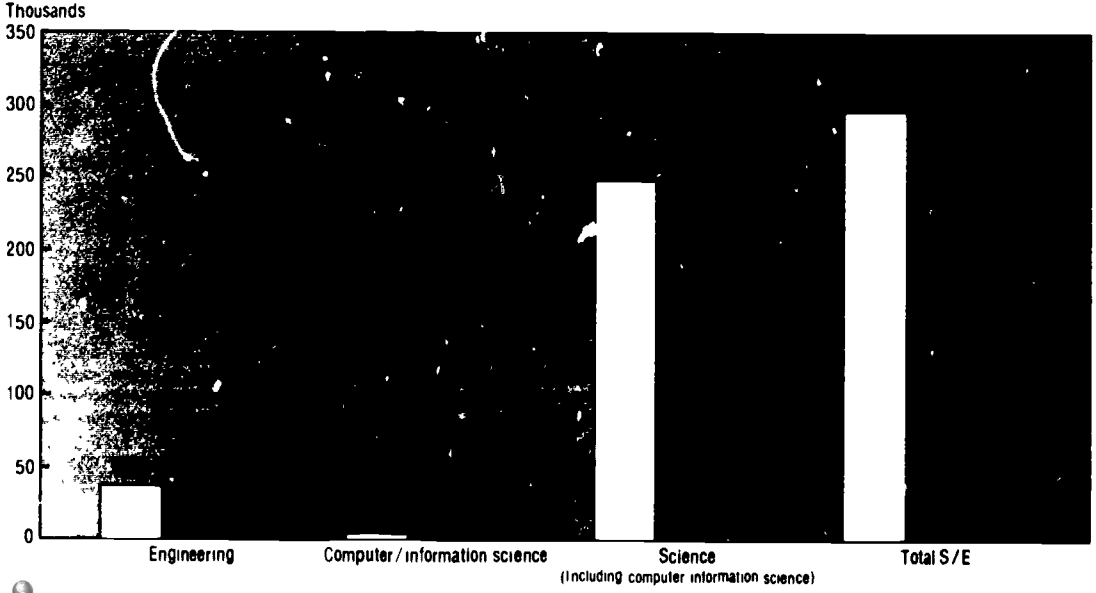
Retention rates, fifth grade through receipt of science/engineering doctorate: 1965-84



SOURCES National Center for Education Statistics National Academy of Sciences and National Science Foundation
Additional data may be obtained from Mary A Golladay SRS Phone (202) 634 4787

Figure 25

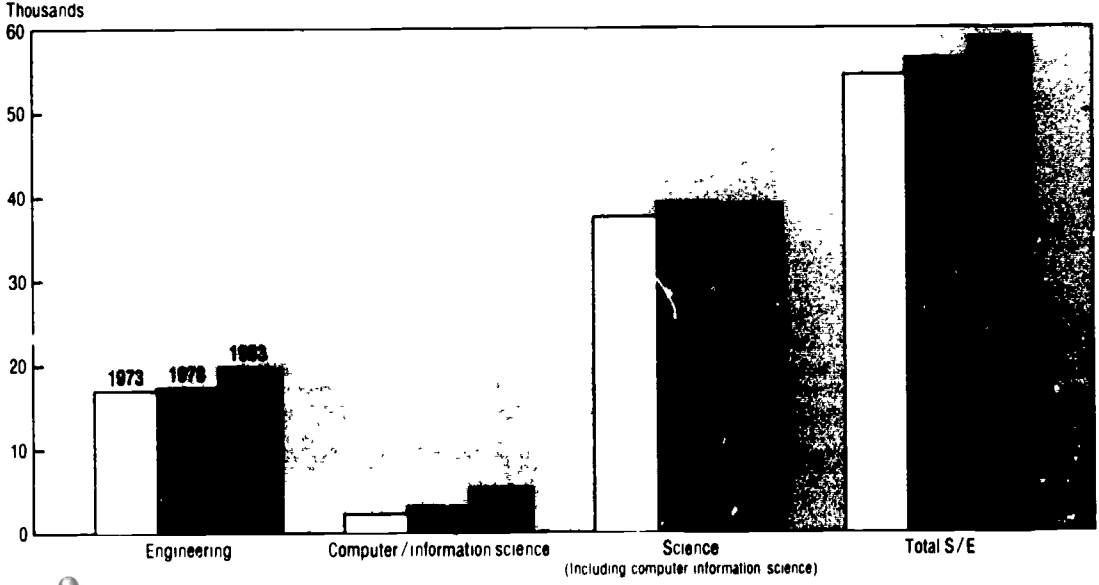
Bachelor's degrees awarded in major science and engineering (S/E) fields



RCES National Center for Education Statistics and National Science Foundation
tional data may be obtained from Mary A Golladay SRS Phone (202) 634 4787

Figure 26

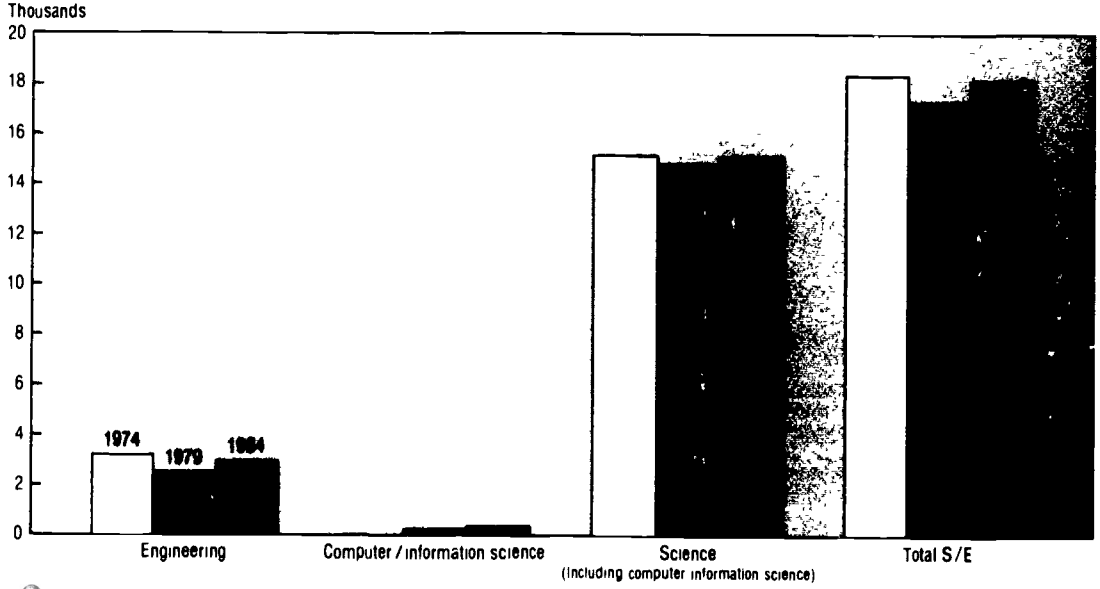
Master's degrees awarded in major science and engineering (S/E) fields



...ional Center for Education Statistics and National Science Foundation
...may be obtained from Mary A. Golladay, SRS. Phone: (202) 634-4787

Figure 27

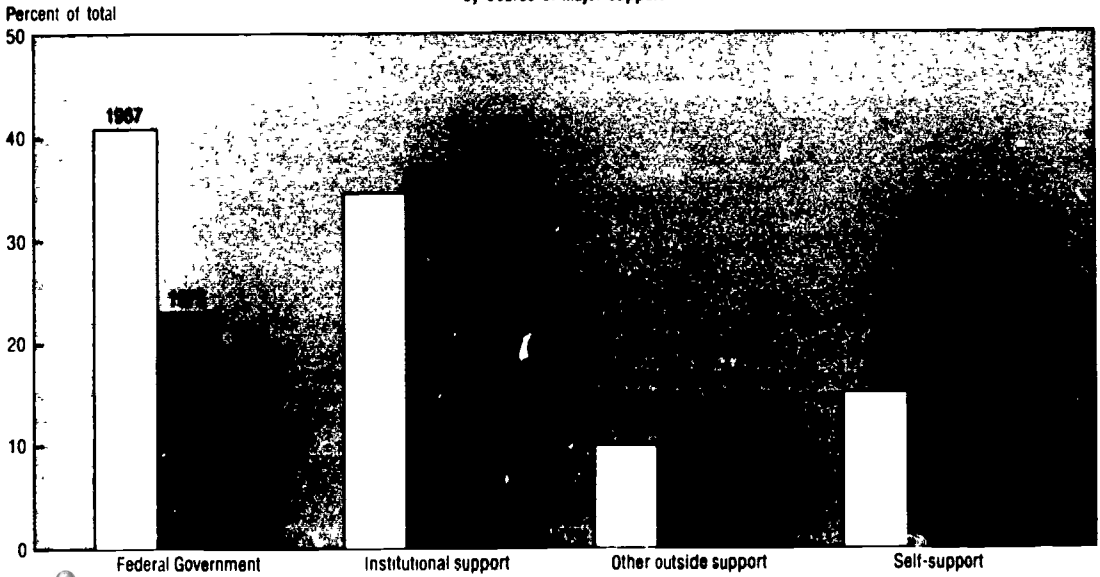
Doctor's degrees awarded in major science and engineering (S/E) fields



S National Academy of Science and National Science Foundation
h data may be obtained from Mary A Golladay SRS Phone (202) 634-4787

Figure 28

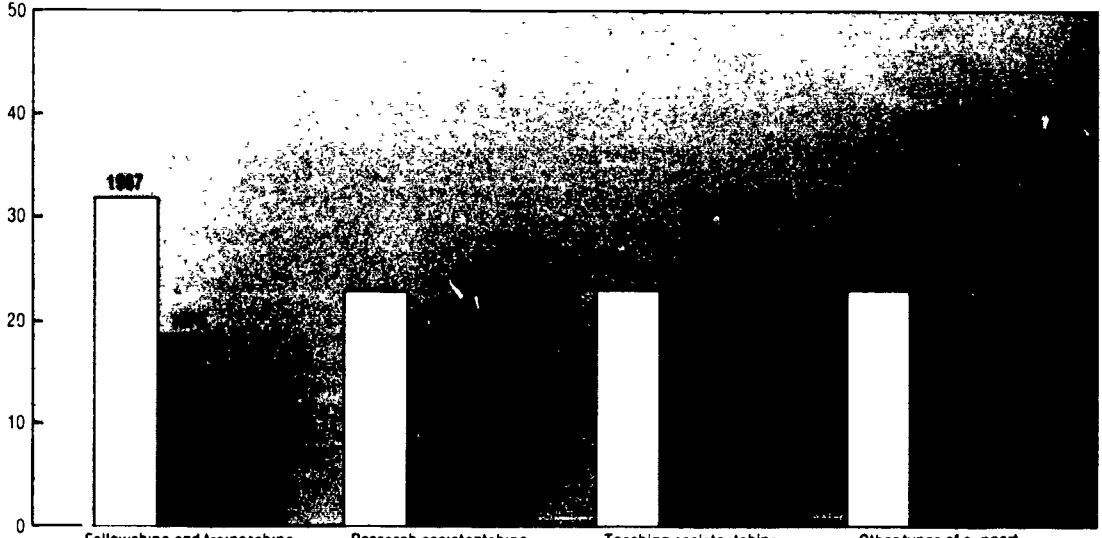
Full-time science/engineering graduate students
by source of major support



"onal Science Foundation
may be obtained from Penny D Foster SRS Phone (202) 634 4629

Figure 29

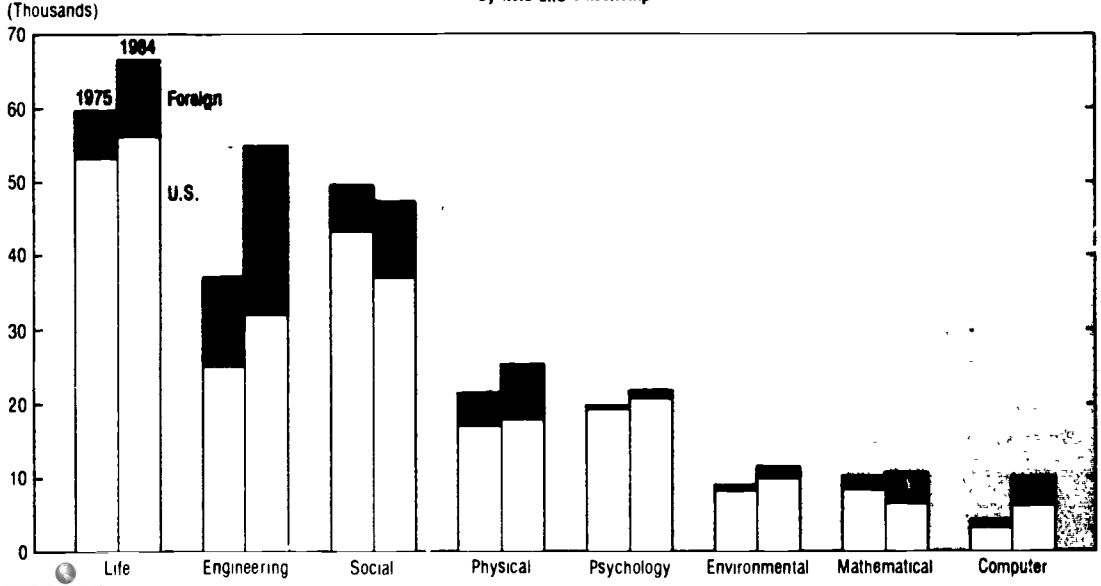
Full-time science/engineering graduate students
by type of major support



E National Science Foundation
nal data may be obtained from Penny D Foster SRS Phone (202) 634-4629

Figure 30

Full-time science/engineering graduate students
by field and citizenship

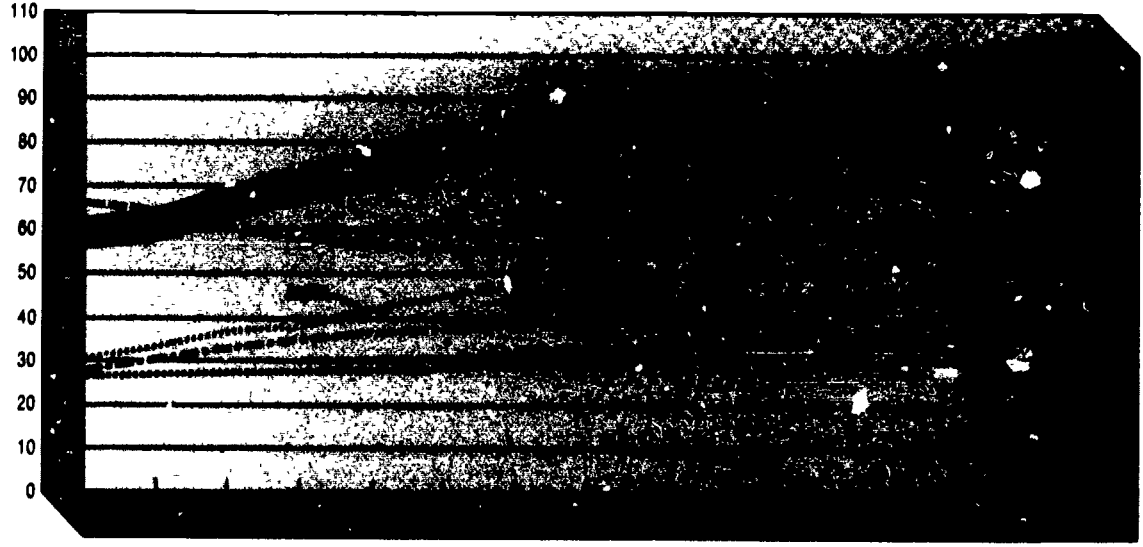


onal Science Foundation
may be obtained from Penny D Foster SRS Phone (202) 634 4629

INTERNATIONAL S/T INDICATORS

Figure 31

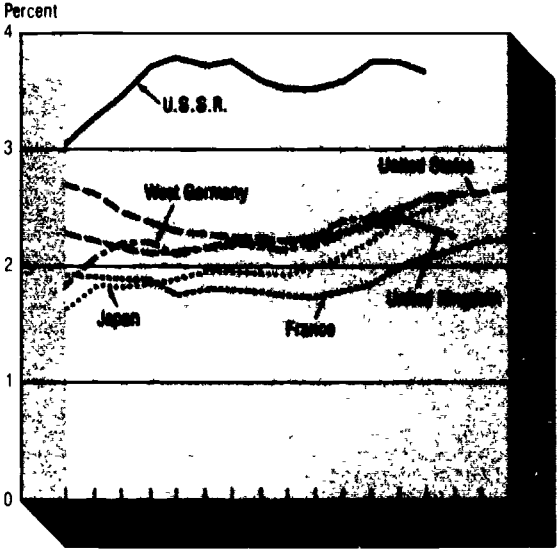
Scientists and engineers engaged in R&D per 10,000 labor force by country



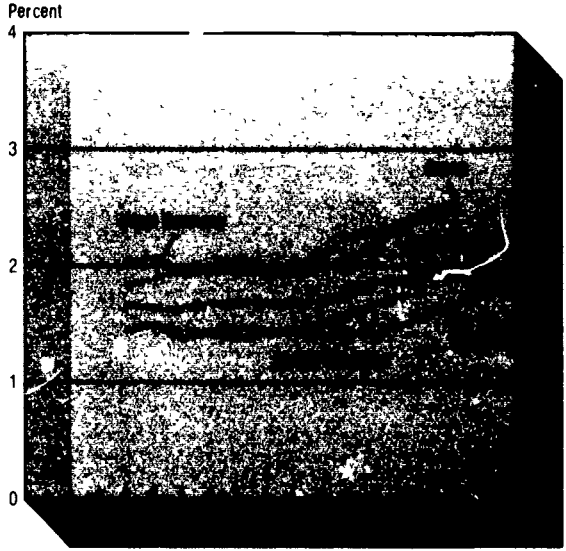
NOTE: A range has been provided for the U.S.S.R. because of the difficulties inherent in comparing Soviet scientific personnel data
SOURCES: National Science Foundation, Organization for Economic Cooperation and Development, and Dr. Robert Campbell (Indiana University)
Additional data may be obtained from: Carlos Kruytbosch, SRS, Phone: (202) 634-4662

Figure 32

R&D / GNP ratios by country



Nondefense[a] R&D / GNP ratios by country[a]

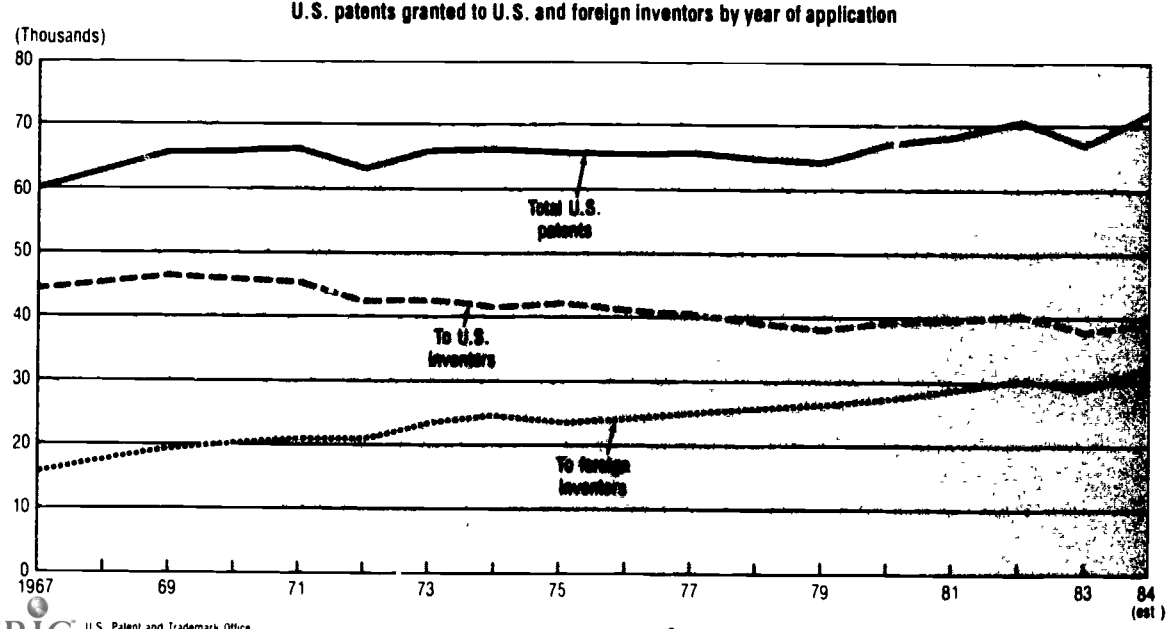


[a]Separate data for nondefense R&D in the U.S.S.R. not available

NOTES: National Science Foundation and Organization for Economic Cooperation and Development

Additional data may be obtained from: Carlos Kruytbosch, SRS. Phone: (202) 634-4682

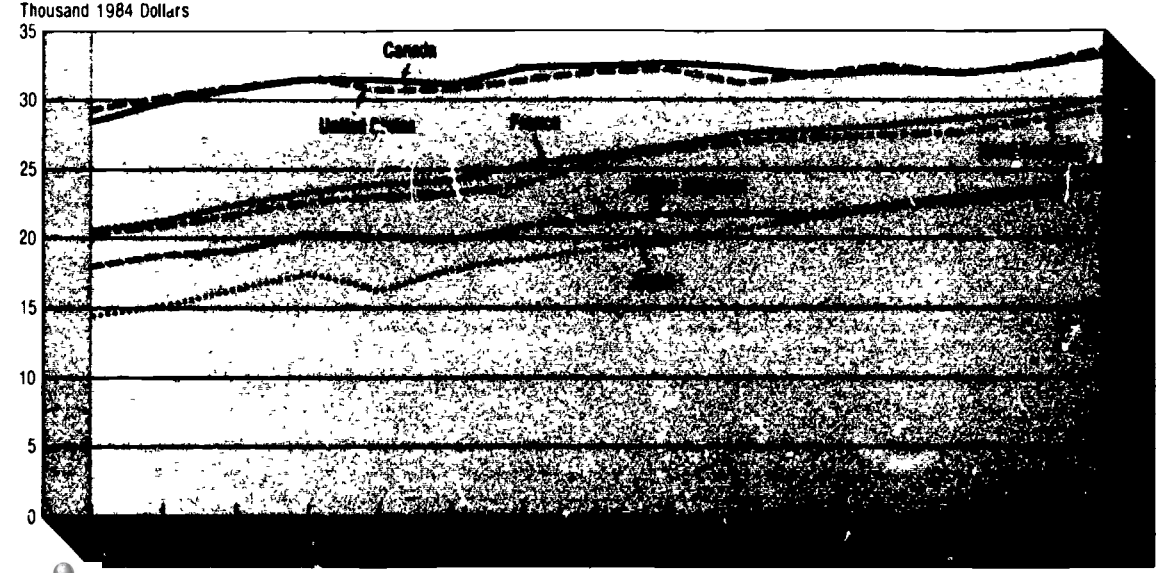
Figure 33



U.S. Patent and Trademark Office
al data may be obtained from Carlos Kruytbosch SRS Phone (202) 634-4884

Figure 34

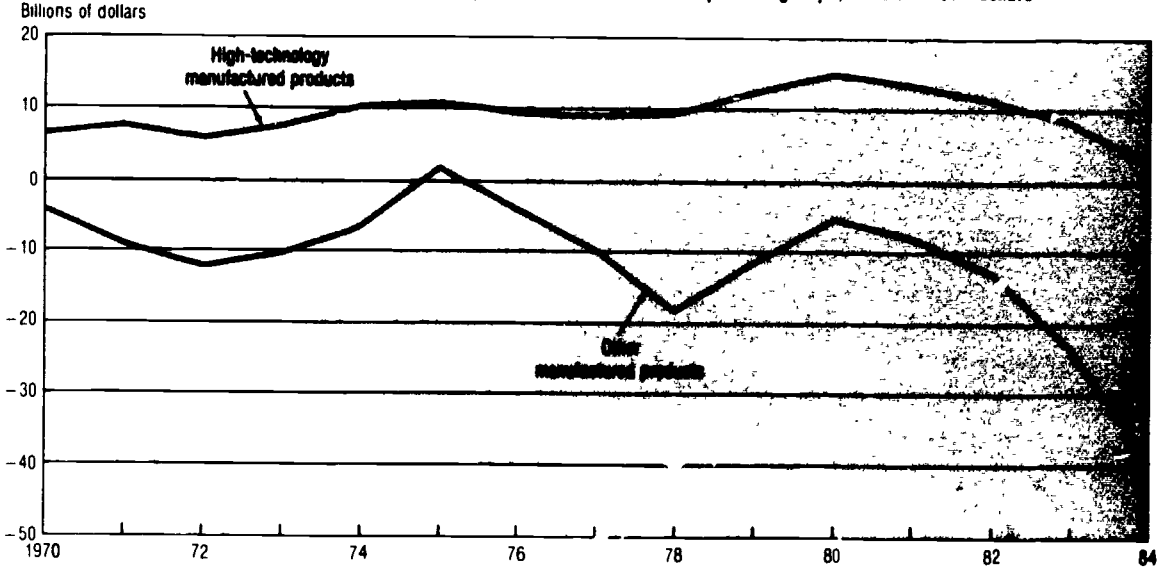
Gross domestic product per employed person, constant (1984) dollars



SOURCE Department of Labor Bureau of Labor Statistics
Additional data may be obtained from Carlos Kruytbosch SRS Phone (202) 634 4682

Figure 35

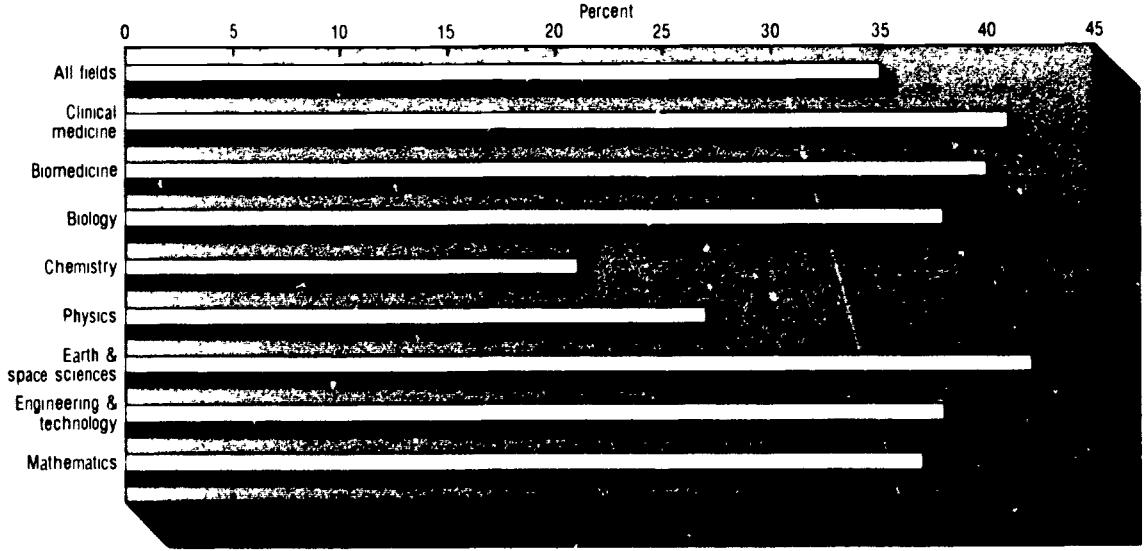
U.S. trade balance[2] in high-technology and other manufactured product groups, constant 197[illegible] dollars



[illegible]orts less imports
[illegible]RCE: Department of Commerce
[illegible]tional data may be obtained from: Carlos Kruytbosch, SRS, Phone (202) 634-4682

Figure 36

U.S. scientific and technical (S/T) publications as a percent of world S/T publications: 1982



NOTE: These data are based on the articles, notes, and reviews in over 2,100 influential journals carried in the 1981 *Science Citation Index* of the Institute for Scientific Information. An article written by researchers from more than one country is prorated across the countries involved.
SOURCE: Computer Horizons, Inc.
Additional data may be obtained from: Carlos Kruytbosch, SRS, Phone: (202) 634-4682

Other Science Resources Publications

	NSF No
R&D Funds	
15% Increase in Federal R&D Funds Proposed in 1986 Budget Mostly for Defense	85 322
Federal Emphasis on Defense is Major Factor in 1983 Increase in Industrial R&D Performance	85 318 (Rev)
Universities Report Research Equipment Shortages Are Most Severe in the Physical Sciences and Engineering	85 320
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Academic R&D Funding Increased 7% in FY 1983, Higher Gains Expected Through 1985	85 306
7% Real Growth Expected in 1985 National R&D Expenditures Defense and Economy Major Factors	85 304
Defense Research and Development Emphasized in 1985 Budget	84 333
Plans for Company Funded Research and Development Show 12% Annual Increases Through 1985	84 329
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Graduate S/E Enrollment Rose 4% in 1983 with Major Gains in Computer Science and Engineering	85 313
Shortages Increase for Engineering Personnel in Industry	85 309
Ph D Scientists and Engineers Shift to Industrial Employment and Related Activities	85-301
Women and Non U S Citizens Responsible for Increase in Production of Science and Engineering Doctorates in 1983	84-328
Science and Engineering Jobs Grew Twice as Fast as Overall U S Employment with Industry Taking the Lead	84 319

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