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Selected
Characteristics of
Persons in
**Mathematical
Specialties:**
1978



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SYMBOLS USED IN TABLES

—	Represents zero.
X	Not applicable.
Z	Less than 0.05 percent.
*	Based on fewer than 20 sample cases.
27+	The median fell in the category 27 weeks or more.

Related Materials

Statistics from a related survey, the 1972 Professional, Technical, and Scientific Manpower Survey, are found in U.S. Bureau of the Census, Technical Paper No. 33, *Characteristics of Persons in Engineering and Scientific Occupations: 1972*, and U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 45, *Persons in Engineering, Scientific, and Technical Occupations: 1970 and 1972*.

The Census Bureau report based on the results of the 1974 National Survey of Scientists and Engineers is U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 53, *Selected Characteristics of Persons in Fields of Science or Engineering: 1974*. The Census Bureau report based on the 1976 survey is U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976*. This is the fourth report in a series of reports based on the 1978 survey; the first report in the Series was U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 108, *Selected Characteristics of Persons in Physical Science: 1978*.

For a list of the National Science Foundation reports based on the above-mentioned 1972 and 1974 surveys, see National Science Foundation, *Characteristics of the National Sample of Scientists and Engineers 1974, Part III* (NSF 76-330); and National Science Foundation, *U.S. Scientists and Engineers: 1974* (NSF 76-329). Two National Science Foundation reports based on the results of the 1976 National Survey of Natural and Social Scientists and Engineers are Science Resources Studies Highlights, *National Sample of Scientists and Engineers: Changes in Employment, 1972-1974 and 1974-1976* (NSF 77-322); and *Characteristics of Experienced Scientists and Engineers, 1976* (NSF 78-305). A National Science Foundation report containing results from the 1978 survey, along with other data from the Manpower Characteristics System, is *U.S. Scientists and Engineers 1978* (NSF 90-304).

Selected Characteristics of Persons in Mathematical Specialties: 1978

INTRODUCTION

The statistics in this report are based on the 1978 survey in a series of biennial surveys known as the National Sample of Scientists and Engineers. The series was sponsored by the National Science Foundation and conducted by the Bureau of the Census. The series began with the 1972 Professional, Technical, and Scientific Manpower Survey, with follow-up surveys of persons from the 1972 survey conducted in 1974, 1976, and 1978. All persons in the national sample were experienced workers who either had jobs in 1970 or were looking for jobs; new entrants into the labor force since 1970 were *not* included. Thus, almost none of the sample persons were under 30 years old in 1978. In addition, the fields of science and engineering in the national sample were limited to persons who met strict educational, occupational, and professional qualifications. For these reasons, persons in the 1978 national sample represented approximately 1.5 million scientists and engineers, only a part of the Nation's total scientific and engineering work force. (The Department of Labor estimates that, based on occupational qualifications alone, there were 2.4 million scientists and engineers in the United States in 1978.)¹

This report is the fourth in a series of reports based on the 1978 survey. Profiled here are the 29,947 persons represented in the 1978 National Sample's field of mathematical specialists: 22,054 mathematicians and 7,893 statisticians.

COMPOSITION (TABLE 1)

The mathematical specialists were predominantly male (86 percent). Women constituted approximately 16 percent of the statisticians and 13 percent of the mathematicians.² The median age in 1978 of the mathematical specialists was 42 years.

In 1978, the distribution of mathematical specialists throughout the regions of the United States was generally similar to that of the overall population of the United States 25 years old and over. However, only 20 percent of the mathematical specialists resided in the North Central States, compared with 26 percent of the general population 25 years and over.³ (See figure 1.)

In 1978, the racial distribution of mathematical specialists was 93 percent White. Blacks made up 4 percent, and Chinese,

Japanese, and Koreans 3 percent. Only about 1 percent of the mathematical specialists indicated that their ethnic heritage was Hispanic.

The fields of science or engineering (S/E) in the national sample were more strictly defined categories than occupations. In general, to be classified into a specific field, a person had to have at least two of the following three characteristics: (1) employment in one of a set of specified occupations, (2) an academic degree among a set of specified academic disciplines, and (3) self-identification within a set of specified professions. Because of these criteria, persons in each field were distributed among a spectrum of occupations. Not surprisingly, a large majority of mathematical specialists were in mathematical science occupations (73 percent): about 47 percent reported their occupation as "mathematician," 22 percent as "statistician," and 4 percent as "operations researcher." About 21 percent of the mathematical specialists reported the occupation "managers and administrators."

EDUCATION AND TRAINING (TABLE 2)

About 41 percent of the mathematical specialists held doctorate degrees, while 31 percent held master's degrees and 28 percent held bachelor's degrees. About one-third (34 percent) of the statisticians held doctorates, compared with 43 percent of the mathematicians. About 82 percent of the mathematical specialists held their highest degree in a mathematical science.

Supplementary training program (such as on-the-job training and employer training programs) gave mathematical specialists the opportunity to maintain or upgrade their academic skills. About 39 percent of the statisticians and 34 percent of the mathematicians turned to these training programs in 1977.^{4 5}

PROFESSIONAL EXPERIENCE AND GROWTH OF THE FIELD (TABLE 3)

Most of these mathematical specialists have been involved in professional work, though not necessarily as mathematical specialists, for a number of years. The median number of years of professional experience for the group was 16 years. About 94 percent of the mathematical specialists had more than 5 years of professional experience, 75 percent had over 10 years, and about 31 percent had more than 20 years.

¹ U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, Vol. 26, No. 1, January 1979.

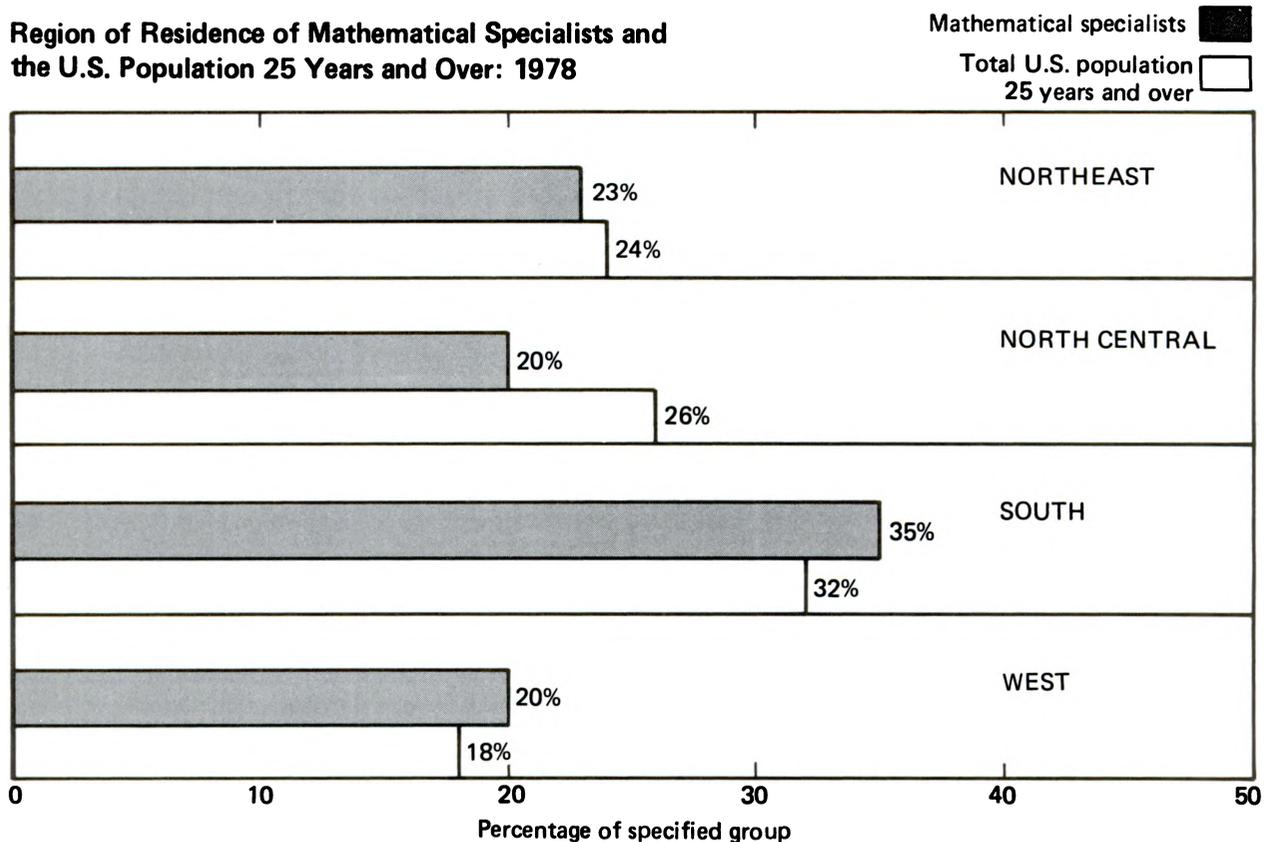
² The apparent difference between the 16 percent and the 13 percent is not statistically significant.

³ Current Population Reports, Series P-20, No. 331, *Geographical Mobility*: March 1975 to March 1978.

⁴ Note that the categories of supplemental training are not mutually exclusive: the same person may have received more than one kind of supplemental training.

⁵ The apparent difference between the 39 percent and the 34 percent is not statistically significant.

Region of Residence of Mathematical Specialists and the U.S. Population 25 Years and Over: 1978



Source: Table 1 and *Current Population Reports*, Series P-20, No. 331, *Geographical Mobility: March 1975 to March 1978*.

The figures in the lower percent distribution of table A show the interfield mobility between 1976 and 1978 of persons in the National Sample. Among persons who were mathematical specialists in 1976, almost 79 percent were also mathematical specialists in 1978; 11 percent were in other S/E fields, such as engineering (4 percent); and 11 percent were outside S/E fields altogether. The upper percent distribution of table A shows the 1978 fields, particularly mathematical specialists, in terms of their 1976 components.

About 27 percent of the mathematical specialists employed in February 1978 and February 1976 changed jobs⁶ during the 2-year period; among these job changers, 54 percent changed their detailed occupation. Of those employed in February 1978 and January 1974, 42 percent changed jobs during the 4-year period; of these, 46 percent changed detailed occupations. Finally, of those employed in February 1978 and January 1972, about one-half (51 percent) had a different job at the end of the 6-year period than at the beginning; of these, 47 percent changed detailed occupations.⁷

⁶ That is, changed employers or remained with the same employer, but had a significant change in their duties, level of responsibility, or occupation.

⁷ There is some evidence that the 54 percent for those who changed detailed occupations between: 1976 and 1978 is statistically different from the 46 percent and the 47 percent for those who changed detailed occupations between the other time periods specified. The apparent difference between the 46 percent and the 47 percent is not statistically significant.

LABOR FORCE PARTICIPATION (TABLE 4)

In February 1978, 93 percent of the mathematical specialists were in the labor force. Of those not in the labor force, 71 percent were retired, 4 percent were students, and 19 percent listed "tending to family responsibilities" as their most important reason for not seeking work.

The unemployment rate (the number unemployed as a percent of those in the labor force) for these mathematical specialists was about 1 percent in February 1978. The national unemployment rate of male professional, technical, and kindred workers 25 years and older in February 1978 (not seasonally adjusted) was 1.5 percent.^{8 9} (See table B.)

About 4 percent of the mathematical specialists were employed part time in 1978, and three-fourths of these were not seeking full-time work (table C).

Only 2.5 percent of the mathematical specialists were unemployed at some time in 1977. The median number of weeks in which these unemployed mathematical specialists searched for a job was 14. About 38 percent searched for 27 weeks or more.

The majority of employed mathematical specialists worked in four major industry groups in 1978: educational

⁸ U.S. Department of Labor, Bureau of Labor Statistics, unpublished Current Population Survey data.

⁹ There is some evidence that the unemployment rate for mathematical specialists is statistically different from the 1.5 percent rate cited here.

Table A. Field of Science or Engineering in 1978, by Field of Science or Engineering in 1976

(Numbers in thousands)

Field of science or engineering in 1976	Total national sample in 1978	In field of science or engineering in 1978				Not in S/E field in 1978
		Total	Mathematical specialists	Other S/E field		
				Total	Engineers	
Total national sample in 1976.....	1,350	1,138	30	1,108	721	211
In S/E field in 1976.....	1,119	1,029	25	1,004	660	90
Mathematical specialists.....	28	25	22	3	1	3
Other S/E field.....	1,091	1,004	3	1,001	659	87
Engineers.....	707	660	1	659	649	47
Not in S/E field in 1976.....	173	64	3	61	32	109
Did not report in 1976.....	57	45	2	43	30	12
PERCENT DISTRIBUTION						
Total national sample in 1976.....	100.0	100.0	100.0	100.0	100.0	100.0
In S/E field in 1976.....	82.9	90.4	83.3	90.6	91.5	42.6
Mathematical specialists.....	2.1	2.2	73.3	0.3	0.1	1.4
Other S/E field.....	80.8	88.2	10.0	90.3	91.4	41.2
Engineers.....	52.4	58.0	3.3	59.5	90.0	22.3
Not in S/E field in 1976.....	12.8	5.6	10.0	5.5	4.4	51.7
Did not report in 1976.....	4.2	4.0	6.7	3.9	4.1	5.7
Total national sample in 1976.....	100.0	84.3	2.2	82.1	53.4	15.7
In S/E field in 1976.....	100.0	91.9	2.2	89.7	59.0	8.0
Mathematical specialists.....	100.0	89.3	78.6	10.7	3.6	10.7
Other S/E field.....	100.0	92.0	0.3	91.7	60.4	8.0
Engineers.....	100.0	93.4	0.1	93.2	91.8	6.6
Not in S/E field in 1976.....	100.0	37.0	1.7	35.3	18.5	63.0
Did not report in 1976.....	100.0	78.9	3.5	75.4	52.6	21.1

Source: Unpublished data from the 1978 National Sample of Scientists and Engineers.

institutions (47 percent); manufacturing (16 percent); services, except education and health (15 percent); and public administration (12 percent).

The 1978 national sample survey asked persons to describe the type of organization of their principal employment or post-doctoral appointment. Among mathematical specialists employed in February 1978, 29 percent specified their employer's organization as a private business or industry, 47 percent as an educational institution (38 percent indicated college and university), and 20 percent as government (15 percent indicated U.S. Government).

Teaching and training was the primary work activity of the largest proportion of employed mathematical specialists

(38 percent). Other activities with high proportions were management and administration (listed by 25 percent of the mathematical specialists) report writing, statistical work, computer applications (17 percent), and research and development (14 percent).

The mathematical specialists in the national sample were asked to choose, from among a list of selected topics of critical national interest, the problem to which they devoted the most professional time. About 36 percent selected education (mainly teaching), and 13 percent chose national defense, and 28 percent of the mathematical specialists either did not report a national interest topic or indicated that this inquiry was not applicable to them.

Table B. Employment Status in February 1978 of Mathematical Specialists in 1978

Employment status	Total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
Total in labor force in February 1978.....	27,850	100.0	20,779	100.0	7,071	100.0
Employed.....	27,606	99.1	20,630	99.3	6,976	98.7
Unemployed.....	243	0.9	149	0.7	95	1.3

Note: Detail may not add to total because of rounding.

Source: Table 4.

Table C. Full- and Part-Time Work Status of Mathematical Specialists in 1978 Employed in February 1978

Full or part-time work status	Total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Full time.....	26,376	95.5	19,809	96.0	6,567	94.1
Part time.....	1,213	4.4	804	3.9	409	5.9
Seeking full-time work.....	250	0.9	191	0.9	59	0.8
Not seeking full-time work.....	926	3.4	599	2.9	328	4.7
Seeking not reported.....	36	0.1	14	0.1	22	0.3
Full or part time not reported.....	17	(Z)	17	0.1	-	-

Z Less than 0.05 percent.

- Represents zero.

Source: Table 4.

The Federal Government sponsored or supported at least some of the work of 40 percent of the mathematical specialists. Chief Government sponsors were the Department of Defense (which provided funds to 17 percent of the mathematical specialists); the Department of Health, Education, and Welfare (which funded 7 percent); and the National Science Foundation (which funded 7 percent).

INCOME (TABLE 5)

The median basic annual salary rate of mathematical specialists employed full time in February 1978 was \$27,232. The median for mathematicians was \$27,252, and that for statisticians was \$27,193.¹⁰ The median earnings in 1977, as estimated from the CPS¹¹, for male professional, technical, and kindred workers 14 years old and over who worked year round, full time was \$18,224; the comparable figure for women was \$11,995. Male year-round, full-time workers 25 years old and over with 4 or more years of college (regardless of occupation) had mean earnings in 1977 of \$21,441;

¹⁰ Apparent differences among the medians for mathematical specialists (total), mathematicians, and statisticians are not statistically significant.

¹¹ U.S. Department of Commerce, Bureau of the Census, Current Population Reports, *Money Income in 1977 of Families and Persons in the United States*, Series P-60, No. 118.

those with 5 or more years of college had mean earnings of \$25,782. It should be noted that the CPS figures are not strictly comparable with those for mathematical specialists in the national sample.¹²

Results from the 1976 survey of the National Sample of Scientists and Engineers showed a median basic annual salary in February 1976 of mathematical specialists employed full time in February 1976 of \$23,551. Thus, the median basic annual salary of full-time mathematical specialists rose by \$3,681 between February 1976 and February 1978. However, when the 1976 and 1978 basic annual salaries are expressed in constant 1977 dollars, the increase is approximately \$716 or about 1.4 percent per year.¹³

¹² The CPS concept "earnings" includes more sources of remuneration than does the national sample concept of "basic annual salary"; there were also other differences between the National Sample's basic annual salary concept and the CPS earnings concept, including differences in reference periods and data collection procedures. CPS figures for 1977 are cited because 1977 is the full year most nearly comparable with the reference year for the 1978 national sample question on basic annual salary.

¹³ The 1976-78 comparisons in terms of constant 1977 dollars must be approached cautiously. Problems are introduced into the comparisons by, among other things, the way the basic annual salary data are defined and collected, the differences between the non-response adjustment procedures of the 1976 and 1978 surveys, and the difficulty of establishing appropriate time periods for the constant dollar computations.

Table 1. Occupation, Professional Identification, and Selected Characteristics of Mathematical Specialists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Occupation, professional identification, and selected characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Male.....	25,838	86.3	19,185	87.0	6,653	84.3
Female.....	4,109	13.7	2,869	13.0	1,240	15.7
Under 30 years.....	376	1.3	276	1.3	100	1.3
30 to 34 years.....	5,273	17.6	3,678	16.7	1,594	20.2
35 to 39 years.....	7,494	25.0	6,166	28.0	1,328	16.8
40 to 44 years.....	5,028	16.8	3,690	16.7	1,338	17.0
45 to 49 years.....	4,052	13.5	2,977	13.5	1,075	13.6
50 to 54 years.....	3,102	10.4	2,452	11.1	651	8.2
55 to 59 years.....	1,727	5.8	1,082	4.9	644	8.2
60 to 64 years.....	1,382	4.6	888	4.0	495	6.3
65 to 69 years.....	905	3.0	441	2.0	464	5.9
70 years and over.....	610	2.0	404	1.8	205	2.6
Median age.....	42	(X)	41	(X)	43	(X)
RESIDENCE IN 1978						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
United States.....	29,509	98.5	21,785	98.8	7,724	97.8
Northeast.....	7,020	23.4	5,098	23.1	1,922	24.3
New England.....	1,820	6.1	1,364	6.2	456	5.8
Middle Atlantic.....	5,200	17.4	3,734	16.9	1,465	18.6
North Central.....	6,071	20.3	4,452	20.2	1,619	20.5
East North Central.....	4,386	14.6	3,243	14.7	1,143	14.5
West North Central.....	1,685	5.6	476	6.0	7,481	9.2
South.....	10,394	34.7	7,217	32.7	3,177	40.3
South Atlantic.....	7,136	23.8	4,666	21.2	2,470	31.3
East South Central.....	938	3.1	732	3.3	206	2.6
West South Central.....	2,320	7.7	1,819	8.2	501	6.3
West.....	6,024	20.1	5,018	22.8	1,006	12.7
Mountain.....	1,751	5.8	1,469	6.7	282	3.6
Pacific.....	4,273	14.3	3,549	16.1	723	9.2
Outlying areas.....	14	(Z)	14	(Z)	-	-
Foreign countries.....	424	1.4	254	1.2	170	2.2
Not reported.....	-	-	-	-	-	-
RACE						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
White.....	27,753	92.7	20,696	93.8	7,057	89.4
Black.....	1,117	3.7	921	4.2	196	2.5
American Indian.....	140	0.5	22	(Z)	118	1.5
Chinese, Japanese, Korean.....	825	2.8	393	1.8	432	5.5
All other races.....	113	0.4	22	0.1	90	1.1
HISPANIC HERITAGE						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Hispanic.....	374	1.3	296	1.3	79	1.0
Not Hispanic.....	28,653	95.7	21,167	96.0	7,486	94.8
Not reported.....	920	3.1	592	2.7	329	4.2

Table 1. Occupation, Professional Identification, and Selected Characteristics of Mathematical Specialists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Occupation, professional identification, and selected characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
OCCUPATION IN 1978						
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Computer specialists, total.....	573	2.1	521	2.5	52	0.7
Computer systems analysts.....	298	1.1	278	1.3	19	0.3
Computer scientists.....	80	0.3	63	0.3	18	0.3
Computer programmers.....	131	0.5	116	0.6	15	0.2
Other computer fields.....	64	0.2	64	0.3	-	-
Engineers, total.....	285	1.0	243	1.2	42	0.6
Aeronautical and astronautical.....	16	(Z)	16	(Z)	-	-
Agricultural.....	-	-	-	-	-	-
Chemical.....	-	-	-	-	-	-
Civil and architectural.....	-	-	-	-	-	-
Electrical and electronic.....	79	0.3	79	0.4	-	-
Industrial.....	42	0.2	-	-	42	0.6
Mechanical.....	-	-	-	-	-	-
Metallurgical and materials.....	-	-	-	-	-	-
Mining, petroleum, and geological.....	-	-	-	-	-	-
Nuclear.....	-	-	-	-	-	-
Environmental and sanitary.....	-	-	-	-	-	-
Operations research/systems.....	117	0.4	117	0.6	-	-
Other engineering fields.....	31	0.1	31	0.1	-	-
Mathematicians and statisticians, total.....	20,222	73.3	14,089	68.3	6,134	87.9
Mathematicians.....	12,963	47.0	12,946	62.8	16	0.2
Statisticians.....	6,170	22.4	143	0.7	6,027	86.4
Actuaries.....	16	(Z)	16	(Z)	-	-
Operations research.....	1,073	3.9	983	4.8	90	1.3
Life scientists.....	-	-	-	-	-	-
Agricultural scientists.....	-	-	-	-	-	-
Biological scientists.....	-	-	-	-	-	-
Biochemists.....	-	-	-	-	-	-
Biophysicists.....	-	-	-	-	-	-
Medical scientists.....	-	-	-	-	-	-
Other life scientists.....	-	-	-	-	-	-
Physical scientists, total.....	17	(Z)	17	(Z)	-	-
Chemists.....	-	-	-	-	-	-
Physicists and astronomers.....	-	-	-	-	-	-
Other physical scientists.....	17	(Z)	17	(Z)	-	-
Environmental scientists, total.....	13	(Z)	13	(Z)	-	-
Earth scientists.....	13	(Z)	13	(Z)	-	-
Atmospheric scientists.....	-	-	-	-	-	-
Oceanographers.....	-	-	-	-	-	-
Psychologists.....	-	-	-	-	-	-
Social scientists, total.....	74	0.3	74	0.4	-	-
Economists.....	57	0.2	57	0.3	-	-
Sociologists and anthropologists.....	-	-	-	-	-	-
Other social scientists.....	17	(Z)	17	(Z)	-	-
Health occupations.....	-	-	-	-	-	-
Physician or surgeon.....	-	-	-	-	-	-
Dental technician.....	-	-	-	-	-	-
Medical technician.....	-	-	-	-	-	-
Other health occupations.....	-	-	-	-	-	-
Technicians and technologists, except medical....	-	-	-	-	-	-
Teachers ¹	351	1.3	329	1.6	22	0.3
Administrators and managers.....	5,895	21.4	5,169	25.2	697	10.0
Other occupations.....	144	0.5	115	0.6	29	0.4
Not reported.....	33	0.1	33	0.2	-	-

See footnote at end of table.

Table 1. Occupation, Professional Identification, and Selected Characteristics of Mathematical Specialists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Occupation, professional identification, and selected characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
PROFESSIONAL IDENTIFICATION IN 1978						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Computer specialists.....	1,297	4.3	1,238	5.6	59	0.7
Engineers.....	688	2.3	672	3.0	16	0.2
Mathematicians and statisticians.....	22,782	76.1	15,856	71.9	6,926	87.7
Life scientists.....	13	(Z)	13	(Z)	-	-
Physical scientists.....	90	0.3	90	0.4	-	-
Environmental scientists.....	30	0.1	30	0.1	-	-
Psychologists.....	15	(Z)	-	-	15	0.2
Social scientists.....	64	0.2	16	(Z)	47	0.6
Health occupations.....	-	-	-	-	-	-
Technicians, except medical.....	-	-	-	-	-	-
Teachers.....	271	0.9	271	1.2	-	-
Administrators.....	4,312	14.4	3,648	16.5	665	8.4
All other occupations.....	90	0.3	73	0.3	17	0.2

¹College or university teachers of science or engineering are excluded from teachers and included in occupation corresponding to subject taught.

Table 2. Selected Educational Characteristics of Mathematical Specialists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Selected educational characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
HIGHEST DEGREE HELD						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
With a degree.....	29,947	100.0	22,054	100.0	7,893	100.0
Associate.....	-	-	-	-	-	-
Bachelor's.....	8,315	27.8	5,942	26.9	2,373	30.1
Master's.....	9,265	30.9	6,520	29.6	2,745	34.8
Doctorate.....	12,176	40.7	9,473	43.0	2,703	34.2
Professional/medical.....	191	0.6	118	0.5	73	0.9
Other.....	-	-	-	-	-	-
No degree.....	-	-	-	-	-	-
Not reported.....	-	-	-	-	-	-
MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Computer science and systems analysis.....	85	0.3	55	0.3	30	0.4
Engineering.....	417	1.4	203	0.9	214	2.7
Mathematical sciences.....	24,458	81.7	20,007	90.7	4,450	56.4
Agricultural sciences.....	336	1.1	16	(Z)	320	4.0
Biological sciences.....	177	0.6	-	-	177	2.2
Medical sciences.....	177	0.6	46	0.2	130	1.7
Chemistry.....	131	0.4	43	0.2	88	1.1
Physics and astronomy.....	428	1.4	400	1.8	28	0.4
Earth, space, and marine sciences.....	31	0.1	31	0.1	-	-
Psychology.....	238	0.8	-	-	238	3.0
Economics.....	867	2.9	-	-	867	11.0
Sociology and anthropology.....	133	0.4	-	-	133	1.7
Other social sciences.....	121	0.4	22	(Z)	99	1.3
Business and commerce.....	515	1.7	78	0.4	437	5.5
All other fields.....	1,695	5.7	1,047	4.7	647	8.2
All fields below BA.....	13	(Z)	-	-	13	0.2
Field not reported.....	127	0.4	105	0.5	22	0.3
SUPPLEMENTAL TRAINING IN 1977¹						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
With supplemental training in 1977.....	10,554	35.2	7,499	34.0	3,054	38.7
On-the-job training.....	5,822	19.4	4,216	19.1	1,606	20.3
Military training applicable to civilian occupations.....	182	0.6	182	0.8	-	-
Extension or correspondence courses.....	591	2.0	491	2.2	100	1.3
Employer training programs.....	4,457	14.9	3,538	16.0	919	11.6
Adult education center.....	1,242	4.1	832	3.8	410	5.2
Other training.....	2,570	8.6	1,994	9.0	576	7.3
No supplemental training in 1977.....	16,834	56.2	12,750	57.8	4,084	51.7
Not reported.....	2,560	8.5	1,805	8.2	755	9.6

¹Sum of types of training may exceed total with training because of multiple response.

Table 3. Years of Professional Experience, Field of Science or Engineering in 1976, and Job Mobility of Mathematical Specialists in 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Professional experience, field in 1976, and job mobility	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
YEARS OF PROFESSIONAL EXPERIENCE						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
With years of professional experience reported...	29,356	98.0	21,740	98.6	7,616	96.5
Less than 1 year.....	52	0.2	52	0.2	-	-
1 to 5 years.....	1,001	3.3	691	3.1	310	3.9
6 to 10 years.....	5,748	19.2	4,112	18.6	1,636	20.7
11 to 15 years.....	7,910	26.4	6,141	27.8	1,770	22.4
16 to 20 years.....	5,277	17.6	3,902	17.7	1,375	17.4
21 to 25 years.....	3,595	12.0	2,887	13.1	708	9.0
26 to 30 years.....	2,934	9.8	2,059	9.3	875	11.1
31 to 35 years.....	1,284	4.3	840	3.8	445	5.6
36 to 40 years.....	913	3.0	628	2.8	285	3.6
41 years or more.....	642	2.1	430	1.9	212	2.7
Median years of professional experience.....	16	(X)	16	(X)	16	(X)
Years of professional experience not reported....	591	2.0	314	1.4	277	3.5
FIELD OF SCIENCE OR ENGINEERING IN 1976						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Computer specialists.....	1,778	5.9	1,673	7.6	104	1.3
Engineers.....	938	3.1	756	3.4	182	2.3
Mathematical specialists.....	22,372	74.7	15,920	72.2	6,452	81.7
Mathematicians.....	15,900	53.1	15,695	71.2	205	2.6
Statisticians.....	6,472	21.6	225	1.0	6,246	79.1
Life scientists.....	41	0.1	26	0.1	15	0.2
Agricultural scientists.....	-	-	-	-	-	-
Biologists.....	26	0.1	26	0.1	-	-
Medical scientists.....	15	0.1	-	-	15	0.2
Physical scientists.....	60	0.2	45	0.2	16	0.2
Chemists.....	-	-	-	-	-	-
Physicists and astronomers.....	60	0.2	45	0.2	16	0.2
Other physical scientists.....	-	-	-	-	-	-
Environmental scientists.....	17	0.1	17	0.1	-	-
Earth scientists.....	17	0.1	17	0.1	-	-
Atmospheric scientists.....	-	-	-	-	-	-
Oceanographers.....	-	-	-	-	-	-
Psychologists.....	27	0.1	-	-	27	0.3
Social scientists.....	70	0.2	57	0.3	13	0.2
Economists.....	13	-	-	-	13	0.2
Sociologists and anthropologists.....	-	-	-	-	-	-
Other social scientists.....	57	0.2	57	0.3	-	-
Not in a field in 1976.....	3,197	10.7	2,413	10.9	784	9.9
Did not report in 1976.....	1,448	4.8	1,146	5.2	302	3.8
JOB MOBILITY						
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Employed in February 1976.....	25,532	92.5	18,972	92.0	6,560	94.0
Job change since 1976.....	7,015	25.4	5,373	26.0	1,642	23.5
Occupation change.....	3,797	13.8	3,359	16.3	438	6.3
No occupation change.....	3,110	11.3	1,930	9.4	1,179	16.9
Occupation change not reported.....	108	0.4	84	0.4	25	0.4
Same job in 1976 and 1978.....	17,707	64.1	13,032	63.2	4,675	67.0
Not reported.....	810	2.9	567	2.7	243	3.5
Not employed or employment status not reported in February 1976.....	2,074	7.5	1,658	8.0	416	6.0
Employed in January 1974.....	25,942	94.0	19,281	93.5	6,661	95.5
Job change between 1974 and 1978.....	10,876	39.4	8,204	39.8	2,673	38.3
Occupation change.....	5,046	18.3	4,423	21.4	623	8.9
No occupation change.....	5,830	21.1	3,781	18.3	2,050	29.4
Occupation change not reported.....	-	-	-	-	-	-
Same job in 1974 and 1978.....	14,171	51.3	10,450	50.7	3,721	53.3
Not reported.....	895	3.2	627	3.0	268	3.8
Not employed or employment status not reported in February 1974.....	1,664	6.0	1,350	6.5	315	4.5
Employed in 1972.....	26,749	96.9	20,101	97.4	6,648	95.3
Job change between 1972 and 1978.....	13,587	49.2	9,827	47.6	3,760	53.9
Occupation change.....	6,332	22.9	5,161	25.0	1,171	16.8
No occupation change.....	7,255	26.3	4,666	22.6	2,589	37.1
Occupation change not reported.....	-	-	-	-	-	-
Same job in 1972 and 1978.....	12,174	44.1	9,552	46.3	2,622	37.6
Not reported.....	989	3.6	723	3.5	266	3.8
Not employed or employment status not reported in February 1972.....	857	3.1	529	2.6	328	4.7

Table 4. Employment Status and Selected Job-Related Characteristics of Mathematical Specialists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
EMPLOYMENT STATUS IN FEBRUARY 1978						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
In labor force.....	27,850	93.0	20,779	94.2	7,071	89.6
Employed.....	27,606	92.2	20,630	93.5	6,976	88.4
Full time.....	26,376	88.1	19,809	89.8	6,567	83.2
Part time.....	1,213	4.0	804	3.6	409	5.2
Seeking full-time work.....	250	0.8	191	0.9	59	0.7
Not seeking full-time work.....	926	3.1	599	2.7	328	4.2
Not reported.....	36	0.1	14	(Z)	22	0.3
Full or part time not reported.....	17	(Z)	17	(Z)	-	-
Unemployed.....	243	0.8	149	0.7	95	1.2
Not in labor force.....	2,098	7.0	1,275	5.8	823	10.4
Retired.....	1,485	5.0	777	3.5	708	9.0
Student.....	79	0.3	79	0.4	-	-
Family responsibilities.....	405	1.4	290	1.3	115	1.5
Could not find work.....	27	(Z)	27	0.1	-	-
Other.....	101	0.3	101	0.5	-	-
FULL-TIME EMPLOYMENT IN SCIENCE OR ENGINEERING IN 1978						
Total employed full time in February 1978..	26,376	100.0	19,809	100.0	6,567	100.0
In science or engineering.....	25,030	94.9	18,516	93.5	6,514	99.2
Not in science or engineering.....	1,315	5.0	1,277	6.4	38	0.6
Preferred nonscience or nonengineering.....	129	0.5	129	0.7	-	-
Promoted out of science or engineering.....	389	1.5	367	1.9	22	0.3
Pay better in nonscience or nonengineering....	183	0.7	183	0.9	-	-
Locational preference.....	62	0.2	62	0.3	-	-
Science or engineering position not available..	100	0.4	100	0.5	-	-
Other reason.....	400	1.5	400	2.0	-	-
Reason not reported.....	52	0.2	36	0.2	16	0.2
UNEMPLOYMENT IN CALENDAR YEAR 1977						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Unemployed in calendar year 1977.....	748	2.5	643	2.9	105	1.3
1 to 4 weeks.....	118	0.4	118	0.5	-	-
5 to 10 weeks.....	173	0.6	160	0.7	13	0.2
11 to 14 weeks.....	100	0.3	100	0.5	-	-
15 to 26 weeks.....	43	0.1	26	0.1	17	0.2
27 weeks or more.....	281	0.9	225	1.0	55	0.7
Median weeks of unemployment.....	14	(X)	12	(X)	*27+	(X)
Weeks of unemployment not reported.....	33	0.1	13	(Z)	19	0.2
Not unemployed in calendar year 1977.....	28,837	96.3	21,243	96.3	7,594	96.2
Not reported.....	362	1.2	168	0.8	194	2.5

Table 4. Employment Status and Selected Job-Related Characteristics of Mathematical Specialists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
INDUSTRY IN 1978						
Total employed in 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Agriculture, forestry, and fisheries.....	274	1.0	-	-	274	3.9
Mining and petroleum extraction.....	99	0.4	86	0.4	13	0.2
Construction.....	169	0.6	56	0.3	113	1.6
Manufacturing, total.....	4,453	16.1	3,316	16.1	1,138	16.3
Primary metal industries.....	27	(Z)	-	-	27	0.4
Fabricated metal industries.....	-	-	-	-	-	-
Machinery, except electrical.....	227	0.8	185	0.9	42	0.6
Electrical machinery, equipment, and supplies..	344	1.2	329	1.6	14	0.2
Electronic machinery and computing equipment...	1,286	4.7	1,175	5.7	111	1.6
Aircraft and aircraft parts.....	300	1.1	270	1.3	30	0.4
Motor vehicles and motor vehicle equipment.....	159	0.6	159	0.8	-	-
Ordnance.....	460	1.7	380	1.8	80	1.2
Chemicals and allied products.....	657	2.4	215	1.0	442	6.3
Petroleum refining and related industries.....	265	1.0	171	0.8	94	1.4
Other manufacturing.....	729	2.6	431	2.1	297	4.3
Transportation, communications, and other public utilities.....	641	2.3	487	2.4	154	2.2
Wholesale and retail trade.....	284	1.0	284	1.4	-	-
Finance, insurance, and real estate.....	355	1.3	257	1.2	98	1.4
Educational institutions, total.....	12,981	47.0	11,024	53.4	1,957	28.0
College or university.....	10,372	37.6	8,954	43.4	1,418	20.3
Other.....	2,609	9.5	2,071	10.0	538	7.7
Health services.....	184	0.7	14	(Z)	169	2.4
Services, except education and health, total.....	4,002	14.5	2,874	13.9	1,128	16.2
Engineering and architectural services.....	631	2.3	587	2.8	44	0.6
Research institutions.....	2,634	9.5	1,891	9.2	743	10.6
Other.....	737	2.7	396	1.9	341	4.9
Public administration.....	3,249	11.8	1,576	7.6	1,673	24.0
Federal.....	1,779	6.4	666	3.2	1,114	16.0
Other.....	1,403	5.1	861	4.2	543	7.8
Military.....	67	0.2	50	0.2	16	0.2
Other industries.....	797	2.9	551	2.7	246	3.5
Not reported.....	119	0.4	106	0.5	13	0.2
TYPE OF EMPLOYER IN 1978						
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Business or industry.....	8,003	29.0	5,784	28.0	2,218	31.8
Educational institutions, total.....	12,970	47.0	11,045	53.5	1,926	27.6
Junior or 2-year college, technical institute..	2,088	7.6	1,925	9.3	163	2.3
Medical school.....	369	1.3	26	0.1	343	4.9
4-year college or university, except medical school.....	10,376	37.6	8,957	43.4	1,419	20.3
Elementary or secondary school system.....	137	0.5	137	0.7	-	-
Hospital or clinic.....	46	0.2	-	-	46	0.7
Nonprofit organization.....	783	2.8	512	2.5	270	3.9
U.S. military service/commissioned groups.....	83	0.3	50	0.2	33	0.5
Government, total.....	5,590	20.2	3,154	15.3	2,436	34.9
Federal.....	3,991	14.5	2,160	10.5	1,831	26.2
State.....	749	2.7	318	1.5	430	6.2
Local or other.....	851	3.1	676	3.3	175	2.5
International agency.....	31	0.1	-	-	31	0.4
Other.....	16	(Z)	-	-	16	0.2
Not reported.....	85	0.3	85	0.4	-	-

Table 4. Employment Status and Selected Job-Related Characteristics of Mathematical Specialists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
PRIMARY WORK ACTIVITY IN 1978						
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
Research and development.....	3,811	13.8	2,982	14.5	829	11.9
Basic research.....	1,548	5.6	1,239	6.0	309	4.4
Applied research.....	1,185	4.3	821	4.0	364	5.2
Development.....	940	3.4	783	3.8	156	2.2
Design.....	138	0.5	138	0.7	-	-
Management or administration, total.....	6,873	24.9	5,435	26.3	1,439	20.6
Research and development.....	3,171	11.5	2,455	11.9	717	10.3
Other.....	3,702	13.4	2,980	14.4	722	10.3
Teaching and training.....	10,453	37.9	9,282	45.0	1,171	16.8
Production and inspection.....	776	2.8	684	3.3	91	1.3
Quality control.....	197	0.7	181	0.9	16	0.2
Operations.....	473	1.7	411	2.0	62	0.9
Distribution-sales.....	106	0.4	93	0.4	13	0.2
Consulting.....	489	1.8	180	0.9	308	4.4
Clinical diagnosis.....	-	-	-	-	-	-
Consulting.....	489	1.8	180	0.9	308	4.4
Report writing, statistical work, and computer applications.....	4,703	17.0	1,662	8.1	3,041	43.6
Report writing.....	285	1.0	145	0.7	139	2.0
Statistical work.....	3,111	11.3	387	1.9	2,724	39.1
Computer applications.....	1,307	4.7	1,130	5.5	177	2.5
Other activities.....	282	1.0	233	1.1	49	0.7
Not reported.....	220	0.8	173	0.8	47	0.7
NATIONAL INTEREST TOPICS¹						
Total.....	29,947	100.0	22,054	100.0	7,893	100.0
Health.....	2,066	6.9	378	1.7	1,688	21.4
Education, total.....	10,681	35.7	9,368	42.5	1,313	16.6
Teaching.....	10,119	33.8	9,012	40.9	1,106	14.0
Other.....	562	1.9	356	1.6	206	2.6
Environmental protection, pollution control.....	753	2.5	459	2.1	294	3.7
Space.....	650	2.2	636	2.9	14	0.2
National defense.....	3,788	12.6	3,245	14.7	542	6.9
Crime prevention and control.....	61	0.2	38	0.2	23	0.3
Food production and technology.....	427	1.4	45	0.2	382	4.8
Energy and fuel.....	1,314	4.4	1,075	4.9	239	3.0
Other mineral resources.....	19	(Z)	19	(Z)	-	-
Community development and services.....	387	1.3	346	1.6	41	0.5
Housing.....	360	1.2	165	0.8	194	2.5
Other.....	1,058	3.5	408	1.8	650	8.2
Not applicable.....	6,459	21.6	4,501	20.4	1,958	24.8
Not reported.....	1,924	6.4	1,371	6.2	553	7.0

See footnote at end of table.

Table 4. Employment Status and Selected Job-Related Characteristics of Mathematical Specialists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
FEDERAL SUPPORT IN 1978²						
Total employed in February 1978.....	27,606	100.0	20,630	100.0	6,976	100.0
With Federal support.....	11,029	40.0	7,297	35.4	3,732	53.5
Department of Agriculture.....	643	2.3	-	-	643	9.2
Department of Commerce.....	657	2.4	202	1.0	456	6.5
Department of Defense.....	4,590	16.6	3,804	18.4	786	11.3
Department of Energy.....	848	3.1	644	3.1	205	2.9
Department of Health, Education, and Welfare...	1,916	6.9	648	3.1	1,268	18.2
Department of Housing and Urban Development....	99	0.4	71	0.3	27	0.4
Department of the Interior.....	199	0.7	186	0.9	13	0.2
Department of Justice.....	138	0.5	46	0.2	92	1.3
Department of Labor.....	309	1.1	46	0.2	264	3.8
Department of Transportation.....	320	1.2	184	0.9	137	2.0
Agency for International Development.....	144	0.5	22	0.1	122	1.8
Environmental Protection Agency.....	501	1.8	200	1.0	300	4.3
NASA.....	810	2.9	688	3.3	122	1.7
National Science Foundation.....	1,870	6.8	1,666	8.1	204	2.9
Nuclear Regulatory Commission.....	177	0.6	103	0.5	73	1.1
Other department or agency.....	583	2.1	204	1.0	379	5.4
Agency not known.....	76	0.3	45	0.2	31	0.4
Agency not reported.....	84	0.3	71	0.3	13	0.2
No Federal support.....	14,866	53.8	11,921	57.8	2,944	42.2
Federal support not known.....	1,381	5.0	1,201	5.8	180	2.6
Not reported.....	331	1.2	211	1.0	120	1.7

¹Area of national concern in which persons devoted the largest proportion of professional time.

²Sum of individual agencies support may exceed total with Federal support because of multiple response.

Table 5. Basic Annual Salary Rate of Full-Time Employed Mathematical Specialists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Salary	Mathematical specialists, total		Mathematicians		Statisticians	
	Number	Percent	Number	Percent	Number	Percent
Total employed full time in February 1978..	26,376	100.0	19,809	100.0	6,567	100.0
With salary ¹ reported.....	25,226	95.6	18,996	95.9	6,230	94.9
Less than \$8,000.....	75	0.3	75	0.4	-	-
\$8,000 to \$9,999.....	19	(Z)	-	-	19	0.3
\$10,000 to \$14,999.....	822	3.1	458	2.3	364	5.5
\$15,000 to \$19,999.....	2,567	9.7	2,023	10.2	544	8.3
\$20,000 to \$24,999.....	5,852	22.2	4,500	22.7	1,351	20.6
\$25,000 to \$29,999.....	6,332	24.0	4,664	23.5	1,669	25.4
\$30,000 to \$39,999.....	7,381	28.0	5,725	28.9	1,656	25.2
\$40,000 to \$49,999.....	1,883	7.1	1,348	6.8	535	8.1
\$50,000 and over.....	295	1.1	203	1.0	92	1.4
Median salary (dollars).....	\$27,232	(X)	\$27,252	(X)	\$27,193	(X)
Salary not reported.....	1,150	4.4	813	4.1	337	5.1

¹Refers to salary for job held during the week of February 12-18, 1978.

Appendix A. Definitions and Explanations

The 1978 National Survey of Natural and Social Scientists and Engineers was the fourth survey based on the 1970 population of scientists and engineers. It was conducted by the Bureau of the Census for the National Science Foundation. The first survey, the 1972 Professional, Technical, and Scientific Manpower Survey,¹ was conducted among a nationwide sample of approximately 150,000 persons who were recorded in the 1970 Census of Population as being in the experienced civilian labor force in 1 of 63 engineering, scientific, or related occupations. The survey also included a small sample of persons who had completed 4 or more years of college, but were not in any of the specified occupations. Based on responses in the 1972 survey and on criteria established by the National Science Foundation, approximately 50,000 persons from the 1972 survey sample (excluding the small sample of college graduates) were chosen as the sample for the series of longitudinal surveys known as the National Sample of Scientists and Engineers. The 1978 National Survey of Natural and Social Scientists and Engineers was the third survey in this longitudinal series; it was preceded by surveys in 1976 and 1974.²

Questionnaires for the 1978 survey were mailed in February 1978. After all data collection activities, 81 percent of the sample (approximately 40,800 persons) completed their questionnaires. The 19 percent who did not complete their questionnaires included persons who refused to participate, the deceased, and persons who returned questionnaires with insufficient information to permit processing. For an analysis of response, see appendix E.

The estimates derived for this survey were prepared by using a ratio estimation procedure and an adjustment for nonresponse in 1978. For each sample case for which a completed questionnaire was obtained, the information from the 1978 survey was matched with the 1972 survey data and the 1970 census data for the same person. Weights applied to samples cases in the 1972 survey were then used to weight the resultant matched data file. The weighting procedure for the 1972 survey involved first the preparation of a preliminary estimate by weighting the results for each sample person by the reciprocal of the probability of selection. As a second

step, these weights were adjusted by applying a factor for certain age-sex-race cells within each occupation category. Within each of the cells, the factor was computed as the ratio of the 1970 census count to the preliminary estimate. The final 1972 weight was this factor multiplied by the inverse of the probability of selection for each person. To the extent that the data being tabulated and the estimated count of persons in the cells are positively correlated, the ratio estimate procedure will improve the reliability of the estimate. A discussion of the reliability of the estimates, including a description of the standard errors of totals and percentages, is presented in appendix B.

A nonresponse adjustment was done in 1978 to reduce the bias in the survey estimates due to the high nonresponse rate in 1978. This adjustment was done separately for in-scope³ and out-of-scope⁴ persons, and included an adjustment for the mortality in the longitudinal sample from 1972 to 1978. The first step in the nonresponse adjustment was to adjust the nonrespondents for mortality from 1972 to 1978 by means of mortality tables for age-race-sex groups. The second step was to determine the estimated proportion of nonrespondents that were in-scope and out-of-scope. To estimate these proportions, an intensive follow-up was conducted to obtain interviews for a subsample of the 1978 nonrespondents. This follow-up showed that approximately 80 percent of the nonrespondents were in-scope and the remaining 20 percent were out-of-scope. The final step was to determine a nonresponse adjustment factor for different age-race-sex cells. Within each of the cells, the factor was computed as the ratio of the weighted count, using the 1972 weights, of the estimated total (i.e., respondent and nonrespondent) in-scope or out-of-scope persons, divided by the weighted count of the respondent in-scope or out-of-scope persons.

The final weight for the 1978 survey was the product of the 1972 weight and the appropriate 1978 nonresponse adjustment factor.

The definitions for many of the characteristics shown in this report are self-explanatory or can best be understood by referring to the appropriate 1978 questionnaire items or reference lists (appendixes C and D). An explanation of the other subjects is provided below.

Age in 1978. The reference period for age in 1978 was April 1978. The age classification is based on the age of the person at his or her last birthday. The median age is that age that

¹ For a description of the 1972 survey and related matters, see U.S. Bureau of the Census, *Characteristics of Persons in Engineering and Scientific Occupations: 1972*, Technical Paper No. 33, U.S. Government Printing Office, Washington, D.C., 1974.

² Results from the 1974 survey were published in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 53, *Selected Characteristics of Persons in Fields of Science or Engineering: 1974*, U.S. Government Printing Office, Washington, D.C., 1975; results from the 1976 survey were published in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976*, U.S. Government Printing Office, Washington, D.C., 1978.

³ "In-scope" means "in a field of science or engineering."

⁴ "Out-of-scope" refers to the category "not in a field of science or engineering."

divides the distribution into two equal parts, one-half being older than the median age and one-half younger. Median ages were divided from an estimation process that distributed the subject populations into 5-year age groups.

Race. The data on race are based on responses in the 1970 Census of Population. The "other races" category includes all races not included in the specific categories listed.

Divisions of the United States. The divisions of the United States comprise the following States:

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Middle Atlantic: New York, New Jersey, Pennsylvania

East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin.

West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota.

South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia.

East South Central: Alabama, Kentucky, Mississippi, Tennessee.

West South Central: Arkansas, Louisiana, Oklahoma, Texas.

Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming.

Pacific: Alaska, California, Hawaii, Oregon, Washington.

Outlying areas of the United States include Puerto Rico, Guam, Virgin Islands, American Samoa, and Canal Zone.

Fields of science and engineering. Science or engineering (S/E) fields are categories established by the survey sponsor, the National Science Foundation, to identify persons who could be classified as engineers or scientists under most definitions. In general, to be classified into one of the fields, a person had to have at least two of the following three characteristics: (1) employment in the field, (2) attainment of a specified educational level in an academic discipline related to the field, or (3) self-identification, based upon total education and experience, as being in the field. More detailed information on the criteria for membership in a scientific and technical field is given in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976*, U.S. Government Printing Office, Washington, D.C., 1978.

Highest degree held. Highest degree held in 1978 refers to the highest academic degree awarded to the respondent in 1978

or earlier. Data on highest degree held were derived as follows: The level and the year of award of the highest degree received by the respondent between January 1972 and 1978 surveys (this degree will be referred to as degree "A") were compared with the level and year of award, determined from the 1976, 1974, and 1972 surveys, of the previously-designated highest degree held by the respondent (this is referred to as degree "B"). If degree A was at the same level or at a higher level than degree B, and if its date of award was later than that of degree B, degree A was designated as the highest degree held in 1978; otherwise, degree B was designated as the highest degree held in 1978.

The "other degree" category includes persons whose highest academic degree was one of the following: RN, LLB, MD, and academic degrees other than those shown in the tables.

Major field of study for highest degree held. The data on major field of study refer to the major subject associated with the highest degree held in 1978 determined by the method described above. For persons who received their highest degree held in 1978 after January 1972, the data are derived from question 3 of the 1978 questionnaire (see appendix C), or question 1, part b of the 1976 questionnaire or from question 2, part b5 of the 1974 questionnaire. For persons who received their highest degree in 1971 or earlier, the data on major subject are based on the 1972 survey.

Employment status. Employed persons are those who reported that they were employed, either full time or part time, on vacation, or otherwise temporarily absent from a job for health or personal reasons during the reference week (February 12-18, 1978). The unemployed are persons who marked the "unemployed and seeking work" category (box 3) of item 5a of the 1978 questionnaire (see appendix C), or who indicated in item 7 that they were on layoff from a job. All other persons were classified as "not in the labor force."

Unemployment in 1977. The data on unemployment in 1977 relate to the occurrence of unemployment during the entire calendar year rather than just during a reference week. Medians are based on the intervals shown in the tables.

Primary work activity in 1978. The data on primary work activity in 1978 were derived, in general, from answers to question 11b of the 1978 questionnaire. In certain instances of nonresponse to question 11b, however, the data were derived from an imputation procedure that used responses to question 11a.

Type of employer. The data on type of employer in 1978 are based entirely on responses to question 12 of the 1978 questionnaire.

Basic annual salary rate. The statistics on salary refer to the basic annual salary associated with the job held in February 1978. The figures relate to salary before deductions for income tax, Social Security, retirement, etc., but do not include bonuses, overtime pay, or earnings from secondary

jobs. For employees of educational institutions whose salary was for 9 or 10 months, the salary rate was adjusted to a 12-month basis. Median salaries were derived by an estimation process that distributed the subject population into \$1,000 intervals.

Job and occupational mobility in 1976 and 1978. The data on mobility between 1976 and 1978 were derived from answers on both the 1976 and 1978 questionnaires. Persons were classified as with a "job change between 1976 and 1978" if they were employed in both 1976 and 1978 and reported in the 1978 survey that their current job began in 1976 or later. Persons were classified as "same job in 1976 and 1978" if the beginning date of their most recent job was in 1975 or earlier, and as "not reported" if they did not report the beginning date of the most recent job. For persons with a job change, the detailed occupation of the 1978 job was compared with that of the 1976 job, and persons were

classified as with the same or a different occupation or as "occupation change not reported."

Job and occupational mobility in 1974 and 1978 and in 1972 and 1978. The data on mobility between 1974 and 1978 and between 1972 and 1978 were derived from answers on the 1974 and 1978 questionnaires and 1972 and 1978 questionnaires, respectively. The procedure was analogous to that described for the data on job and occupational mobility in 1976 and 1978.

Years of professional experience. Median years of professional experience are based on 1-year intervals.

Symbols. A dash (-) represents zero, and "X" means "not applicable." The symbol "Z" means less than 0.05 percent. The symbol "*" means based on fewer than 20 sample cases. For the characteristic "Unemployment in Calendar Year 1977," the symbol "27+" means that the median fell in the category "27 weeks or more."

Appendix B. Reliability of the Estimates and Standard Errors of Totals and Percentages

There are two types of possible errors associated with estimates based on data from a sample survey: sampling and nonsampling. The following is a description of the sampling and nonsampling errors associated with the 1978 Survey of Scientists and Engineers.

SAMPLING ERRORS

The particular sample used for this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Even if the same schedules and instructions were used, estimates from each of the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is defined as the sampling error. The standard error of a survey estimate attempts to provide a measure of this variation among the estimates from the possible samples, and thus, is a measure of the precision with which an estimate from the sample approximates the average result of all possible samples.

As calculated for this survey, the standard error also partially measures the variation in the estimates due to response errors (nonsampling errors), but it does not measure, as such, any systematic biases in the data. Therefore, the accuracy of the estimates depends on both the sampling and nonsampling errors, measured by the standard error, and biases and some additional nonsampling errors not measured by the standard error.

The figures presented in the tables B-1 to B-3 are approximations to the standard errors of the various estimates for this survey. A number of approximations and generalizations have been used so that the standard errors would be applicable to a wide variety of characteristics and still be prepared at a moderate cost. Thus, the standard errors in the following tables provide an indication of the order of magnitude, rather than precise measurements of the standard errors.

Standard errors on totals. Table B-1 presents the standard errors applicable to estimated totals for characteristics of mathematical specialists. Standard errors for estimated totals not specifically shown in table B-1 can be found by linear interpolation or by computing them directly from the following standard error formula:

$$\text{standard error of } x = \sqrt{ax^2 + bx}$$

The "a" and "b" parameters for each mathematical specialist group are:

Field	"a" parameter	"b" parameter
Math. specialists, total	-.000191	34.8
Mathematicians000607	34.2
Statisticians00217	23.5

For example, there are an estimated 1,485 mathematical specialists, total, who were retired in 1978. The above table shows that a = -.000191 and b = 34.8 for mathematical specialists, total. Thus the estimated standard error of 1,485 is

$$\sqrt{(-.000191)(1,485)^2 + (34.8)(1,485)} = 226$$

Standard errors on percentages. The reliability of an estimated percentage, computed by using sample data for both the numerator and the denominator, depends upon both the size of the percentage and the size of the total upon which the percentage is based. Estimated percentages are relatively more reliable than the corresponding estimates of the numerators of the percentage, particularly if the percentages are 50 percent or more.

Tables B-2 and B-3 present the standard errors of estimated percentages for mathematical specialists. Standard errors for estimated percentages not specifically shown in tables B-2 and B-3 can be found by using two-way interpolation or by computing them directly from the following formula:¹

$$\begin{aligned} &\text{standard error of the percentage } p \text{ on a base of } y \\ &= \sqrt{(p)(100-p)\frac{b}{y}} \end{aligned}$$

For example, an estimated 4.0 percent of the 29,947 mathematical specialists, total, worked part time in 1978. The above table shows that b = 34.8 for mathematical specialists, total. Thus, the standard error for the 4.0 percent on a base of 29,947 is

$$\sqrt{\frac{(4.0)(100-4.0)(34.8)}{29,947}} = .67 \text{ percent}$$

¹ The tables for the standard errors of percentages for most scientific and engineering fields (SEF's) were combined. The tables of standard errors given for such collapsed groups are always conservative, i.e., the table for the SEF with the largest standard errors was chosen to represent all the SEF's in the group. Because of this, the standard errors calculated directly from the formula may differ slightly from those found in the tables.

Table B-1. Standard Errors of Totals

(68 chances out of 100)

Size of estimate	Mathematical specialists, total	Mathematicians	Statisticians
100.....	60	60	50
200.....	80	80	70
500.....	130	130	110
700.....	160	160	130
1,000.....	190	190	160
2,500.....	290	300	270
5,000.....	410	430	410
10,000.....	570	630	670
25,000.....	870	1,110	-
50,000.....	1,120	-	-

Standard error intervals. The sample estimate and its estimated standard error enable one to construct interval estimates that include the average result of all possible samples with a known probability. For example, if all possible samples were selected, each of these surveyed under identical conditions and an estimate and its estimated standard error were calculated from each sample, then:

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average result of all possible samples;

2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples;

3. Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate would include the average result of all possible samples.

The average result of all possible samples either is or is not contained in any particular computed interval. However, for a particular sample one can say with specified confidence that the average result of all possible samples is included within the constructed interval.

For example, of the 29,947 mathematical specialists, total, in 1978, 30.9 percent have the master's degree as the highest degree held in 1978. The standard error of this percent as computed from table B-2 is 1.6 percentage points. Based on these data, we may conclude that the percentage of mathematical specialists, total, with the master's degree as the highest degree held in 1978 lies between 27.7 percent and 34.1 percent with 95-percent confidence, i.e., within 2 standard errors.

Standard errors of differences between estimates. The figures in these tables are not directly applicable to standard errors of differences between two sample estimates. The standard error of the estimated difference between two figures may be approximated by the square root of the sum of the squares of the standard error of each estimate. This approximation

Table B-2. Standard Errors of Percentages for Mathematicians

(68 chances out of 100)

Base of percentage	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	25 or 75	50
100.....	5.9	8.3	12.9	17.7	21.1	25.6	29.6
200.....	4.2	5.9	9.1	12.5	14.9	18.1	20.9
500.....	2.6	3.7	5.8	7.9	9.4	11.4	13.2
700.....	2.2	3.1	4.9	6.7	8.0	9.7	11.2
1,000.....	1.9	2.6	4.1	5.6	6.7	8.1	9.3
2,500.....	1.2	1.7	2.6	3.5	4.2	5.1	5.9
5,000.....	.8	1.2	1.8	2.5	3.0	3.6	4.2
10,000.....	.6	.8	1.3	1.8	2.1	2.6	3.0
25,000.....	.4	.5	.8	1.1	1.3	1.6	1.9
50,000.....	.3	.4	.6	.8	.9	1.1	1.3

Table B-3. Standard Errors of Percentages for Statisticians

(68 chances out of 100)

Base of percentage	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	25 or 75	50
100.....	4.8	6.8	10.6	14.5	17.3	21.0	24.2
200.....	3.4	4.8	7.5	10.3	12.2	14.8	17.1
500.....	2.2	3.0	4.7	6.5	7.7	9.4	10.8
700.....	1.8	2.6	4.0	5.5	6.5	7.9	9.2
1,000.....	1.5	2.1	3.3	4.6	5.5	6.6	7.7
2,500.....	1.0	1.4	2.1	2.9	3.5	4.2	4.8
5,000.....	.7	1.0	1.5	2.1	2.4	3.0	3.4
10,000.....	.5	.7	1.1	1.5	1.7	2.1	2.4

will yield an exact result when the two characteristics are uncorrelated. If the two characteristics are positively (negatively) correlated, the approximation will overestimate (underestimate) the standard error of the difference. For a difference between two sample estimates, one of which represents a subclass of the other, the table can be used with the difference considered as the sample estimate.

For example, of the 29,947 mathematical specialists, total, in 1978, 40.7 percent have the Ph.D. as the highest degree held in 1978. The standard error of this percent as computed from table B-2 is 1.7 percentage points. The standard error of the difference between the percentage of those with master's degrees and the percentage of those with doctorates (i.e., $40.7 - 30.9 = 9.8$ percent) is then approximately

$$\sqrt{(1.6)^2 + (1.7)^2} = 2.3 \text{ percentage points}$$

Based on these data, we may conclude with 95-percent confidence that the average estimate of the difference of the percentages derived from all possible sample lies within the interval 5.2 percentage points to 14.4 percentage points.

Standard errors of medians. The figures in these tables are not directly applicable to standard errors of estimated medians. The sampling variability of an estimated median depends upon the size of the base as well as on the distribution from which the median is determined. An approximate method for measuring the reliability of a median is to determine an interval about the estimated median, such that there is a stated degree of confidence that the median based on all possible samples lies with the interval. The following procedure may be used to estimate confidence limits of a median based on sample data:

1. Determine the standard error of a 50 percent characteristic from the appropriate standard error table (B-2 and B-3) using the appropriate base;
2. Add this standard error to 50 percent to obtain an upper boundary percentage and subtract this standard error from 50 percent to obtain a lower boundary percentage;
3. Using the cumulative distribution from which the median is derived, read off the numbers corresponding to the boundary percentages. The interval between these two numbers (i.e., the confidence limits) will be the 68-percent confidence interval. A 95-percent confidence interval may be determined by finding the values corresponding to 50 percent plus or minus twice the standard error in step 1.

For example, the data for 1978 indicate that the estimate of the median age for mathematicians is 41.0 years. The distribution of mathematicians by age is shown in the following table.

From standard error table B-2 the standard error of a 50 percent characteristic with a base of 22,054 is 2.1 percentage points. From the table of cumulative age distribution, the percentage point that corresponds to 40 years is 46.0 percent and to 45 years is 62.7 percent. The lower confidence limit corresponding to 47.9 percent (50 percent

Age (years)	Percentage	Cumulative distribution
Under 30	1.3	1.3
30 to 34	16.7	18.0
35 to 39	28.0	46.0
40 to 44	16.7	62.7
45 to 49	13.5	76.2
50 to 54	11.1	87.3
55 to 59	4.9	92.2
60 to 64	4.0	96.2
65 to 69	2.0	98.2
70 and over	1.8	100.0

minus 2.1 percent) is found by linear interpolation between 40 years and 45 years to be 40.6 years, i.e.,

$$40 + \left[(45 - 40) \left(\frac{47.9 - 46.0}{62.7 - 46.0} \right) \right] = 40.6$$

Similarly, the upper confidence limit corresponding to 52.1 percent (50 percent plus 2.1 percent) is found to be 41.8 years:

$$40 + \left[(45 - 40) \left(\frac{52.1 - 46.0}{62.7 - 46.0} \right) \right] = 41.8$$

Consequently the 68-percent confidence interval, as shown by the data, is from 40.6 years to 41.8 years. Likewise, we could conclude that the 95-percent confidence interval is from 39.9 years (the distribution point corresponding to 45.8 percent) to 42.5 years (corresponding to 54.2 percent).

In the text of this report, an unqualified statement which is either a comparison or could be reasonably interpreted as one has passed a statistical significance test at the 5 percent level, there is only a 1 in 20 chance that this statement will be made when it is actually not true. A statement which is footnoted to be not statistically significant has failed this test and any apparent differences are not supported by the data. In some instances, a statement which has failed the significance test at the 5 percent level but could have passed it at the 10 percent level is footnoted by the qualifications of "some evidence." The chance that this statement being included in the report incorrectly could be as high as 1 in 10.

NONSAMPLING ERRORS

In general, nonsampling errors can be attributed to many sources: inability to obtain information about all cases, definitional difficulties, differences in the interpretation of questions, inability or unwillingness to provide correct information on the part of the respondents, mistakes in recording or coding the data, and other errors of collection, response, processing, coverage, and estimation for missing data. As the above list indicates, nonsampling errors are not unique to sample surveys, since they can, and do, occur in complete censuses as well.

The primary source of nonsampling error in the 1978 National Sample survey is probably the high nonresponse rate. An adjustment in the estimation procedure for the 23 percent noninterview rate in the 1972 survey and the additional 19 percent nonresponse rate in 1978 was made, but there still remains some unknown bias in the estimates due to differences in the characteristics of those who were interviewed in 1978 and those who were not.

It should also be pointed out that estimates for this survey do not represent those who have entered the labor force in scientific and engineering fields since 1970. In particular, this survey does not include the large numbers of graduates produced since 1970. This causes significant biases for such items as the relative distributions of sex, age, and race and the unemployment figures if the results are assumed to be indicative of the current scientific and engineering fields including new entrants since 1970.

Appendix C. Questionnaire and Reference Lists

O.M.B. No. 99-577003; Approval Expires December 31, 1978

<p>FORM PMS-26D (9-26-77)</p> <p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE BUREAU OF THE CENSUS</p> <p style="text-align: center;">1978 NATIONAL SURVEY OF NATURAL AND SOCIAL SCIENTISTS AND ENGINEERS</p>	<p>NOTICE - Your report to the Census Bureau is confidential. It may be seen only by sworn Census employees and may be used only for statistical purposes.</p>
<p>A. Do you currently live in the State (or foreign country) printed in the above mailing label?</p> <p>1 <input type="checkbox"/> Yes, same State (or foreign country)</p> <p>2 <input type="checkbox"/> No, different State (or foreign country) - Please enter your current State (or foreign country) of residence _____</p>	<p><i>Please read</i> instructions carefully before answering questions.</p> <p>Answer as accurately as you can by printing your reply clearly or by entering an "X" in the box next to the appropriate reply.</p> <p>When the instructions for a question direct you to enter a code and description from a list, please refer to the reference list attached to this questionnaire.</p>
<p>PLEASE COMPLETE AND RETURN TO Bureau of the Census 1201 East Tenth Street Jeffersonville, Indiana 47132</p>	
<p>FROM THE DIRECTOR BUREAU OF THE CENSUS</p> <p>This is the final questionnaire for the series of surveys known as the National Sample of Scientists and Engineers. The National Science Foundation, the project sponsor, and the Bureau of the Census wish to thank you for your invaluable contribution to this program. Each of the biennial surveys has given policymakers and planners an increasingly clearer view of the dynamics of the educational system and the job market for one of the Nation's central resources—highly trained persons. The goal of this final survey is to complete the picture for the decade of the 1970's.</p> <p>Thus, we are asking you to provide one final report on your employment and related topics. The questionnaire is much shorter than previous ones. Please note that the sample includes many kinds of highly trained persons in addition to scientists and engineers. For the survey to be successful and yield truly representative information, it is important that each person fill out and return the questionnaire.</p> <p>Please complete the questions which follow on pages 2 through 4 and return your questionnaire in the enclosed preaddressed envelope. For some questions you are instructed to enter a code and description from Reference List A, B, or C. These lists are attached to the questionnaire.</p> <p>This information is being collected under the authority of the National Science Foundation Act of 1950, as amended. The information you provide is confidential and may be seen only by sworn employees of the Bureau of the Census. The information cannot be used for anything but statistical purposes and cannot be given to any other Government agency, private concern, or individual. The data will be released only in the form of statistical summaries from which it will be impossible to identify information about any particular person. Your response is entirely voluntary, and your failure to provide some or all of the requested information will in no way adversely affect you.</p> <p>Thank you for your cooperation.</p> <p>Sincerely,</p> <p style="text-align: center;"> MANUEL D. PLOTKIN</p> <p>Enclosure</p>	

<p>1. Since January 1972 have you attended any college, university, or other post high school institution?</p>	<p>1 <input type="checkbox"/> Yes - Continue with question 2a 2 <input type="checkbox"/> No - Skip to question 4</p>																
<p>2a. What is the highest degree you have RECEIVED since January 1972? Mark only one box</p>	<p>1 <input type="checkbox"/> Associate 2 <input type="checkbox"/> Registered Nurse (R.N.) 3 <input type="checkbox"/> Bachelor's 4 <input type="checkbox"/> Master's 5 <input type="checkbox"/> First Professional Non-Medical (J.D., LL.B., Th.B.) 6 <input type="checkbox"/> First Professional Medical (D.D.M., D.D.S., D.O., D.V.M., M.D.) 7 <input type="checkbox"/> Doctorate 8 <input type="checkbox"/> Other - Specify _____ 9 <input type="checkbox"/> None - Skip to question 4</p>																
<p>b. When was this degree awarded? If you received more than one degree at the same level (e.g., two master's degrees), enter the year of award of the most recent one.</p>	<p>19 _____</p>																
<p>3. What was the major field of study of the degree you described in question 2? Enter code and description from Reference List A.</p>	<table border="1"> <thead> <tr> <th>Code</th> <th>Description from Reference List A</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td>_____</td> </tr> <tr> <td><input type="checkbox"/></td> <td>_____</td> </tr> </tbody> </table>	Code	Description from Reference List A	<input type="checkbox"/>	_____	<input type="checkbox"/>	_____										
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<p>4. Aside from formal education, which of the following types of training did you receive in 1976 or 1977? Mark the appropriate year for each type of training you have received.</p> <p>(1) On-the-job training (2) Military training applicable to civilian occupations (3) Extension or correspondence courses (4) Courses at employer's training facility (5) Courses at adult education center (6) Other training (7) None</p>	<table border="1"> <thead> <tr> <th>a. 1976</th> <th>b. 1977</th> </tr> </thead> <tbody> <tr> <td>1 <input type="checkbox"/></td> <td>1 <input type="checkbox"/></td> </tr> <tr> <td>2 <input type="checkbox"/></td> <td>2 <input type="checkbox"/></td> </tr> <tr> <td>3 <input type="checkbox"/></td> <td>3 <input type="checkbox"/></td> </tr> <tr> <td>4 <input type="checkbox"/></td> <td>4 <input type="checkbox"/></td> </tr> <tr> <td>5 <input type="checkbox"/></td> <td>5 <input type="checkbox"/></td> </tr> <tr> <td>6 <input type="checkbox"/></td> <td>6 <input type="checkbox"/></td> </tr> <tr> <td>7 <input type="checkbox"/></td> <td>7 <input type="checkbox"/></td> </tr> </tbody> </table>	a. 1976	b. 1977	1 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>
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7 <input type="checkbox"/>	7 <input type="checkbox"/>																
<p>5a. What was your employment status during the week of February 12-18, 1978?</p>	<p>1 <input type="checkbox"/> Employed full time (including self-employed full time) - Skip to 6a 2 <input type="checkbox"/> Employed part time (including self-employed part time) - Answer 5b 3 <input type="checkbox"/> Unemployed and seeking work - Go to Part III 4 <input type="checkbox"/> Not employed and not seeking work - Skip to 7</p>																
<p>b. If you worked part time, were you seeking full-time work?</p>	<p>1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No</p>																
<p>6a. Were you working in a position related to science or engineering during the week of February 12-18, 1978?</p>	<p>1 <input type="checkbox"/> Yes - Go to Part III 2 <input type="checkbox"/> No - Answer 6b</p>																
<p>b. What was the most important reason for taking this position? Mark only one box</p>	<p>1 <input type="checkbox"/> Preferred nonscience or nonengineering position 2 <input type="checkbox"/> Promoted out of science or engineering position 3 <input type="checkbox"/> Pay was better in nonscience or nonengineering position 4 <input type="checkbox"/> Locational preference 5 <input type="checkbox"/> Science or engineering position not available 6 <input type="checkbox"/> Other - Specify _____ (Go to Part III)</p>																
<p>7. If you were not employed and not seeking work during the week of February 12-18, 1978, what was your most important reason for not seeking work? Mark only one box</p>	<p>1 <input type="checkbox"/> On vacation or otherwise temporarily absent from a job for health or personal reasons 2 <input type="checkbox"/> On layoff from a job 3 <input type="checkbox"/> Retired 4 <input type="checkbox"/> Student 5 <input type="checkbox"/> Tending to family responsibilities 6 <input type="checkbox"/> Could not find work or believed no jobs available in my particular field 7 <input type="checkbox"/> Other - Specify _____ (Go to Part III)</p>																

PART III - JOB ACTIVITIES	
INSTRUCTIONS	
<p>a. Complete questions 8-15 for the job held during the week of February 12-18, 1978, or, if you did not hold a job during that week, complete these questions for your most recent job prior to that week.</p> <p>b. If you held more than one job, please report only the job at which you worked the greatest number of hours.</p>	
<p>8. Where did you work? <i>Write in city and State or foreign country of company, business, agency, or other employer.</i></p>	<p style="text-align: center;">Job held during the week of February 12-18, 1978, or most recent prior job.</p> <p>City _____</p> <p><input type="checkbox"/> <input type="checkbox"/> State or foreign country _____</p>
<p>9. What kind of business was this? <i>Enter code and description from Reference List B.</i></p>	<p>Code <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Description from Reference List B _____</p>
<p>10. What was your occupation? <i>Enter code and description from Reference List C.</i></p>	<p>Code <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Description from Reference List C _____</p>
<p>11a. What percent of working time did you devote to each of the following activities? Entries should sum to 100%.</p> <p>PLEASE NOTE Basic research is study directed toward gaining scientific knowledge primarily for its own sake. Applied research is study directed toward gaining scientific knowledge in an effort to meet a recognized need. Development is direction of the knowledge gained from research toward production of useful materials, devices, systems, and methods.</p>	<p>01 _____ % Management or administration of research and development</p> <p>02 _____ % Management or administration of other than research and development</p> <p>03 _____ % Teaching and training - preparing and teaching courses, guiding and counseling students or trainees</p> <p>04 _____ % Basic research</p> <p>05 _____ % Applied research</p> <p>06 _____ % Development - product, process, and technical development</p> <p>07 _____ % Report and technical writing, editing, information retrieval</p> <p>08 _____ % Clinical diagnosis</p> <p>09 _____ % Design of equipment, processes, models</p> <p>10 _____ % Quality control, testing, evaluation, or inspection</p> <p>11 _____ % Operations - production, maintenance, construction, installation</p> <p>12 _____ % Distribution - sales, traffic, purchasing, customer and public relations</p> <p>13 _____ % Statistical work - survey work, forecasting, statistical analysis</p> <p>14 _____ % Consulting</p> <p>15 _____ % Computer applications</p> <p>16 _____ % Other activities - <i>Specify</i> _____</p> <p>TOTAL=100%</p>
<p>b. Among all these activities, which was your primary and which was your major secondary work activity? <i>Fill in the appropriate code numbers (01-16) from question 11a.</i></p>	<p>Code (01-16 from Question 11a).</p> <p><input type="checkbox"/> <input type="checkbox"/> Primary work activity</p> <p><input type="checkbox"/> <input type="checkbox"/> Secondary work activity</p>
<p>12. Which category best describes the type of organization of your principal employment or postdoctoral appointment? <i>Mark only one box</i></p>	<p>01 <input type="checkbox"/> Business or industry, including self-employed</p> <p>02 <input type="checkbox"/> Junior college, 2-year college, technical institute</p> <p>03 <input type="checkbox"/> Medical school</p> <p>04 <input type="checkbox"/> 4-year college or university, other than medical school</p> <p>05 <input type="checkbox"/> Elementary or secondary school system</p> <p>06 <input type="checkbox"/> Hospital or clinic</p> <p>07 <input type="checkbox"/> Non-profit organization, other than hospital, clinic, or educational institution</p> <p>08 <input type="checkbox"/> U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA</p> <p>09 <input type="checkbox"/> U.S. Government, civilian employee</p> <p>10 <input type="checkbox"/> State government</p> <p>11 <input type="checkbox"/> Local or other government - <i>Specify</i> _____</p> <p>12 <input type="checkbox"/> International agency</p> <p>13 <input type="checkbox"/> Other - <i>Specify</i> _____</p>

PART III - JOB ACTIVITIES - Continued								
<p>13. What was the basic salary associated with this position? (If not working during February 12-18, report ending salary of most recent prior job.)</p> <p><i>If you were on a postdoctoral appointment, include stipend plus allowances. (Basic salary refers to salary before deductions for income tax, social security, retirement, etc. but does not include bonuses, overtime, summer teaching, or other payment for secondary jobs.)</i></p>	<p style="text-align: center;">Job held during week of February 12-18, 1978, or most recent prior job</p> <p>a. \$ _____ .00</p> <p>b. <input type="checkbox"/> Per year <input type="checkbox"/> Per month <input type="checkbox"/> Per week</p> <p>c. If academically employed, mark whether salary is for - <input type="checkbox"/> 9-10 months <input type="checkbox"/> 11-12 months</p>							
<p>14. Between what dates did you hold this position?</p> <p><i>Enter month and year</i></p> <p>Consider a change in positions to have occurred if there were significant changes in your duties, level of responsibility, or occupation, even if you continued to work for the same employer.</p>	<p>a. Beginning month and year: _____</p> <p>b. Ending month and year: _____ OR <input type="checkbox"/> Present</p>							
<p>15a. Was ANY of your work supported or sponsored by U.S. Government funds?</p>	<p><input type="checkbox"/> Yes - Continue with 15b <input type="checkbox"/> No <input type="checkbox"/> Don't know } Skip to 16a</p>							
<p>b. Which of the following agencies or departments were supporting the work?</p> <p><i>Mark as many as apply</i></p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>01 <input type="checkbox"/> AID (Agency for International Development)</p> <p>02 <input type="checkbox"/> Department of Agriculture</p> <p>03 <input type="checkbox"/> Department of Commerce</p> <p>04 <input type="checkbox"/> Department of Defense</p> <p>05 <input type="checkbox"/> Department of Energy</p> <p>Department of Health, Education, and Welfare</p> <p>06 <input type="checkbox"/> Alcohol and Drug Abuse Mental Health Administration</p> <p>07 <input type="checkbox"/> NIH (National Institutes of Health)</p> <p>08 <input type="checkbox"/> Office of Education</p> <p>09 <input type="checkbox"/> Other HEW - Specify _____</p> <p>10 <input type="checkbox"/> Department of Housing and Urban Development</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>11 <input type="checkbox"/> Department of the Interior</p> <p>12 <input type="checkbox"/> Department of Justice</p> <p>13 <input type="checkbox"/> Department of Labor</p> <p>14 <input type="checkbox"/> Department of Transportation</p> <p>15 <input type="checkbox"/> EPA (Environmental Protection Agency)</p> <p>16 <input type="checkbox"/> NASA (National Aeronautics and Space Administration)</p> <p>17 <input type="checkbox"/> NSF (National Science Foundation)</p> <p>18 <input type="checkbox"/> Nuclear Regulatory Commission</p> <p>19 <input type="checkbox"/> Other agency or department - Specify _____</p> <p>20 <input type="checkbox"/> Don't know source agency or department</p> </td> </tr> </table>	<p>01 <input type="checkbox"/> AID (Agency for International Development)</p> <p>02 <input type="checkbox"/> Department of Agriculture</p> <p>03 <input type="checkbox"/> Department of Commerce</p> <p>04 <input type="checkbox"/> Department of Defense</p> <p>05 <input type="checkbox"/> Department of Energy</p> <p>Department of Health, Education, and Welfare</p> <p>06 <input type="checkbox"/> Alcohol and Drug Abuse Mental Health Administration</p> <p>07 <input type="checkbox"/> NIH (National Institutes of Health)</p> <p>08 <input type="checkbox"/> Office of Education</p> <p>09 <input type="checkbox"/> Other HEW - Specify _____</p> <p>10 <input type="checkbox"/> Department of Housing and Urban Development</p>	<p>11 <input type="checkbox"/> Department of the Interior</p> <p>12 <input type="checkbox"/> Department of Justice</p> <p>13 <input type="checkbox"/> Department of Labor</p> <p>14 <input type="checkbox"/> Department of Transportation</p> <p>15 <input type="checkbox"/> EPA (Environmental Protection Agency)</p> <p>16 <input type="checkbox"/> NASA (National Aeronautics and Space Administration)</p> <p>17 <input type="checkbox"/> NSF (National Science Foundation)</p> <p>18 <input type="checkbox"/> Nuclear Regulatory Commission</p> <p>19 <input type="checkbox"/> Other agency or department - Specify _____</p> <p>20 <input type="checkbox"/> Don't know source agency or department</p>					
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PART IV - OTHER INFORMATION								
<p>16a. At anytime during calendar year 1977 were you without a job AND actively seeking employment?</p>	<p><input type="checkbox"/> Yes - Continue with 16b <input type="checkbox"/> No - Skip to question 17</p>							
<p>b. For how many weeks were you seeking employment?</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>1 <input type="checkbox"/> 1 to 4 weeks</p> <p>2 <input type="checkbox"/> 5 to 10 weeks</p> <p>3 <input type="checkbox"/> 11 to 14 weeks</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>4 <input type="checkbox"/> 15 to 26 weeks</p> <p>5 <input type="checkbox"/> 27 weeks or more</p> </td> </tr> </table>	<p>1 <input type="checkbox"/> 1 to 4 weeks</p> <p>2 <input type="checkbox"/> 5 to 10 weeks</p> <p>3 <input type="checkbox"/> 11 to 14 weeks</p>	<p>4 <input type="checkbox"/> 15 to 26 weeks</p> <p>5 <input type="checkbox"/> 27 weeks or more</p>					
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<p>17. How many years of professional experience, including teaching, have you had? <i>Enter number of years</i></p>	<p>_____ Years</p>							
<p>18. Based on your total education and experience, what do you regard yourself as professionally?</p> <p><i>Enter code and description from Reference List C.</i></p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 15%; border: none;">Code</td> <td style="border: none;">Description from Reference List C</td> </tr> <tr> <td style="border: none;"> <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> </tr> </table> </td> <td style="border: none;">_____</td> </tr> </table>	Code	Description from Reference List C	<table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> </tr> </table>				_____
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<p>19. Listed at the right are selected topics of critical national interest. If you devote a significant proportion of your professional time to any of these problem areas, please mark the box for the one on which you spend the MOST time.</p> <p><i>Mark only one box</i></p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>01 <input type="checkbox"/> Health</p> <p>02 <input type="checkbox"/> Environment protection, pollution control</p> <p>Education:</p> <p>03 <input type="checkbox"/> Teaching</p> <p>04 <input type="checkbox"/> Other</p> <p>05 <input type="checkbox"/> Space</p> <p>06 <input type="checkbox"/> National defense</p> <p>07 <input type="checkbox"/> Crime prevention and control</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>08 <input type="checkbox"/> Food production and technology</p> <p>09 <input type="checkbox"/> Energy and fuel</p> <p>10 <input type="checkbox"/> Other mineral resources</p> <p>11 <input type="checkbox"/> Community development and services</p> <p>12 <input type="checkbox"/> Housing (planning, design, construction)</p> <p>13 <input type="checkbox"/> Other - Specify _____</p> <p>14 <input type="checkbox"/> Does not apply</p> </td> </tr> </table>	<p>01 <input type="checkbox"/> Health</p> <p>02 <input type="checkbox"/> Environment protection, pollution control</p> <p>Education:</p> <p>03 <input type="checkbox"/> Teaching</p> <p>04 <input type="checkbox"/> Other</p> <p>05 <input type="checkbox"/> Space</p> <p>06 <input type="checkbox"/> National defense</p> <p>07 <input type="checkbox"/> Crime prevention and control</p>	<p>08 <input type="checkbox"/> Food production and technology</p> <p>09 <input type="checkbox"/> Energy and fuel</p> <p>10 <input type="checkbox"/> Other mineral resources</p> <p>11 <input type="checkbox"/> Community development and services</p> <p>12 <input type="checkbox"/> Housing (planning, design, construction)</p> <p>13 <input type="checkbox"/> Other - Specify _____</p> <p>14 <input type="checkbox"/> Does not apply</p>					
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<p>20a. Are you physically handicapped?</p>	<p><input type="checkbox"/> Yes - Continue with 20b <input type="checkbox"/> No - Skip to question 21</p>							
<p>b. What is the nature of your handicap(s)?</p> <p><i>Mark as many as apply</i></p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>1 <input type="checkbox"/> Visual</p> <p>2 <input type="checkbox"/> Auditory</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>3 <input type="checkbox"/> Orthopedic</p> <p>4 <input type="checkbox"/> Other - Specify _____</p> </td> </tr> </table>	<p>1 <input type="checkbox"/> Visual</p> <p>2 <input type="checkbox"/> Auditory</p>	<p>3 <input type="checkbox"/> Orthopedic</p> <p>4 <input type="checkbox"/> Other - Specify _____</p>					
<p>1 <input type="checkbox"/> Visual</p> <p>2 <input type="checkbox"/> Auditory</p>	<p>3 <input type="checkbox"/> Orthopedic</p> <p>4 <input type="checkbox"/> Other - Specify _____</p>							
<p>21. Is your ethnic heritage Hispanic? (Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>							
<p>22. In the event that it is necessary to contact you to clarify some of the information you provided, may we contact you by telephone?</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%; border: none; vertical-align: top;"> <p><input type="checkbox"/> Yes - Enter number(s) on which you can be reached →</p> <p><input type="checkbox"/> No</p> </td> <td style="width: 20%; border: none; vertical-align: top;"> <p>Area code</p> <p>_____</p> </td> <td style="width: 20%; border: none; vertical-align: top;"> <p>Telephone number</p> <p>_____</p> </td> </tr> <tr> <td style="border: none;"></td> <td style="border: none; vertical-align: top;"> <p>Area code</p> <p>_____</p> </td> <td style="border: none; vertical-align: top;"> <p>Telephone number</p> <p>_____</p> </td> </tr> </table>	<p><input type="checkbox"/> Yes - Enter number(s) on which you can be reached →</p> <p><input type="checkbox"/> No</p>	<p>Area code</p> <p>_____</p>	<p>Telephone number</p> <p>_____</p>		<p>Area code</p> <p>_____</p>	<p>Telephone number</p> <p>_____</p>	
<p><input type="checkbox"/> Yes - Enter number(s) on which you can be reached →</p> <p><input type="checkbox"/> No</p>	<p>Area code</p> <p>_____</p>	<p>Telephone number</p> <p>_____</p>						
	<p>Area code</p> <p>_____</p>	<p>Telephone number</p> <p>_____</p>						
<p>23. Please print your name here</p>	<p>Date prepared</p> <p>_____</p>							

REFERENCE LIST B – KINDS OF BUSINESSES

This list is to be used in answering question 9 about the kind of business or industry for which you worked. Please scan the entire list, choose the appropriate answer for the question and enter the code and description from this list. If none of the categories listed below adequately describes the kind of business for which you worked, use the "Other" category (code 731).

Code	Description	Code	Description
Manufacturing		Other Kinds of Business	
701	Aircraft, aircraft engines, aircraft parts	720	Agriculture, forestry, and fisheries
702	Chemicals and allied products	721	Business, personal, and professional services
703	Electrical machinery, equipment and supplies for the generation, storage, transformation, transmission, and utilization of electrical energy	722	Construction
704	Electronic apparatus, radio, television and communication equipment and parts	723	Engineering or architectural services
705	Electronic computers, accounting, calculating and office machinery and equipment	724	Finance, insurance, or real estate
706	Fabricated metal products (except ordnance, machinery and transportation equipment)	725	Mining and petroleum extraction
707	Machinery (except electrical) including engines and turbines, farming and construction machinery, mining, metalworking and other manufacturing and service industry machines	726	Private, nonprofit organizations other than educational institutions and hospitals
708	Motor vehicles and motor vehicle equipment including trucks, buses, automobiles, railroad engines and cars	727	Professional and technical societies
709	Ordnance, including manufacture of arms, ammunition, tanks, and complete guided missiles, space vehicles and equipment	728	Research institutions
710	Petroleum refining and related industries	729	Retail and wholesale trade
711	Primary metal industries, including smelting, refining, rolling, drawing, alloying, and manufacture of castings, forgings and other basic metal products	730	Transportation, communication, or other public utilities
712	Professional and scientific equipment and supplies	731	Other (Describe briefly under the applicable item on the questionnaire.)
713	Other manufacturing including printing and publishing		
Educational Institutions		Public Administration (Include only uniquely governmental activities, such as the U.S. Postal Service, U.S. Air Force, State court, Department of Motor Vehicles, city building inspection, or city public welfare. For example, if you work for the U.S. Postal Service use code 733, Federal public administration; on the other hand, if you work at a Veterans' Administration Hospital, use code 718, Hospital or clinic; if you work at a State university, use code 714, College or university; if you work for a county road building agency, use code 722, Construction; if you work in a Defense Department research laboratory, use code 728, Research institution.)	
714	College or university (offering at least a bachelor's degree)	732	Uniformed military service
715	Junior college or technical institute	733	Federal public administration
716	Medical school	734	State public administration
717	Other educational institutions	735	Local public administration (city, county, etc.)
Health Services		737	Regional government
718	Hospital or clinic	736	Other government
719	Other medical and health services		

REFERENCE LIST C – OCCUPATIONS

This list is to be used in answering questions 10 and 18 about your occupational classification. Please scan the entire list, choose the appropriate entry and enter the code and description from this list. If you cannot find exactly the right entry, please choose the one that comes nearest to it. If none of the entries is at all appropriate, use the "Other" category (code 475) and enter a brief description in the space provided on the questionnaire.

Code	Description	Code	Description
Engineers, including college professors and instructors		Health Occupations, including persons who are primarily practitioners. Persons engaged primarily in medical research, teaching, and similar activities use code 432, Medical scientist.	
401	Engineer, aeronautical and astronautical	438	Physician or surgeon
402	Engineer, agricultural	439	Technician, dental
403	Engineer, chemical	440	Technician, medical
404	Engineer, civil and architectural	441	Other health occupation (Describe briefly under the applicable item on the questionnaire.)
405	Engineer, electrical and electronic		
406	Engineer, industrial	Technicians and Technologists, except medical	
407	Engineer, mechanical	442	Designer, electronic parts and machine tools
408	Engineer, metallurgical and materials	443	Designer, industrial
409	Engineer, mining, petroleum, and geological	444	Designer, other
410	Engineer, nuclear	445	Draftsman
411	Engineer, environmental and sanitary	446	Surveyor
412	Engineer, operations research/systems	447	Technician, biological and agricultural
413	Engineer, other fields (Describe briefly under the applicable item on the questionnaire.)	448	Technician, electrical and electronic
Computer Specialist, including college professors and instructors		449	Technician, construction, highways, and architectural
414	Computer programmer	450	Technician, mechanical
415	Computer systems analyst	451	Technician, other engineering
416	Computer scientist	452	Technician, physical science
417	Other computer specialist (Describe briefly under the applicable item on the questionnaire.)	453	Technician, other fields (Describe briefly under the applicable item on the questionnaire.)
Mathematicians and Statisticians, including college professors and instructors		Teachers	
418	Actuary	454	Teacher, elementary school
419	Mathematician	455	Teacher, secondary school
420	Statistician	456	Teacher, college and university, excluding engineering and science (Engineering and science teachers see codes 401-437 above.)
421	Operations research analyst	Administrators, Managers, and Officials, excluding farm	
Physical Scientists, including college professors and instructors		476	Urban and regional planner
422	Chemist	477	College president or dean
423	Earth scientists including geologists, geophysicists, etc.	478	Administrator or manager, scientific and technical research and development
424	Physicist, astronomer	479	Administrator or manager, production and operations
425	Atmospheric scientist, meteorologist	480	Administrator, manager, or official, all other, excluding self-employed
426	Oceanographer	461	Self-employed proprietor
427	Other physical scientist (Describe)	All Other Occupations	
Biological Scientists, including college professors and instructors		462	Accountant
428	Agricultural scientists, including foresters and conservationists	463	Attorney or judge
429	Biological scientist	464	Sales worker
430	Biochemist	465	Clerical worker (such as bookkeeper, secretary, etc.)
431	Biophysicist	466	Clergy
432	Medical scientist, excluding persons who are primarily medical practitioners; see Health Occupations	467	Craft worker (such as baker, carpenter, electrician, mechanic, repair worker)
433	Other biological scientist (Describe)	468	Farmer (owner, manager, tenant, or farm laborer)
Social scientists, including college professors and instructors		469	Fire fighter or police
434	Economist	470	Laborer, except farm
435	Psychologist	471	Librarian
436	Sociologist or anthropologist	472	Merchant or shopkeeper, self-employed
437	Other social scientist (Describe briefly under the applicable item on the questionnaire.)	473	Operative (such as assembler, factory worker, miner, welder, truck driver, etc.)
		474	Postal worker
		475	Other occupations, not specified above (Describe briefly under the applicable item on the questionnaire.)

Appendix D. Source of Data

Characteristic	Table number	Item number on 1978 questionnaire
Age in 1978*.....	1	(From the 1970 census response)
Sex.....	1	(From the 1972 survey response, if available; otherwise from the 1970 census response)
Race*.....	1	(From the 1970 census response)
Residence in 1978.....	1	A, page 1
Professional identification.....	1	Part IV, 18
Hispanic heritage.....	1	Part IV, 21
Occupation in 1978.....	1	Part III, 10
Highest degree held*.....	2	2a; otherwise from 1976, 1974, or 1972 survey response
Major field of study for highest degree held*.....	2	3; otherwise from 1976, 1974, or 1972 survey response
Type of supplementary training: 1977.....	2	Part I, 4b
Job and occupational mobility: 1976, 1978*.....	3	1976 survey response and Part III, 10, 14
Job and occupational mobility: 1974, 1978*.....	3	1974 survey response and Part III, 10, 14
Job and occupational mobility: 1972, 1978*.....	3	1972 survey response and Part III, 10, 14
Years of professional experience*.....	3	Part IV, 17
Type of employer.....	4	Part III, 12
Federal support.....	4	Part III, 15a, 15b
Unemployment status: 1977.....	4	Part IV, 16a, 16b
Employment status: February 1978*.....	4	Part II, 5a, 5b, 7
Full-time employment in science or engineering: February 1978.....	4	Part II, 6a, 6b
National interest topics.....	4	Part IV, 19
Industry in 1978.....	4	Part III, 9
Primary work activity*.....	4	Part III, 11b
Annual salary rate: 1978.....	5	Part III, 13

*For more information, see appropriate subject in appendix A.

Appendix E. Response Rates

Table E-1 presents response rates of various components of the sample for the 1978 National Survey of Natural and Social Scientists and Engineers. The characteristics presented here are based on the 1970 census or on the 1978, 1976, 1974, or 1972 surveys. Since the percentages in table E-1 are based on a complete count of the sample cases, no reference to the standard error tables is necessary.

Table E-2 presents distributions of respondents and nonrespondents by the set of characteristics shown in table E-1.

Table E-1 is the counterpart of table E-1 of appendix E of the first report in this series *Selected Characteristics of Persons in Physical Science: 1978*. Table E-1 of that report, however, contained data for 362 respondents whose data were not represented in the tables and text of the report. Table E-1 of this report for mathematical specialists excludes data for these 362 respondents.

Table E-1. National Sample, by Field of Science or Engineering in 1976, 1974, and 1972, Age in 1978, and Sex, by Response in the 1978 Survey (Unweighted)

Sex, age in 1978 and field of science or engineering 1976	Response in 1978			
	Total		Respondents	Nonrespondents
	Number	Percent		
Total.....	50,093	100.0	81.4	18.6
SEX				
Male.....	46,877	100.0	81.6	18.4
Female.....	3,216	100.0	78.5	21.5
AGE IN 1978				
Under 30 years.....	287	100.0	76.0	24.0
30 to 34 years.....	6,264	100.0	75.7	24.3
35 to 39 years.....	9,226	100.0	78.1	21.9
40 to 44 years.....	8,075	100.0	81.3	18.7
45 to 49 years.....	7,644	100.0	83.1	16.9
50 to 54 years.....	6,994	100.0	84.9	15.1
55 to 59 years.....	5,183	100.0	85.8	14.2
60 to 64 years.....	3,193	100.0	85.5	14.5
65 to 69 years.....	1,930	100.0	82.2	17.8
70 years and over.....	1,297	100.0	76.2	23.8
FIELD OF SCIENCE OR ENGINEERING IN 1976				
Respondents in 1976.....	42,644	100.0	91.8	8.2
Total in scope in 1976.....	37,602	100.0	92.0	8.0
Computer specialists.....	2,064	100.0	90.8	9.2
Engineers.....	19,922	100.0	91.4	8.6
Mathematical specialists.....	1,486	100.0	92.6	7.4
Life scientists.....	3,800	100.0	93.9	6.1
Physical scientists.....	4,695	100.0	93.4	6.6
Environmental scientists.....	1,749	100.0	92.3	7.7
Psychologists.....	1,936	100.0	92.1	7.9
Social scientists.....	1,950	100.0	92.4	7.6
Total out-of-scope in 1976.....	5,042	100.0	89.8	10.2
Nonrespondents in 1976.....	7,449	100.0	21.9	78.1
FIELD OF SCIENCE OR ENGINEERING IN 1974				
Respondents in 1974.....	44,158	100.0	88.9	11.1
Total in scope in 1974.....	39,473	100.0	89.2	10.8
Computer specialists.....	2,291	100.0	87.4	12.6
Engineers.....	20,814	100.0	88.6	11.4
Mathematical specialists.....	1,612	100.0	89.3	10.7
Life scientists.....	4,026	100.0	91.0	9.0
Physical scientists.....	4,824	100.0	91.3	8.7
Environmental scientists.....	1,867	100.0	88.6	11.4
Psychologists.....	1,989	100.0	89.0	11.0
Social scientists.....	2,050	100.0	89.2	10.8
Total out-of-scope in 1974.....	4,685	100.0	86.2	13.8
Nonrespondents in 1974.....	5,935	100.0	25.6	74.4
FIELD OF SCIENCE OR ENGINEERING IN 1972				
Respondents in 1972.....	50,093	100.0	81.4	18.6
Total in scope in 1972.....	50,093	100.0	81.4	18.6
Computer specialists.....	3,391	100.0	76.7	23.3
Engineers.....	25,797	100.0	81.1	18.9
Mathematical specialists.....	2,185	100.0	81.9	18.1
Life scientists.....	4,891	100.0	84.1	15.9
Physical scientists.....	6,248	100.0	84.0	16.0
Environmental scientists.....	2,095	100.0	82.2	17.8
Psychologists.....	2,488	100.0	79.9	20.1
Social scientists.....	2,998	100.0	79.4	20.6

Table E-2. Respondents and Nonrespondents in the 1978 National Survey, by Field of Science or Engineering in 1976, 1974, and 1972; by Age in 1978, and Sex (Unweighted)

Sex, age in 1978, and field of science or engineering in 1976, 1974, 1972	Responded in 1978		Did not respond in 1978	
	Number	Percent	Number	Percent
Total.....	40,771	100.0	9,322	100.0
SEX				
Male.....	38,245	93.8	8,632	92.6
Female.....	2,526	6.2	690	7.4
AGE IN 1978				
Under 30 years.....	218	0.5	69	0.7
30 to 34 years.....	4,739	11.6	1,525	16.4
35 to 39 years.....	7,208	17.7	2,018	21.6
40 to 44 years.....	6,565	16.1	1,510	16.2
45 to 49 years.....	6,354	15.6	1,290	13.8
50 to 54 years.....	5,939	14.6	1,055	11.3
55 to 59 years.....	4,445	10.9	738	7.9
60 to 64 years.....	2,729	6.7	464	5.0
65 to 69 years.....	1,586	3.9	344	3.7
70 years and over.....	988	2.4	309	3.3
Median age.....	45	(X)	43	(X)
FIELD OF SCIENCE OR ENGINEERING IN 1976				
Responded in 1976.....	39,137	96.0	3,507	37.6
In scope in 1976.....	34,609	84.9	2,993	32.1
Computer specialists.....	1,875	4.6	189	2.0
Engineers.....	18,206	44.7	1,716	18.4
Mathematical specialists.....	1,376	3.4	110	1.2
Mathematicians.....	992	2.4	89	1.0
Statisticians.....	384	0.9	21	0.2
Life scientists.....	3,568	8.8	232	2.5
Agricultural scientists.....	1,446	3.5	94	1.0
Biologists.....	1,720	4.2	112	1.2
Medical scientists.....	402	1.0	26	0.3
Physical scientists.....	4,384	10.8	311	3.3
Chemists.....	2,692	6.6	171	1.8
Physicists and astronomers.....	1,443	3.5	124	1.3
Other physical scientists.....	249	0.6	16	0.2
Environmental scientists.....	1,615	4.0	134	1.4
Earth scientists.....	1,357	3.3	114	1.2
Atmospheric scientists.....	187	0.5	13	0.1
Oceanographers.....	71	0.2	7	0.1
Psychologists.....	1,784	4.4	152	1.6
Social scientists.....	1,801	4.4	149	1.6
Economists.....	750	1.8	70	0.8
Sociologists and anthropologists.....	484	1.2	38	0.4
Other social scientists.....	567	1.4	41	0.4
Out of scope.....	4,528	11.1	514	5.5
Did not respond in 1976.....	1,634	4.0	5,815	62.4

Table E-2. Respondents and Nonrespondents in the 1978 National Survey, by Field of Science or Engineering in 1976, 1974, and 1972, by Age in 1978, and Sex (Unweighted)—Continued

Sex, age in 1978, and field in science or engineering in 1976, 1974, 1972	Responded in 1978		Did not respond in 1978	
	Number	Percent	Number	Percent
FIELD OF SCIENCE OR ENGINEERING IN 1974				
Responded in 1974.....	39,252	96.3	4,906	52.6
In scope in 1974.....	35,212	86.4	4,261	45.7
Computer specialists.....	2,003	4.9	288	3.1
Engineers.....	18,450	45.3	2,364	25.4
Mathematical specialists.....	1,440	3.5	172	1.8
Mathematicians.....	1,041	2.6	131	1.4
Statisticians.....	399	1.0	41	0.4
Life scientists.....	3,663	9.0	363	3.9
Agricultural scientists.....	1,491	3.7	159	1.7
Biologists.....	1,755	4.3	160	1.7
Medical scientists.....	417	1.0	44	0.5
Physical scientists.....	4,402	10.8	422	4.5
Chemists.....	2,713	6.7	251	2.7
Physicists and astronomers.....	1,409	3.5	145	1.6
Other physical scientists.....	280	0.7	26	0.3
Environmental scientists.....	1,655	4.1	212	2.3
Earth scientists.....	1,399	3.4	176	1.9
Atmospheric scientists.....	186	0.5	22	0.2
Oceanographers.....	70	0.2	14	0.2
Psychologists.....	1,771	4.3	218	2.3
Social scientists.....	1,828	4.5	222	2.4
Economists.....	787	1.9	109	1.2
Sociologists and anthropologists.....	490	1.2	54	0.6
Other social scientists.....	551	1.4	59	0.6
Out of scope.....	4,040	9.9	645	6.9
Did not respond in 1974.....	1,519	3.7	4,416	47.4
Responded in 1972.....	40,771	100.0	9,322	100.0
In scope in 1972.....	40,771	100.0	9,322	100.0
Computer specialists.....	2,600	6.4	791	8.5
Engineers.....	20,927	51.3	4,870	52.2
Mathematical specialists.....	1,790	4.4	395	4.2
Mathematicians.....	1,315	3.2	289	3.1
Statisticians.....	475	1.2	106	1.1
Life scientists.....	4,113	10.1	778	8.3
Agricultural scientists.....	1,720	4.2	305	3.3
Biologists.....	1,798	4.4	341	3.7
Medical scientists.....	595	1.5	132	1.4
Physical scientists.....	5,249	12.9	999	10.7
Chemists.....	3,061	7.5	583	6.3
Physicists and astronomers.....	1,791	4.4	337	3.6
Other physical scientists.....	397	1.0	79	0.8
Environmental scientists.....	1,723	4.2	372	4.0
Earth scientists.....	1,553	3.8	345	3.7
Atmospheric scientists.....	132	0.3	18	0.2
Oceanographers.....	38	0.1	9	0.1
Psychologists.....	1,988	4.9	500	5.4
Social scientists.....	2,381	5.8	617	6.6
Economists.....	954	2.3	262	2.8
Sociologists and anthropologists.....	554	1.4	142	1.5
Other social scientists.....	873	2.1	213	2.3
Out of scope in 1972.....	-	-	-	-
Did not respond in 1972.....	-	-	-	-

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