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ABSTRACT

Presented are national statistics on the 1960-62 employment conditions of America's scientific and engineering manpower in relation to economic and social characteristics. The eight-page questionnaire used in the 1962 postcensal survey is concerned with the collection of data from individuals classified as scientists and engineers in the 1960 Decennial Censns of Population. A total of 37 tables is provided in this report to illustrate the following topics: stability of employment, occupation, work activities, and type of employer for employed engineers and scientists; career patterns, including work histories of employer and occupational turnover, and occupational origins; educational preparation, including formal and nonformal training and change in this preparation over time; and the personal, social, and professional characteristics of scientists and engineers, covering citizenship, marital status, residence, salaries, and income. Included in the appendices are an example questionnaire, a fields of specialization list, two descriptions of the postcensal studies program, two tables of universe estimates, and ten tables of standard errors of absolutes and percentages. (CC)

technical paper

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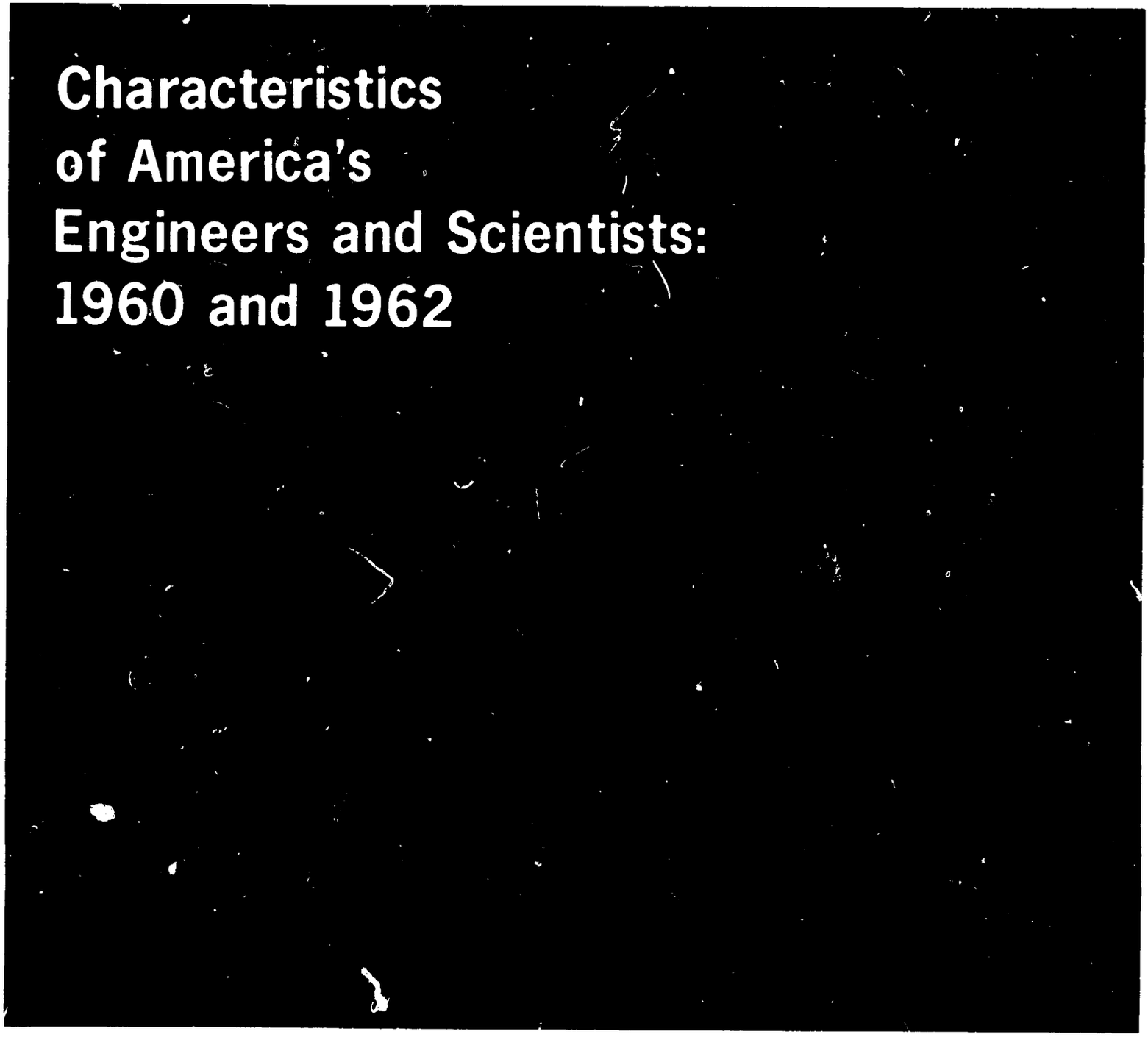
The Postcensal Survey:

Characteristics of America's Engineers and Scientists: 1960 and 1962



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The Postcensal Survey:

technical paper

Characteristics of America's Engineers and Scientists: 1960 and 1962

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Several organizations participated in the Postcensal Survey. Those principally involved were the National Science Foundation, the National Opinion Research Center of the University of Chicago, and the Bureau of the Census. other Federal organizations cooperating in the Postcensal Survey included the Bureau of Labor Statistics, the U S. Office of Education, the National Institutes of Health, and the Veterans' Administration.

With these organizations the individuals substantially involved in carrying out this study were:

National Science Foundation--The postcensal study was carried out by the Sponsored Surveys and Studies Section, **Thomas J. Mills**, Head, of the Foundation's Office of Economic and Manpower Studies. **Robert W. Cain**, Study Director, Special Analysis Group, and **Norman Seltzer**, Study Director, Scientific Manpower Studies Group, were directly involved in all phases of the study, from the planning stage through the operations, review, and evaluation of the prepared reports. In addition, **Norman Seltzer** served as coordinator for all of the organizations participating in the project. **Mary Bedell**, now with the Manpower Administration of the U.S. Department of Labor, prepared the format and edited the tabular material in the present report.

Bureau of the Census--**Stanley Greene**, Chief, Economic Statistics Branch, Population Division, had primary responsibility for carrying out the survey operations and reviewing the tabulations prepared, assisted by **John Priebe**. **David L. Kaplan**, formerly Assistant Chief, Population Division, assisted in the planning of the survey, the design of the survey questionnaire, and the selection of the appropriate sample. Contributions were also made by **William J. Milligan** and **Stuart Garfinkle**, formerly of the Bureau of the Census. **Charles L. Kincannon** was instrumental in reviewing and revising the contents of this report and preparing it for publication.

National Opinion Research Center--**Seymour Warkov** had major responsibility for all phases of the postcensal project at NORC, assisted by **Sanford Abrams** and **John Marsh**, under the general direction of **Peter H. Rossi**.

RELATED MATERIALS

In addition to the present report, two others have been issued by the National Opinion Research Center (NORC). One report is ***The Education and Training of America's Scientists and Engineers: 1962*** (Report No. 104) by Seymour Warkov and John Marsh. The other is ***The United States College-Educated Population: 1960*** (Report No. 102), by Mildred A. Schwartz. Two other reports were recently completed and are being reviewed by the National Science Foundation. They are: ***Occupations of Engineers; Economic Aspects***, prepared by Glen Cain and M. Lee Hansen, of the University of Wisconsin under an arrangement with NORC, and ***Classifications of Scientists and Engineers***, by Seymour Warkov.

Two articles based on the Postcensal Survey have been issued by the U.S. Department of Labor, Bureau of Labor Statistics. "Education and Training of Technicians," by Howard V. Stambler and Annie Lefkowitz, appeared in the November 1964 issue of ***Monthly Labor Review***, and "Projections of Manpower Supply in a Specific Occupation," by Neal H. Rosenthal, was in the November 1966 issue of the same publication. Also based on the Postcensal Survey was BLS Bulletin Number 1512, ***Technician Manpower: Requirements, Resources, and Training Needs***, by Neal H. Rosenthal, published in June 1966.

An additional study employing data from the Postcensal Survey was ***Library Manpower: Occupational Characteristics of Public and School Librarians***, by Henry T. Drennan and Richard L. Darling, published in 1966 by the U.S. Department of Health, Education and Welfare, Office of Education.

PREFACE

This report presents detailed national statistics on the employment of America's scientific and engineering manpower in relation to various economic and social characteristics. Responsibility for the publication of this report is shared by the Bureau of the Census and the National Science Foundation.

The statistics in this report are based on a postcensal survey conducted in 1962 representing a sample of particular occupations and other groups selected from the 25-percent sample tape file of the population enumerated in the Eighteenth Decennial Census of Population, taken as of April 1, 1960.

Because of the critical importance of engineers, scientists, other professional workers, and technicians to the national welfare and security, a special program was initiated to develop needed data for these groups. In 1957 a Special Advisory Panel and the President's Committee on Scientists and Engineers identified the major requirements for scientific manpower information and formulated a program of data collection to meet these needs. The findings, issued in the report *A Program for National Information on Scientific and Technical Personnel* (NSF 58-28), became the basis for many of the data collection and study programs subsequently sponsored by the National Science Foundation. One of the projects recommended in that report as "highly urgent" was "a special direct survey of a large sample of the persons recorded in the 1960 census enumeration as college graduates or as persons currently or last employed in scientific and technical positions, whether college graduates or not, to determine relationships between training and subsequent occupations."[1] With this impetus, data collection for this project, known as the Postcensal Survey of Professional and Technical Manpower, was begun in 1962 by the Census Bureau when records from the Decennial Census became available.

[1] A fuller description of the background and aims of the postcensal study is given in the "Postcensal Studies Program: Background and Content," by Norman Seltzer, in American Statistical Association Proceedings of the Social Statistics Section, 1963 (Washington, D.C.: American Statistical Association, 1964), reproduced as appendix B of this report.

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CHARACTERISTICS OF AMERICA'S ENGINEERS AND SCIENTISTS 1960 AND 1962

INTRODUCTION

The need for information on the Nation's scientific and engineering manpower resources has grown sharply in the past decade. Policy planners and managers involved in developing and administering programs dealing with such diverse subjects as research and development, national defense and security, space, health, education, and economic growth have become increasingly concerned that adequate and accurate information on the manpower resources essential to these activities be available.

The development of enlightened manpower policies for science can be successful only if educators, planners, and officials have information on manpower supply, utilization, and demand. The postcensal series of studies was designed to supply information not previously available on some of these subjects.

This postcensal study provides information on such topics as: Stability of employment, occupation, work activities, and type of employer for employed engineers and scientists; career patterns of engineers and scientists, including work histories of employer and occupational turnover, and occupational origins; educational preparation, including formal and nonformal training and change in this preparation over time; the personal, social, and professional characteristics of engineers and scientists, covering citizenship, marital status, residence, salaries, income, etc. Moreover, it focuses on a series of topics regarding the characteristics of persons employed in engineering and science occupations; to wit:

* The utilization of scientists and engineers in terms of their major work activities by college degree.
* The earnings of scientists and engineers in relation to their college degree.
* The extent to which holders of Ph. D.'s in science and engineering occupations are citizens of foreign countries.
* The length of job tenure in science and engineering occupations by college degree.
* The extent of employment of science and engineering occupations by industry.

The postcensal survey in effect provides a profile of information, heretofore unavailable, on a sample of the persons classified in scientific and technical occupations in the 1960 census. This information includes data on their 1960 and 1962 employment situations, early occupational origins, educational attainment, and other characteristics. The data collected afford an opportunity to examine changes over a period of time in a profile of scientific and technical occupations.

THE SAMPLE

The basic reference point of the survey was the 1960 Census of Population, which classified one-fourth of the population by key characteristics, including occupation and education. Workers were classified by occupation on the basis of responses given to the question, "What kind of work was he doing?" as reported on the Household Questionnaire for the 1960 Census. This 25-percent sample file comprised the sampling frame for the postcensal survey.

Samples ranging in size from 1,000 to 4,000 persons per occupation were drawn from the 25-percent sample for some 40 scientific, technical, and professional occupations classified as "Professional, Technical, and Kindred" by the Census Bureau's detailed occupation classification scheme. Occupations were sampled in sufficient numbers to assure the minimum of 1,000 cases per occupational title for the initial mail-out of questionnaires.

The largest class of persons in the postcensal survey was comprised of persons reported as being in the experienced civilian labor force in 40 specific professional and technical occupations in 1960; however, this report covers only professional persons in the scientific and engineering occupations (see appendix C). The postcensal survey also included a sample of persons who had completed 4 years or more of college, but were not employed in the specific occupations in 1960. A separate report covering the college sample was prepared by the National Opinion Research Center (see reference Report No. 102 under Related Materials).

Postcensal survey questionnaires were mailed in the spring, summer, and fall of 1962 to 71,300 persons selected for the study. The mailing operations resulted in a response rate of 72.2 percent, representing 51,505 completed questionnaires. The listing of occupations and other segments of the study population is shown in appendix C, as are the sample size and response rate for each occupation and component in the study.[1]

THE QUESTIONNAIRE

Each respondent was asked to complete by self-enumeration an eight-page questionnaire (reproduced as appendix A).

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[1]A detailed description of the procedural aspects of the study is given in "The Postcensal Study: Data Collection, Processing, and Tabulating," by Stanley Greene and David L. Kaplan, in American Statistical Association, Proceedings of the Social Statistics Section, 1963 (Washington, D.C.: American Statistical Association, 1964), reproduced as appendix C of this report.

The questionnaire consisted of four sections:

Section I considered current (1962) employment of those in the selected occupations in 1960 and asked questions about employment status, and if working, about the respondent's occupation, industry, type of employing organization, earnings, job activities, work relationships, work attitudes, and the nature of a second job (if any).

Section II dealt with employment status as of April 1960 (when the decennial census was taken), and the respondent's first full-time job after reaching age 24 (an age when most persons have completed their formal education).

Section III sought information about the education and training of respondents, including college attended, field of study, type of degree granted, and years of attendance. Other topics covered here included sources of financing of post high school training (distinguishing between undergraduate and graduate level support) and other types of training respondents might have received, such as apprenticeships; company training programs, correspondence courses, military training applicable to civilian occupations, and the like.

Section IV secured such background information as age, sex, residence, father's occupation, marital status, age and sex of children, and membership in professional societies or associations.

WEIGHTING AND ESTIMATING PROCEDURES

The universe estimates of persons for the postcensal survey were derived using differential weightings within each of the selected occupation groups and labor force categories by age groupings. Preliminary to the assigning of weights, the survey cases returned from the original and followup mailings were hand edited and coded, punched on cards, transferred to computer tapes, and machine edited for inconsistencies and other problems. The edited cases were then arranged into the 1960 occupational categories from which they had been selected. Weights were established within these categories by three age groups on the assumption that the nonrespondents within each of the age groups were adequately represented by those responding in the same age group. Thus, within a given occupational category, a ratio estimate was used for each of three age groups. The age groups used were (a) under 25 years, (b) 25 to 54 years, and (c) 55 years and over. The weight assigned to each sample record was calculated by dividing the 1960 census total (based on a 5-percent sample of the 1960 census) for each occupation-age group by the total number of response cases in the same occupation-age group.[2]

The effect of this procedure was to produce universe estimates consistent with known census totals. As an example, for engineers as a group including professors of engineering, the 14,716 respondents were weighted up to the 1960 census total of 879,742. Tables 1-5 in appendix D show the basic universe numbers involved for persons in the scientific and engineering occupation groups in the experienced civilian labor force in 1960 and 1962 and those employed in 1960 and 1962. Estimates are also given by age and education categories. Table 6 in appendix D shows the weighted number of persons in each universe reporting selected variables in 1962.

Finally, since the estimates are based on a sample, they may differ somewhat from the figure that would have been obtained if a complete census had been taken using the same schedules and operating procedures. As in any survey work, the results are subject to errors of response and of reporting, as well as being subject to sampling variability. In this survey the levels of nonresponse averaged around 28 percent for most occupation groups. (The response rates for each of the components in the sample are shown in appendix C.) The results of a field followup procedure for a subsample of the nonrespondents achieved a response rate of around 30 percent for these cases and indicated that substantial reduction in the overall 28-percent-nonresponse rate would be attainable only with unreasonable expenditure of effort. The statistics presented, therefore, embody the implicit assumption that the characteristics of the 28 percent who failed to respond are like those of the 72 percent who did respond. This procedure, of course, produces statistical uncertainties, the magnitudes of which are unknown. However, the rather high level of nonresponse indicates that the nonsampling variability is likely to have had a greater effect on the data than the sampling variability. Thus, the standard errors associated with the data in this report should not be taken as adequate measures of the reliability of the totals and percentages estimated from the sample.

The standard error is primarily a measure of sampling variability, i.e., of the variations that occur by chance because a sample rather than the whole population is surveyed. The standard error does not include any cumulative effects of processing errors, reporting errors, or errors introduced by the failure to obtain a response, since these factors have comparable effects whether sample or complete coverage procedures are used. The variability of an estimated percentage or frequency of occurrence of a characteristic within a population under study, computed by using sample data for both numerator and denominator, depends upon both the size of the percentage and the size of the total on which the percentage is based.

The standard errors of totals and percentages estimated from the sample for the five occupational groups included in this report are shown in appendix E. The chances are about 68 out of 100 that the estimate obtained through the sample would differ from the one that would have been obtained in a complete census by less than the standard error, assuming that all factors other than sampling are the same in the two situations. It also follows that the chances are about 95 out of 100 that the sample estimate would not differ from a complete census figure by as much as twice the standard error.

[2] Integral rather than fractional weights were used in the sample records in order to avoid problems of rounding in the tabulations. As an example, if a weight was calculated to be 100.37, 37 percent of the cases (selected in a random manner on the computer) were given a weight of 101 and the remainder were given a weight of 100.0.

through an enumeration survey of a sample of households in the United States. The data from the Census enumeration differ from those collected through other means, such as the National Register of Scientific and Technical Personnel, surveys of employers of scientific and technical personnel, or surveys of degrees granted by universities and colleges due to a number of factors. Among these are conceptual differences in the criteria used to identify an engineer or a scientist, the different collection techniques used, differences in the time period to which the data apply, differences in question wording and format of schedules, differences in coverage, differences in the methods used to process the original data, differences in weighting procedures and in the population controls, differences in extent and allocation of noninterview cases, and in the sampling variability used.

DEFINITIONS AND EXPLANATIONS

EMPLOYMENT STATUS.--The data on employment status relate to the calendar week prior to the date on which the respondents completed their questionnaires. This week is not the same for all respondents because not all persons completed their questionnaires during the same week. The questionnaires were in the field in the spring and summer of 1962.

Employed persons comprise all civilians 14 years old and over who were either (a) "at work"--those who did any work for pay or profit, or worked without pay for 15 hours or more on a family farm or in a family business; or were (b) "with a job but not at work"--those who did not work and were not looking for work but had a job or business from which they were temporarily absent because of bad weather, industrial dispute, vacation, illness, or other personal reasons.

Persons are classified as unemployed if they were 14 years old and over and not "at work" but looking for work. Unemployed persons who have worked at any time in the past are classified as the "experienced unemployed."

The "civilian labor force" includes all persons classified as employed or unemployed, as described above. The "labor force" also includes members of the Armed Forces (persons on active duty with the United States Army, Air Force, Navy, Marine Corps, or Coast Guard). The "experienced civilian labor force" comprises the employed and the experienced unemployed. Since this report deals only with persons classified in the experienced civilian labor force in 1960, the term "labor force," when used in this report, is the equivalent of "experienced civilian labor force" for 1960.

Persons "not in the labor force" comprise all those 14 years old and over who are not classified as members of the labor force, including persons doing only incidental unpaid family work (less than 15 hours during the week).

HOURS WORKED.--The statistics on hours worked pertain to the number of hours actually worked, and not necessarily to the number usually worked or the scheduled number of hours.

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For an employed person, the information referred to the major job he held during the reference period. For experienced unemployed persons, i.e., unemployed persons who have had job experience, and for those not in the labor force, the occupational information referred to the last job that had been held.

INDUSTRY.--The data on industry in this report refer to the job held during the week for which employment status and occupation was reported.

CLASS OF WORKER.--The class-of-worker information refers to the same job as the occupation information. The assignment of a person to a particular class-of-worker category is basically independent, however, of the occupation in which he worked. The classification by class of worker consists of four categories which are defined as follows:

1. Private wage and salary workers.--Persons who worked for a private employer for wages, salary, commission, tips, pay-in-kind, or at piece rates.

2. Government workers.--Persons who worked for any governmental unit (Federal, State, local, or international), regardless of the activity of the particular agency.

3. Self-employed workers.--Persons who worked for profit or fees in their own business, profession, or trade, or who operated a farm either as an owner or tenant. Included here are the owner-operators of large stores and manufacturing establishments as well as small merchants, independent craftsmen and professional men, farmers, peddlers, and other persons who conducted enterprises of their own. Persons paid to manage businesses owned by other persons or by corporations, on the other hand, are classified as private wage and salary workers (or, in some few cases, as government workers).

4. Unpaid family workers.--Persons who worked without pay on a farm or in a business operated by a person to whom they are related by blood or marriage.

FIELD OF WORK SPECIALIZATION.--The data on field of work specialization were based on a code chosen by the respondent from a Fields of Specialization List (shown in appendix A) as best describing the field in which he was working.

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WORK ACTIVITY.--The work activity information describes what was considered by the respondent to be his major current job. All activities which were a part of the job, and the two most time consuming, were indicated.

EDUCATIONAL ATTAINMENT.--Educational attainment in 1962 refers to the highest academic degree reported by the respondent. Persons who reported the bachelor's as the highest degree, if they also reported having completed 5 years or more of schooling beyond the high school level, were tabulated as having a "bachelor's plus" degree, i.e., with some graduate work but no graduate degree. The data on educational attainment in 1960 were derived using the year given by the respondent as being the date when the work on each of his degrees was ended. If the work on his highest degree was reported as ending in 1959 or earlier, this degree was tabulated as the highest degree attained in 1960; if not, the date work ended on the next highest degree was examined, and so on, until the highest degree with an end-of-work date of 1959 or earlier was determined and thereby tabulated as the highest degree attained in 1960.

MARITAL STATUS.--This classification refers to the marital status of the person at the time of enumeration. Persons classified as "married" comprise, therefore, both those who have been married only once and those who remarried after having been widowed or divorced. Persons reported as separated (either legally separated or otherwise absent from the spouse because of marital discord) are classified as a subcategory of married persons.

Table 1.--Engineers and Scientists in the 1960 Labor Force, by Sex and Age in 1962

Sex and age in 1962	Number					Percent[1]				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
BOTH SEXES										
Total	879,742	135,822	32,879	37,733	68,331	100	100	100	100	100
Under 25 years	17,276	4,670	1,285	2,437	988	2	3	4	6	1
25 to 34 years	243,523	44,273	9,027	13,158	16,823	28	33	27	35	25
35 to 44 years	323,536	49,057	11,709	9,746	22,802	37	36	36	26	33
45 to 54 years	166,143	23,554	6,160	7,194	14,842	19	17	19	19	22
55 years and over	129,264	14,268	4,698	5,198	12,876	15	11	14	14	19
MALE										
Total	873,416	127,082	27,748	27,836	52,024	100	100	100	100	100
Under 25 years	17,141	3,761	777	1,279	480	2	3	3	5	1
25 to 34 years	242,409	41,046	7,429	10,404	13,433	28	32	27	37	26
35 to 44 years	320,961	46,361	10,362	7,322	18,884	37	36	37	26	36
45 to 54 years	164,301	22,320	5,207	5,223	10,582	19	18	19	19	20
55 years and over	128,604	13,594	3,973	3,608	8,645	15	11	14	13	17
FEMALE										
Total	6,326	8,740	5,131	9,897	16,307	100	100	100	100	100
Under 25 years	135	909	508	1,158	508	2	10	10	12	3
25 to 34 years	1,114	3,227	1,598	2,754	3,390	18	37	31	28	21
35 to 44 years	2,575	2,696	1,347	2,424	3,918	41	31	26	24	24
45 to 54 years	1,842	1,234	953	1,971	4,260	29	14	19	20	26
55 years and over	660	674	725	1,590	4,231	10	8	14	16	26

[1]Sums of the percentages may not equal 100 because of rounding.

Table 2.--Engineers and Scientists in the 1960 Labor Force, by Sex and Educational Attainment in 1962

Highest degree held in 1962 and sex	Number					Percent[1]				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
BOTH SEXES										
Total	879,742	135,822	32,879	37,733	68,331	100	100	100	100	100
No degree	381,318	29,325	5,607	11,158	8,611	43	22	15	30	13
Bachelor's	259,863	32,[illegible]	5,363	7,004	6 129	29	24	16	19	9
Bachelor's plus[2]	144,939	24,973	3,716	5,294	6,162	16	18	11	14	9
Master's	70,055	24,075	7,881	9,042	22,881	8	18	24	24	33
Ph. D.	10,056	24,055	10,507	4,790	24,140	1	18	32	13	35
Other[3]	13,511	1,158	406	445	408	2	1	1	1	1
MALE										
Total	873,416	127,082	27,748	27,836	52,024	100	100	100	100	100
No degree	377,411	27,578	3,795	6,673	6,308	43	22	14	24	12
Bachelor's	258,937	29,411	4,076	4,610	3,999	30	23	15	17	8
Bachelor's plus[2]	144,419	23,375	2,995	4,331	4,892	16	18	11	16	9
Master's	69,324	22,280	6,767	7,394	15,766	8	18	24	27	30
Ph. D.	9,938	23,396	9,820	4,514	20,713	1	18	35	16	40
Other[3]	13,387	1,042	295	314	346	2	1	1	1	1
FEMALE										
Total	6,326	8,740	5,131	9,897	16,307	100	100	100	100	100
No degree	3,907	1,747	1,212	4,485	2,303	62	20	24	45	14
Bachelor's	926	2,825	1,286	2,394	2,130	15	32	25	24	13
Bachelor's plus[2]	520	1,598	721	963	1,270	8	18	14	10	8
Master's	731	1,795	1,114	1,648	7,115	12	21	22	17	44
Ph. D.	118	659	687	276	3,427	2	8	13	3	21
Other[3]	124	116	111	131	62	2	1	2	1	-

- Indicates less than 0.5 percent.
[1]Sums of the percentages may not equal 100 because of rounding.
[2]Some graduate work but no graduate degree.
[3]Includes associate, first professional, and registered nurse degrees.

Table 3.--Median Age and Educational Attainment in 1962 for Engineers and Scientists in the 1960 Labor Force, by Sex

Highest degree held in 1962 by sex	Median age in 1962				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
MALE					
Total	873,416	127,082	27,748	27,836	52,024
All degrees[1]	40.5	39.0	40.5	41.4	38.6
No degree	44.2	41.9	44.2	45.9	47.1
Bachelor's	38.6	37.8	38.7	34.2	37.6
Bachelor's plus[2]	37.9	37.5	39.3	33.5	38.4
Master's	37.7	38.3	38.9	37.2	39.1
Ph. D.	39.4	40.2	41.5	40.7	42.8
FEMALE					
Total	6,326	8,740	5,131	9,897	16,307
All degrees[1]	42.4	35.9	38.4	38.3	45.8
No degree	43.2	40.6	40.9	42.6	47.6
Bachelor's	42.8	31.1	32.3	32.6	37.8
Bachelor's plus[2]	39.9	36.6	37.9	35.8	45.9
Master's	40.7	36.2	41.8	40.4	46.0
Ph. D.	40.7	44.1	43.7	53.8	48.0

[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 4.--Engineers and Scientists in the 1960 Labor Force, by Age and Educational Attainment in 1962, by Sex

Age and highest degree held in 1962	Both sexes					Male					Female				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientist	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total percent.	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
UNDER 25 YEARS															
Total[1].....	17,276	4,670	1,285	2,437	988	17,141	3,761	777	1,279	480	135	909	508	1,158	508
No degree.....	52	40	44	44	38	52	43	47	38	39	100	22	37	51	37
Bachelor's.....	21	27	28	25	30	21	18	24	13	20	-	61	32	37	39
Bachelor's plus[2]..	15	15	14	18	23	15	17	13	27	26	-	6	13	8	20
Master's.....	8	13	13	13	4	7	14	14	21	2	-	10	10	4	5
Ph. D.....	-	5	1	-	6	-	6	1	-	13	-	-	-	-	-
25 TO 34 YEARS															
Total[1].....	243,523	44,273	9,027	13,158	16,823	242,409	41,046	7,429	10,404	13,433	1,114	3,227	1,598	2,754	3,390
No degree.....	27	17	10	17	8	27	16	9	14	6	50	[illegible]	16	29	13
Bachelor's.....	36	28	21	25	14	36	27	17	23	12	16	44	41	37	21
Bachelor's plus[2]..	22	21	14	19	12	22	22	14	21	14	12	20	15	13	7
Master's.....	11	20	29	26	42	11	20	31	28	41	21	23	19	20	47
Ph. D.....	1	14	25	10	23	1	15	29	13	26	1	2	8	-	12
35 TO 44 YEARS															
Total[1].....	323,536	49,057	11,709	9,746	22,802	320,961	46,361	10,362	7,322	18,884	2,575	2,696	1,347	2,424	3,918
No degree.....	39	17	11	25	9	39	17	9	17	10	59	23	21	47	9
Bachelor's.....	32	24	16	16	7	33	24	15	16	6	15	23	20	19	13
Bachelor's plus[2]..	17	19	9	14	7	18	19	9	15	7	10	19	15	12	7
Master's.....	8	17	24	28	33	8	17	24	31	31	9	22	23	18	45
Ph. D.....	1	22	39	17	43	1	22	42	21	46	3	11	18	3	25
45 TO 54 YEARS															
Total[1].....	66,143	23,554	6,160	7,194	14,842	164,301	22,320	5,207	5,223	10,582	1,842	1,234	953	1,971	4,260
No degree.....	58	30	17	40	15	58	30	16	36	15	66	37	27	52	15
Bachelor's.....	21	19	13	13	7	21	20	14	12	7	20	14	8	14	9
Bachelor's plus[2]..	13	17	14	9	7	13	16	14	10	8	7	19	14	7	6
Master's.....	6	16	22	22	30	6	16	20	22	25	6	18	33	20	44
Ph. D.....	1	17	34	14	40	1	18	37	18	45	1	13	18	4	26
55 YEARS AND OVER															
Total[1].....	129,264	14,268	4,698	5,198	12,876	128,604	13,594	3,973	3,608	8,649	660	674	725	1,590	4,231
No degree.....	65	35	27	50	20	65	34	25	46	22	71	24	33	59	14
Bachelor's.....	21	16	10	11	6	21	16	9	10	6	2	11	16	13	7
Bachelor's plus[2]..	9	12	7	6	8	8	11	7	6	8	1	19	12	5	10
Master's.....	5	17	21	19	29	5	17	21	21	21	25	24	20	14	44
Ph. D.....	1	20	34	14	36	1	21	37	17	42	1	22	19	8	22

- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 5.--Engineers and Scientists in the 1960 Labor Force, by Age, Marital Status, and Educational Attainment in 1962, by Sex

(Sums of the percentages may not equal 100 because of rounding)

Age and highest degree held in 1962	Male					Female				
	Total		Married	Never married	Separated, divorced, or widowed	Total		Married	Never married	Separated, divorced, or widowed
	Number	Percent				Number	Percent			
ENGINEERS										
Total[1]	875,416	100	92	6	2	6,326	100	64	21	15
Age in 1962										
25 to 34 years	242,409	100	89	10	1	1,114	100	83	17	-
35 to 44 years	320,961	100	95	3	2	2,575	100	67	29	4
45 to 54 years	184,301	100	96	2	2	1,842	100	54	15	32
Highest degree held in 1962										
No degree	377,481	100	93	4	3	3,907	100	71	14	15
Bachelor's	258,937	100	92	6	2	926	100	76	12	12
Bachelor's plus[2]	144,419	100	92	7	1	520	100	25	29	46
Master's	69,324	100	92	7	1	731	100	30	64	6
Ph. D.	9,938	100	91	7	2	118	100	90	10	-
PHYSICAL SCIENTISTS										
Total[1]	127,082	100	89	9	2	8,740	100	49	42	9
Age in 1962										
25 to 34 years	41,046	100	86	13	1	3,227	100	59	36	5
35 to 44 years	46,761	100	94	5	1	2,696	100	46	44	10
45 to 54 years	42,320	100	93	4	3	1,234	100	47	38	15
Highest degree held in 1962										
No degree	27,578	100	88	9	3	1,747	100	58	26	16
Bachelor's	29,411	100	89	9	2	2,825	100	58	36	7
Bachelor's plus[2]	23,375	100	88	10	2	1,598	100	40	56	4
Master's	22,280	100	90	10	1	1,795	100	39	53	10
Ph. D.	23,396	100	92	6	1	659	100	46	50	5
BIOLOGICAL SCIENTISTS										
Total[1]	27,748	100	90	8	2	5,131	100	51	39	10
Age in 1962										
25 to 34 years	7,429	100	85	14	1	1,590	100	60	37	3
35 to 44 years	10,362	100	95	4	1	1,341	100	51	39	10
45 to 54 years	5,207	100	94	3	3	948	100	51	37	12
Highest degree held in 1962										
No degree	3,795	100	84	12	4	1,212	100	61	23	17
Bachelor's	4,076	100	90	8	2	1,286	100	54	40	7
Bachelor's plus[2]	2,995	100	89	10	1	721	100	43	48	9
Master's	6,367	100	90	9	2	1,114	100	49	41	9
Ph. D.	9,820	100	93	5	2	687	100	41	51	8
MATHEMATICIANS										
Total[1]	27,836	100	85	12	3	9,897	100	57	32	11
Age in 1962										
25 to 34 years	10,404	100	82	17	1	2,754	100	64	34	3
35 to 44 years	7,322	100	91	7	2	2,424	100	58	34	8
45 to 54 years	5,223	100	90	8	3	1,971	100	46	35	19
Highest degree held in 1962										
No degree	6,673	100	84	10	6	4,485	100	61	24	15
Bachelor's	4,610	100	84	14	2	2,394	100	63	30	8
Bachelor's plus[2]	4,331	100	85	14	1	963	100	45	43	12
Master's	7,394	100	83	14	3	1,648	100	49	47	4
Ph. D.	4,514	100	91	9	-	276	100	49	41	10
SOCIAL SCIENTISTS										
Total[1]	52,024	100	90	8	3	16,307	100	45	41	14
Age in 1962										
25 to 34 years	13,433	100	86	13	1	3,390	100	59	37	3
35 to 44 years	18,884	100	91	6	2	3,918	100	52	35	12
45 to 54 years	10,582	100	93	4	3	4,260	100	47	36	16
Highest degree held in 1962										
No degree	6,308	100	88	8	4	2,303	100	48	26	25
Bachelor's	3,999	100	86	10	4	2,130	100	62	30	8
Bachelor's plus[2]	4,892	100	91	7	2	1,270	100	46	39	15
Master's	15,766	100	88	10	2	7,115	100	41	49	10
Ph. D.	20,713	100	92	6	2	3,427	100	41	44	15

- Indicates less than 0.5 percent.

[1]Includes age groups under 25 years and 55 years and over and associate, first professional, and registered nurse degrees not shown separately.

[2]Some graduate work but no graduate degree.

Table 6.--Engineers and Scientists in the 1960 Labor Force Reporting U.S. Citizenship, by Educational Attainment in 1962

Highest degree held in 1962	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total number	879,742	135,822	32,879	[illegible]	[illegible]
PERCENT CITIZENS					
No degree	99	97	98	[illegible]	[illegible]
Bachelor's	99	99	100	[illegible]	[illegible]
Bachelor's plus[1]	99	99	99	[illegible]	[illegible]
Master's	98	98	99	[illegible]	[illegible]
Ph. D	94	94	97	[illegible]	98

[1]Some graduate work but no graduate degree.

Table 7.--Engineers and Scientists in the 1960 Labor Force With Ph. D. Degree in 1962 Reporting U.S. Citizenship by Sex and Age in 1962

Characteristic	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total number	10,056	24,055	10,507	4,790	24,140
PERCENT CITIZENS					
Sex					
Male	94	95	98	97	98
Female	95	90	96	90	100
Age in 1962					
25 to 34 years	85	93	92	94	96
35 to 44 years	90	93	98	97	99
45 to 54 years	99	97	100	97	99

Table 8.--Engineers and Scientists in the 1960 Labor Force by Educational Attainment and Division of Residence in 1962

(Sums of the percentages may not equal 100 because of rounding)

Occupation in 1960 and highest degree held in 1962	All divisions[1] [2]		New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
	Number	Percent									
ENGINEERS											
Total[3]	879,742	100	7	22	22	6	11	4	7	4	17
No degree	341,318	100	7	22	24	7	11	4	6	4	16
Bachelor's	259,863	100	6	20	23	6	12	5	7	4	18
Bachelor's plus[4]	144,939	100	8	22	20	6	10	3	8	4	19
Master's	70,055	100	10	28	16	4	10	3	6	3	20
Ph. D.	10,056	100	6	31	16	5	11	3	5	2	21
PHYSICAL SCIENTISTS											
Total[3]	135,822	100	6	23	17	6	12	4	12	7	13
No degree	29,325	100	5	24	22	7	11	4	10	7	11
Bachelor's	32,236	100	5	22	19	5	12	5	16	6	10
Bachelor's plus[4]	24,973	100	7	20	15	6	12	6	13	7	15
Master's	24,075	100	7	21	15	5	10	5	16	8	13
Ph. D.	24,055	100	7	27	16	5	15	2	7	6	15
BIOLOGICAL SCIENTISTS											
Total[3]	32,879	100	6	15	17	10	17	6	8	7	15
No degree	5,007	100	7	19	19	7	16	6	7	6	14
Bachelor's	5,362	100	6	15	15	9	17	5	8	8	16
Bachelor's plus[4]	3,716	100	4	13	15	13	14	3	10	8	21
Master's	7,881	100	5	13	19	11	15	8	8	7	13
Ph. D.	10,507	100	6	14	17	9	19	5	8	7	16
MATHEMATICIANS											
Total[3]	37,733	100	7	23	16	7	17	4	6	4	15
No degree	11,158	100	7	31	16	7	14	3	5	2	16
Bachelor's	7,004	100	9	26	15	5	18	7	4	4	13
Bachelor's plus[4]	5,294	100	6	17	11	8	23	4	7	6	19
Master's	9,042	100	8	20	18	6	19	4	7	5	12
Ph. D.	4,790	100	7	18	22	9	13	2	7	4	17
SOCIAL SCIENTISTS											
Total[3]	68,331	100	7	21	19	8	16	4	7	4	14
No degree	8,611	100	6	26	22	7	13	3	6	3	14
Bachelor's	6,129	100	8	29	14	7	22	4	6	2	9
Bachelor's plus[4]	6,162	100	6	20	16	9	21	3	4	5	15
Master's	22,881	100	7	19	20	7	16	4	8	4	15
Ph. D.	24,140	100	8	20	21	9	13	5	6	3	15

[1]Geographic divisions are comprised of the following groups of States: New England - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; Middle Atlantic - New York, New Jersey, Pennsylvania; East North Central - Ohio, Indiana, Illinois, Michigan, Wisconsin; West North Central - Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas; South Atlantic - Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Florida; East South Central - Kentucky, Tennessee, Alabama, Mississippi; West South Central - Arkansas, Louisiana, Oklahoma, Texas; Mountain - Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada; Pacific - Washington, Oregon, California, Alaska, Hawaii.

[2]Includes other than United States.

[3]Includes associate, first professional, and registered nurse degrees not shown separately.

[4]Some graduate work but no graduate degree.

Table 9.--Engineers and Scientists in the 1960 Labor Force, by Occupation of Father

(Sums of the percentages may not equal 100 because of rounding)

Father's occupation[1]	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	879,742	135,822	32,879	37,733	68,331
Percent	100	100	100	100	100
White-collar workers	44	46	42	51	55
Professional, technical, and kindred workers	14	18	18	19	20
Engineering	6	4	3	3	3
Physical sciences	-	1	1	1	1
Biological and agricultural sciences	-	-	1	-	-
Mathematics	-	-	-	1	-
Social sciences	-	-	-	-	1
College personnel not elsewhere classified	-	1	1	1	1
Secondary school teachers	1	1	1	1	2
Elementary school teachers	-	-	1	1	-
Technicians	1	1	1	1	-
Other	6	10	9	10	12
Managers, officials, proprietors, except farm	19	18	16	21	23
Clerical and kindred workers	5	4	4	5	5
Sales workers	6	6	4	6	7
Farm workers	11	11	27	9	11
Farmers and farm managers	10	10	26	9	11
Farm laborers	1	1	1	-	-
Service workers	3	3	2	3	2
Blue-collar workers	34	31	23	27	21
Craftsmen, foremen, and kindred workers	22	18	14	16	13
Operatives and kindred workers	9	9	6	9	6
Laborers, except farm and mine	3	4	3	2	2
In Armed Forces	1	1	-	1	1
Not living	7	6	6	7	7
Not in labor force	1	1	1	1	1

- Indicates less than 0.5 percent.

[1]Occupation when the member of the 1960 labor force was about 16 years old.

Table 10.--Engineers and Scientists in the 1960 Labor Force Reporting Father Employed as Professional, Technical, or Kindred Worker, by Sex and Educational Attainment in 1962

Highest degree held in 1962 and sex	Percent reporting father employed as professional, technical, or kindred worker[1]				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
BOTH SEXES					
No degree	10	12	9	10	11
Bachelor's	16	16	17	20	14
Bachelor's plus[2]	18	17	19	18	23
Master's	20	21	18	18	21
Ph. D.	23	30	23	30	22
All degrees[3]	15	18	18	19	20
MALE					
No degree	11	12	8	12	12
Bachelor's	17	15	10	16	18
Bachelor's plus[2]	18	18	17	17	23
Master's	20	18	16	15	20
Ph. D.	22	29	23	29	21
All degrees[3]	15	18	17	17	20
FEMALE					
No degree	9	11	14	10	12
Bachelor's	25	31	27	28	13
Bachelor's plus[2]	24	23	27	29	31
Master's	23	37	26	29	22
Ph. D.	42	50	26	21	31
All degrees[3]	15	27	24	22	22

[1]Occupation of father when the member of the 1960 labor force was about 16 years old.
[2]Some graduate work but no graduate degree.
[3]In addition to the five categories shown above, all degrees include associate, first professional, and registered nurse degrees not shown separately.

Table 11.--Class of Worker by Educational Attainment, for Engineers and Scientists Employed in 1960

Highest degree held and class of worker in 1960	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total in occupation in 1960	879,742	135,822	32,879	37,733	68,331
Not employed	11,868	2,903	1,346	1,325	1,756
Employed	867,874	132,919	31,533	36,408	66,575
Percent	100	100	100	100	100
ALL DEGREES[1]					
Private wage and salary workers	79	73	31	61	44
Government workers[2]	18	24	67	38	53
Self-employed workers	3	3	2	1	3
NO DEGREE					
Private wage and salary workers	78	81	43	72	59
Government workers[2]	20	15	50	27	34
Self-employed workers	2	4	7	1	7
BACHELOR'S					
Private wage and salary workers	80	78	28	71	59
Government workers[2]	17	19	71	29	39
Self-employed workers	3	3	1	-	2
BACHELOR'S PLUS[3]					
Private wage and salary workers	82	70	31	58	45
Government workers[2]	16	26	68	41	52
Self-employed workers	2	4	1	1	3
MASTER'S					
Private wage and salary workers	79	68	23	50	39
Government workers[2]	19	29	76	49	60
Self-employed workers	2	3	1	1	1
DOCTOR OF PHILOSOPHY					
Private wage and salary workers	68	67	30	41	40
Government workers[2]	27	32	70	59	57
Self-employed workers	5	1	-	-	3

- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Includes employees of publicly controlled educational institutions.
[3]Some graduate work but no graduate degree.

Table 12.--Employed Engineers and Scientists, by Industry Group and Educational Attainment: 1960

(Sums of the percentages may not equal 100 because of rounding)

Occupation and highest degree held in 1962	All industries		Agriculture, forestry, and fisheries	Mining	Construction	Manufacturing	Transportation, communication, and public utilities	Wholesale and retail trade	Finance, insurance, and real estate
	Number	Percent							
ENGINEERS									
Total[1]	867,874	100	-	2	10	59	9	3	1
No degree	387,864	100	-	1	12	53	11	4	1
Bachelor's	247,407	100	-	2	11	58	8	3	1
Bachelor's plus[2]	149,122	100	-	2	8	60	8	2	1
Master's	53,266	100	-	1	4	58	3	2	1
Ph. D.	7,699	100	-	2	-	35	2	1	-
PHYSICAL SCIENTISTS									
Total[1]	132,919	100	-	10	1	49	2	1	-
No degree	30,773	100	-	7	1	63	3	1	-
Bachelor's	30,192	100	-	15	1	57	3	1	-
Bachelor's plus[2]	27,277	100	-	10	1	44	3	1	-
Master's	20,237	100	-	14	-	39	1	1	-
Ph. D.	20,525	100	-	3	-	38	-	1	-
BIOLOGICAL SCIENTISTS									
Total[1]	31,533	100	6	-	1	9	-	1	-
No degree	5,116	100	16	-	2	10	1	4	1
Bachelor's	4,835	100	5	-	1	14	1	2	1
Bachelor's plus[2]	4,673	100	4	-	1	10	-	1	-
Master's	6,907	100	4	-	-	9	-	1	-
Ph. D.	8,778	100	3	-	-	5	-	-	-
MATHEMATICIANS									
Total[1]	36,408	100	-	1	1	23	5	3	12
No degree	11,906	100	-	1	1	32	10	5	14
Bachelor's	6,109	100	-	1	1	24	7	1	26
Bachelor's plus[2]	6,125	100	-	2	1	25	3	2	7
Master's	7,478	100	-	-	-	14	2	1	8
Ph. D.	3,615	100	-	-	-	6	-	-	2
SOCIAL SCIENTISTS									
Total[1]	66,575	100	-	-	-	11	2	3	2
No degree	9,024	100	-	1	1	25	7	10	4
Bachelor's	5,427	100	-	-	1	31	6	5	3
Bachelor's plus[2]	7,945	100	-	-	1	18	2	1	4
Master's	21,137	100	-	-	-	6	1	1	2
Ph. D.	20,016	100	-	-	-	2	-	-	1

- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 12.--Employed Engineers and Scientists, by Industry Group and Educational Attainment: 1960--Continued

(Sums of the percentages may not equal 100 because of rounding)

Occupation and highest degree held in 1960	Service industries						Public administration
	Business and repair services	Professional and related services					
		Educational institutions				Other professional and related services	
		Colleges and universities	Secondary schools	Elementary schools	Other educational institutions		
ENGINEERS							
Total[1]	3	2	-	-	-	7	8
No degree	2	1	-	-	-	6	9
Bachelor's	2	-	-	-	-	8	8
Bachelor's plus[2]	5	2	-	-	-	8	7
Master's	6	10	-	-	-	11	7
Ph. D.	14	30	-	-	-	11	5
PHYSICAL SCIENTISTS							
Total[1]	4	13	-	-	-	8	11
No degree	4	4	-	-	1	6	9
Bachelor's	3	2	-	-	-	7	12
Bachelor's plus[2]	4	13	-	-	-	9	14
Master's	3	20	-	-	-	9	14
Ph. D.	5	36	-	-	-	9	7
BIOLOGICAL SCIENTISTS							
Total[1]	2	44	1	-	1	14	21
No degree	3	17	1	-	2	20	22
Bachelor's	1	11	-	1	1	21	42
Bachelor's plus[2]	2	35	-	1	1	20	25
Master's	1	48	1	-	1	12	22
Ph. D.	1	76	-	-	1	6	8
MATHEMATICIANS							
Total[1]	4	24	1	-	-	8	19
No degree	3	3	-	-	1	9	20
Bachelor's	5	4	-	-	-	8	22
Bachelor's plus[2]	5	22	2	-	1	8	23
Master's	4	46	1	1	-	7	17
Ph. D.	3	79	1	-	-	5	5
SOCIAL SCIENTISTS							
Total[1]	3	51	1	1	4	10	12
No degree	6	14	2	-	3	7	19
Bachelor's	7	15	2	2	3	4	22
Bachelor's plus[2]	4	37	2	1	3	8	20
Master's	2	56	2	2	7	10	11
Ph. D.	2	75	-	-	2	13	5

Table 13.--Years of Job Tenure for Employed Engineers and Scientists: 1960

(Sums of the percentages may not equal 100 because of rounding)

Tenure with employing organization in 1960	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	867,874	132,919	31,533	36,408	66,575
Percent	100	100	100	100	100
Less than 1 year	3	4	3	3	3
1 year but less than 2 years	10	10	10	12	11
2 years but less than 3 years	8	9	11	10	11
3 years but less than 4 years	8	10	9	11	10
4 years but less than 5 years	7	8	7	9	9
5 years but less than 10 years	25	26	23	21	22
10 years but less than 15 years	16	15	19	13	18
15 years but less than 20 years	8	8	7	7	6
20 years but less than 25 years	6	5	4	4	4
25 years but less than 30 years	3	3	4	3	3
30 years or more	5	4	4	6	4

Table 14.--Median Years of Job Tenure for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1960

Occupation group and age in 1960 and sex	Median years of job tenure in 1960[1]					
	Total[2]	No degree	Bachelor's	Bachelor's plus[3]	Master's	Ph. D.
ENGINEERS						
Total	867,874	387,864	247,407	149,122	53,266	7,695
Both sexes[4]	7.7	9.0	6.9	5.8	6.4	5.8
25 to 34 years	4.5	5.4	4.4	4.2	4.2	3.2
35 to 44 years	8.9	10.0	8.7	8.1	7.2	6.3
45 to 54 years	14.8	14.5	16.9	13.5	14.5	9.7
55 to 64 years	23.5	23.8	25.9	19.1	13.6	24.3
Male	7.3	9.0	6.9	5.8	6.3	5.7
PHYSICAL SCIENTISTS						
Total	132,919	30,773	30,192	27,277	20,237	20,525
Both sexes[4]	7.0	9.0	7.1	5.2	7.0	6.8
25 to 34 years	4.2	5.6	4.7	3.9	4.2	3.4
35 to 44 years	9.2	12.1	10.3	8.4	8.1	7.9
45 to 54 years	16.3	17.5	18.4	15.9	15.5	12.6
55 to 64 years	22.3	27.3	21.6	17.5	19.1	18.6
Male	7.1	9.3	7.4	5.3	7.2	6.8
Female	4.2	3.5	4.0	4.3	5.4	7.6
BIOLOGICAL SCIENTISTS						
Total	31,533	5,116	4,835	4,673	6,907	8,778
Both sexes[4]	7.3	8.2	7.2	5.0	7.6	7.7
25 to 34 years	3.7	4.9	4.4	5.3	3.5	3.5
35 to 44 years	8.4	9.7	10.8	9.0	8.7	7.0
45 to 54 years	14.2	12.9	18.4	13.0	13.9	13.8
55 to 64 years	24.1	21.8	27.4	18.5	27.3	19.2
Male	7.6	9.2	8.3	5.5	7.7	7.8
Female	4.8	5.9	3.7	3.6	7.1	7.0
MATHEMATICIANS						
Total	36,408	11,906	6,109	6,125	7,478	3,615
Both sexes[4]	6.0	8.9	5.3	3.7	5.4	8.4
25 to 34 years	3.9	4.7	4.1	3.4	3.7	3.8
35 to 44 years	8.0	11.4	10.7	6.1	6.7	7.2
45 to 54 years	16.7	18.0	14.6	10.3	10.7	13.9
55 to 64 years	26.1	19.8	30+	8.4	18.1	24.3
Male	5.9	9.9	6.0	3.5	5.5	7.7
Female	6.2	7.6	4.3	5.1	5.1	14.9
SOCIAL SCIENTISTS						
Total	66,575	9,024	5,427	7,245	21,137	20,016
Both sexes[4]	6.4	9.0	5.8	4.2	5.4	7.8
25 to 34 years	3.2	3.9	4.0	3.0	3.0	3.6
35 to 44 years	7.0	8.6	8.0	7.0	6.0	6.8
45 to 54 years	11.7	14.3	13.9	11.5	9.8	11.1
55 to 64 years	16.7	17.1	13.0	13.8	17.0	16.7
Male	6.3	9.6	6.7	4.2	4.8	7.7
Female	6.7	7.2	4.1	4.4	6.9	8.3

[1]Median number of years with organization by which employed in 1960.
[2]Includes associate, first professional, and registered nurse degrees not shown separately.
[3]Some graduate work but no graduate degree.
[4]Based on all ages, including under 25 years and 65 years and over.
[5]Too few females to warrant presentation of separate data.

Table 15.--Employed Engineers and Scientists, by Field of Work Specialization and Educational Attainment: 1960

(Sums of the percentages may not equal 100 because of rounding)

Occupation and highest degree held in 1960	Total		Field of work specialization in 1960											
	Number	Percent	Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Education	Health fields	Other fields
ENGINEERS														
Total[1]	867,874	100	91	1	1	-	-	-	1	-	-	-	-	7
No degree	387,864	100	89	-	-	-	-	-	1	-	-	-	-	9
Bachelor's	247,407	100	94	-	1	-	-	-	1	-	-	-	-	4
Bachelor's plus[2]	149,122	100	93	1	1	1	-	-	1	-	-	-	-	4
Master's	53,266	100	88	1	1	1	-	1	2	-	-	-	1	4
Ph. D.	7,695	100	81	2	4	4	-	1	1	1	1	-	-	4
PHYSICAL SCIENTISTS														
Total[1]	132,919	100	13	10	52	16	1	1	1	-	-	-	2	4
No degree	30,773	100	20	3	54	10	1	-	1	-	-	-	3	7
Bachelor's	30,192	100	12	5	60	18	-	1	1	-	-	-	2	2
Bachelor's plus[2]	27,277	100	15	11	48	17	1	1	1	-	1	1	3	2
Master's	20,237	100	12	15	41	25	1	1	1	-	1	1	1	2
Ph. D.	20,525	100	4	22	56	11	2	1	1	-	-	-	1	1
BIOLOGICAL SCIENTISTS														
Total[1]	31,533	100	2	-	2	-	53	30	-	1	1	2	5	3
No degree	5,116	100	6	1	2	1	33	35	1	-	-	1	12	9
Bachelor's	4,835	100	3	-	2	1	38	45	-	1	1	1	7	2
Bachelor's plus[2]	4,673	100	3	-	3	1	46	30	-	1	2	4	7	4
Master's	6,907	100	2	-	3	-	48	36	-	2	2	3	3	2
Ph. D.	8,778	100	1	-	2	-	76	16	-	1	1	1	1	-
MATHEMATICIANS														
Total[1]	30,408	100	6	1	-	1	-	-	73	1	1	1	1	16
No degree	11,906	100	8	-	-	-	-	-	57	-	1	1	2	30
Bachelor's	[illegible]	100	4	-	-	1	-	-	76	1	1	-	1	17
Bachelor's plus[2]	6,125	100	6	1	-	1	-	-	75	1	1	4	-	12
Master's	7,678	100	4	2	1	1	-	-	80	-	3	3	1	6
Ph. D.	3,615	100	1	-	1	-	-	-	81	2	1	1	-	3
SOCIAL SCIENTISTS														
Total[1]	66,575	100	3	-	1	-	1	1	3	23	32	7	1	29
No degree	9,024	100	9	-	-	-	1	1	8	5	20	5	2	50
Bachelor's	5,427	100	9	-	-	-	1	2	6	4	17	6	1	55
Bachelor's plus[2]	7,945	100	4	-	2	-	1	2	4	17	29	3	1	38
Master's	21,137	100	1	-	1	-	1	1	1	25	31	7	2	29
Ph. D.	20,016	100	1	-	1	-	1	1	1	33	43	8	1	11

- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 16.--Employed Engineers and Scientists Reporting Same Work Specialization and Occupation, by Sex, Age, and Educational Attainment: 1960

Highest degree held, sex, and age in 1960	Engineers		Physical scientists				
	Total number	Percent of total reporting engineering as work specialization	Total number	Percent of total reporting same work specialization and occupation			
				Total [1]	Physics	Chemistry	Other physical sciences
Total[2]	867,874	91	132,919	78	10	52	16
NO DEGREE							
Total[3]	387,864	89	30,773	68	3	54	10
Male	384,129	89	28,939	68	3	55	10
Female	3,735	33	1,834	53	3	46	4
25 to 34 years	87,045	89	8,755	70	4	58	8
35 to 44 years	126,114	90	7,917	64	4	46	14
45 to 54 years	87,782	87	6,537	73	2	60	11
BACHELOR'S							
Total[3]	247,407	94	30,192	82	5	60	18
Male	246,612	94	27,658	82	5	58	19
Female	795	64	2,534	89	5	75	9
25 to 34 years	97,095	93	11,764	83	6	57	20
35 to 44 years	86,518	94	9,826	83	4	57	22
45 to 54 years	29,636	95	3,882	80	1	69	10
BACHELOR'S PLUS[4]							
Total[3]	149,122	93	27,277	75	11	48	17
Male	148,657	94	25,344	76	11	47	18
Female	465	59	1,933	64	2	58	4
25 to 34 years	62,584	94	11,450	74	12	47	15
35 to 44 years	49,372	94	8,301	77	8	47	22
45 to 54 years	18,207	91	3,235	70	6	41	23
MASTER'S							
Total[3]	53,266	88	20,237	80	15	41	25
Male	52,610	89	18,978	80	15	40	25
Female	656	68	1,259	89	10	62	17
25 to 34 years	21,732	89	7,801	81	17	32	32
35 to 44 years	18,937	89	7,056	84	15	46	23
45 to 54 years	7,886	85	3,190	78	11	47	20
DOCTOR OF PHILOSOPHY							
Total[3]	7,695	81	20,525	90	22	56	11
Male	7,589	82	19,866	90	23	56	11
Female	106	6	659	82	12	60	10
25 to 34 years	2,418	90	6,530	91	24	56	11
35 to 44 years	3,206	81	8,467	90	22	58	10
45 to 54 years	1,413	62	3,345	86	20	53	13

- Indicates less than 0.5 percent.
[1] Sums of the individual percentages may not equal the total because of rounding.
[2] Includes associate, first professional, and registered nurse degrees not shown separately.
[3] Includes age groups under 25 years and 55 years and over not shown separately.
[4] Some graduate work but no graduate degree.

Table 16.--Employed Engineers and Scientists Reporting Same Work Specialization and Occupation, by Sex, Age, and Educational Attainment: 1960--Continued

Highest degree held, sex, and age in 1960	Biological scientists				Mathematicians		Social scientists			
	Total number	Percent of total reporting same work specialization and occupation			Total number	Percent of total reporting mathematics or statistics as work specialization	Total number	Percent of total reporting same work specialization and occupation		
		Total[1]	Biological sciences	Agricultural sciences				Total[1]	Psychology	Other social sciences
Total[2]	31,533	83	53	30	36,408	73	66,575	55	23	32
NO DEGREE										
Total[3]	5,116	67	33	35	11,906	57	9,024	25	5	20
Male	3,894	74	30	44	7,302	49	6,692	23	3	20
Female	1,222	54	7	47	4,604	70	2,332	31	11	20
25 to 34 years	970	68	32	36	2,461	52	1,614	25	7	18
35 to 44 years	1,183	70	34	36	2,718	61	2,040	22	3	19
45 to 54 years	1,072	73	34	39	2,496	61	2,339	21	3	18
BACHELOR'S										
Total[3]	4,835	82	38	45	6,109	76	5,427	21	4	17
Male	3,716	86	28	58	4,131	71	3,620	20	1	19
Female	1,119	71	69	2	1,978	88	1,807	23	10	13
25 to 34 years	1,710	84	37	47	2,441	76	2,148	14	4	10
35 to 44 years	1,508	85	30	55	1,337	73	1,396	22	1	21
45 to 54 years	665	81	27	54	819	78	904	28	5	23
BACHELOR'S PLUS[4]										
Total[3]	4,673	76	46	30	6,125	75	7,945	46	17	29
Male	3,893	78	42	36	5,123	74	6,426	44	15	29
Female	780	67	67	-	1,002	80	1,519	54	25	29
25 to 34 years	1,684	81	49	32	2,955	74	3,266	50	19	31
35 to 44 years	1,307	69	34	35	1,239	59	1,640	46	16	30
45 to 54 years	712	84	41	43	701	87	1,168	37	9	28
MASTER'S										
Total[3]	6,907	84	48	36	7,478	80	21,137	57	25	31
Male	5,983	86	45	41	6,085	81	14,558	60	24	36
Female	924	70	69	1	1,393	80	6,579	48	28	20
25 to 34 years	2,441	85	54	31	2,856	80	6,416	65	36	29
35 to 44 years	2,449	86	45	41	2,483	79	7,328	59	25	34
45 to 54 years	1,201	79	47	32	1,188	78	4,207	44	16	28
DOCTOR OF PHILOSOPHY										
Total[3]	8,778	93	76	16	3,615	91	20,016	75	33	43
Male	8,212	92	75	17	3,344	91	17,114	77	32	45
Female	566	91	90	1	271	93	2,902	76	43	33
25 to 34 years	2,103	95	85	10	872	89	3,699	84	52	32
35 to 44 years	3,726	92	72	20	1,336	86	7,898	75	33	42
45 to 54 years	1,755	91	77	14	916	99	4,830	78	29	49

Table 17.--Two Most Important Work Activities of Employed Engineers and Scientists: 1960

Work activity[1]	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	867,874	132,919	31,533	36,408	66,575
Percent[2]	100	100	100	100	100
Teach courses	2	10	30	20	43
Recruit, train people in the organization	2	2	3	2	2
Engage in basic research	2	20	32	11	16
Engage in applied research, product development	15	28	18	13	6
Administer, supervise research, development	5	8	7	4	4
Consult, advise clients, customers on technical matters	11	6	6	6	5
Make drawings, blueprints, models	13	2	1	2	-
Make forecasts, estimate markets	2	1	-	4	5
Exploration, field work	4	9	8	2	1
Design, modify equipment, machinery, production processes	17	2	-	1	-
Supervise work of subordinates	26	21	16	17	11
Quality control, set precision standards	3	13	3	1	-
Public relations, publicity work, speeches	1	1	3	-	3
Budgeting, costing, controlling, allocating expenditures	4	1	1	4	2
Test new, experimental equipment	6	3	1	1	-
Travel	3	1	2	1	2
Construct equipment, apparatus, prosthetic devices	1	1	-	-	-
Treat patients	-	-	1	-	6
Counsel clients, students	1	2	2	6	22
Supervise production, construction	9	3	6	1	1
Write technical, general reports on projects	12	15	10	11	10
Coordinate activities of professional peers	5	1	2	2	3
Keep records	4	6	6	15	5
Statistical analysis	2	1	1	28	7
Technical sales	5	1	1	1	1
Negotiate contracts, raise funds	1	-	-	-	-
Brief superiors on own work	2	2	1	3	1
Plan future operations	5	2	2	3	3
Compile and annotate bibliography, search and select literature	-	1	1	-	2
Other	7	6	8	9	10

- Indicates less than 0.5 percent.
[1]Respondents were asked to indicate the activities which were a part of their work in their major current position of employment and to further indicate on which two of these activities they spent the most time.
[2]Sums of individual percentages exceed 100 because of multiple responses.

Table 18.--Occupation at Age 24 for Employed Engineers and Scientists: 1960

(Sums of the percentages may not equal 100 because of rounding)

Occupation at age 24[1]	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	867,874	132,919	31,533	36,408	66,575
Percent	100	100	100	100	100
White-collar workers	83	91	89	94	93
Professional, technical, and kindred workers	74	86	83	74	77
Same occupation as in 1960	61	69	55	50	42
Other scientific or engineering occupations	1	5	5	6	3
Secondary school teachers	1	3	7	8	13
Technicians	8	6	5	2	1
Other professional, technical, and kindred workers	3	3	11	8	18
Clerical workers	4	3	3	16	9
Other white-collar workers[2]	5	2	3	4	7
Blue-collar workers	17	9	11	6	7
Craftsmen, foremen, operatives, and kindred workers	15	5	5	3	4
Other blue-collar workers[3]	2	4	6	3	3

[1]Full-time job held at age 24 or first such job thereafter if not employed at 24.
[2]Includes sales workers and managers, officials, and proprietors.
[3]Includes farm workers and service workers.

Table 19.--White-Collar Occupations at Age 24, for Employed Engineers and Scientists, by Sex and Educational Attainment: 1960

Occupation in 1960 and at age 24 [1]	Both sexes					Male		
	No degree	Bachelor's	Bachelor's plus [2]	Master's	Ph. D.	No degree	Bachelor's	Bachelor's plus [2]
ENGINEERS								
Total	387,864	247,407	149,122	53,266	7,695	384,129	246,612	148,657
Occupation at age 24, percent								
Same as in 1960	41	61	60	58	43	41	62	60
Professional, technical, or kindred	62	85	86	89	95	62	85	86
White collar [3]	73	92	91	94	98	73	85	91
PHYSICAL SCIENTISTS								
Total	30,773	30,192	27,277	20,237	20,525	28,939	27,658	25,344
Occupation at age 24, percent								
Same as in 1960	62	71	69	70	80	61	71	69
Professional, technical, or kindred	78	85	89	95	96	77	85	88
White collar [3]	84	92	94	97	98	83	91	93
BIOLOGICAL SCIENTISTS								
Total	5,116	4,835	4,673	6,907	8,778	3,894	3,716	3,893
Occupation at age 24, percent								
Same as in 1960	49	56	53	53	63	49	53	53
Professional, technical, or kindred	69	78	83	87	92	66	72	80
White collar [3]	78	87	91	92	95	74	83	89
MATHEMATICIANS								
Total	11,906	6,109	6,125	7,478	3,615	7,302	4,131	5,123
Occupation at age 24, percent								
Same as in 1960	40	60	47	50	67	38	57	49
Professional, technical, or kindred	52	78	78	90	92	52	73	78
White collar [3]	90	96	95	98	100	88	94	95
SOCIAL SCIENTISTS								
Total	9,024	5,427	7,945	21,137	20,016	6,692	3,620	6,426
Occupation at age 24, percent								
Same as in 1960	33	39	33	38	51	31	40	38
Professional, technical, or kindred	51	69	74	81	88	49	67	72
White collar [3]	86	96	92	96	97	83	94	90

[1] Full-time job held at age 24 or first such job thereafter if not employed at age 24.
[2] Some graduate work but no graduate degree.
[3] Includes professional, technical, and kindred; managers, officials, and proprietors; clerical; and sales occupations.

Table 19.--White-Collar Occupations at Age 24, for Employed Engineers and Scientists, by Sex and Educational Attainment: 1960--Continued

Occupation in 1960 and at age 24[1]	Male--Con.		Female				
	Master's	Ph. D.	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.
ENGINEERS							
Total	52,610	7,589	3,735	795	465	656	106
Occupation at age 24, percent							
Same as in 1960	58	42	30	26	48	46	70
Professional, technical, or kindred	89	95	48	76	86	88	100
White collar[3]	94	98	97	100	100	100	100
PHYSICAL SCIENTISTS							
Total	18,978	19,866	1,834	2,534	1,933	1,259	659
Occupation at age 24, percent							
Same as in 1960	71	80	66	73	63	56	66
Professional, technical, or kindred	95	97	90	94	96	95	93
White collar[3]	97	99	99	98	99	100	93
BIOLOGICAL SCIENTISTS							
Total	5,983	8,212	1,222	1,119	780	924	566
Occupation at age 24, percent							
Same as in 1960	54	64	51	67	54	50	51
Professional, technical, or kindred	86	92	80	96	96	95	95
White collar[3]	92	95	90	100	100	98	100
MATHEMATICIANS							
Total	6,085	3,344	4,604	1,978	1,002	1,393	271
Occupation at age 24, percent							
Same as in 1960	52	67	43	65	33	43	62
Professional, technical, or kindred	89	92	53	89	77	93	97
White collar[3]	98	100	95	100	100	100	100
SOCIAL SCIENTISTS							
Total	14,558	17,114	2,332	1,807	1,519	6,579	2,902
Occupation at age 24, percent							
Same as in 1960	41	53	39	36	37	31	36
Professional, technical, or kindred	77	88	58	74	81	91	88
White collar[3]	94	97	94	98	100	100	98

Table 20.--White-Collar Occupations at Age 24, for Employed Engineers and Scientists, by Educational Attainment and Age: 1960

Occupation in 1960 and at age 24[1]	25 to 34 years					35 to 44 years					45 to 54 years				
	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.
ENGINEERS															
Occupation at age 24, percent															
Same as in 1960	61	82	81	89	77	39	66	66	66	80	36	56	55	51	42
Professional, technical, or kindred	74	90	91	95	100	56	80	82	85	97	50	75	76	83	87
White collar[3]	82	94	95	97	100	67	89	88	92	99	65	81	84	94	94
PHYSICAL SCIENTISTS															
Occupation at age 24, percent															
Same as in 1960	68	75	78	81	90	54	65	59	64	77	48	55	39	56	73
Professional, technical, or kindred	94	97	94	96	100	68	81	83	93	95	69	75	79	93	95
White collar[3]	99	100	96	98	100	76	90	90	96	97	80	87	88	97	98
BIOLOGICAL SCIENTISTS															
Occupation at age 24, percent															
Same as in 1960	63	66	61	69	82	41	51	41	49	69	37	39	32	36	52
Professional, technical, or kindred	78	78	86	92	98	60	73	76	84	93	64	69	74	85	89
White collar[3]	83	86	93	95	98	72	84	89	91	96	75	81	82	93	92
MATHEMATICIANS															
Occupation at age 24, percent															
Same as in 1960	49	70	59	58	83	27	38	18	50	68	29	29	9	28	50
Professional, technical, or kindred	58	87	85	93	97	40	61	55	89	91	42	55	49	80	90
White collar[3]	90	93	97	99	100	88	87	88	97	100	83	96	96	99	99
SOCIAL SCIENTISTS															
Occupation at age 24, percent															
Same as in 1960	48	53	49	54	71	23	30	33	37	56	12	16	8	15	40
Professional, technical, or kindred	68	71	74	87	94	33	61	65	75	88	29	56	61	78	87
White collar[3]	90	85	90	97	97	84	95	94	95	97	58	90	77	96	[illegible]

[1] Full-time job held at age 24 or first such job thereafter if not employed at age 24.
[2] Some graduate work but no graduate degree.
[3] Includes professional, technical, and kindred; managers, officials, and proprietors; clerical; and sales occupations.

Table 21.--Employment Status in 1962 of Engineers and Scientists in the 1960 Labor Force

Employment status in 1962[1]	Engineers		Physical scientists		Biological scientists		Mathematicians		Social scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total in 1960 labor force.....	879,742	100	135,822	100	32,879	100	37,733	100	68,331	100
In 1962 labor force[2].....	860,883	98	131,449	97	31,389	95	34,904	93	64,721	95
Armed Forces.....	1,742	-	534	-	148	-	189	1	128	-
Civilian labor force.....	859,141	98	130,915	96	31,241	95	34,715	92	64,593	95
Employed.....	850,938	97	129,459	95	30,946	94	34,355	91	63,914	94
At work.....	787,485	90	117,255	86	27,850	85	30,148	80	50,279	74
Full time.....	778,936	89	113,767	84	26,782	81	29,160	77	47,468	69
Part time.....	8,549	1	3,488	3	1,068	3	988	3	2,811	4
With a job but not at work.....	63,453	7	12,204	9	3,116	9	4,207	11	13,635	20
Unemployed.....	8,203	1	1,456	1	275	1	360	1	679	1
Not in 1962 labor force.....	18,859	2	4,373	3	1,490	5	2,829	7	3,610	5

- Indicates less than 0.5 percent.
[1]Spring-summer, 1962.
[2]Labor force in 1960 does not include Armed Forces.

Table 22.--Engineers and Scientists not in the Labor Force, by Age, Educational Attainment, by Sex: 1962

Age and highest degree held in 1962 by sex	Engineers		Physical scientists		Biological scientists		Mathematicians		Social scientists	
	Number in 1960 labor force	Percent not in 1962 labor force	Number in 1960 labor force	Percent not in 1962 labor force	Number in 1960 labor force	Percent not in 1962 labor force	Number in 1960 labor force	Percent not in 1962 labor force	Number in 1960 labor force	Percent not in 1962 labor force
BOTH SEXES										
Total[1].....	879,742	2	135,822	3	32,879	5	37,733	7	68,331	5
25 to 34 years.....	243,523	1	44,273	4	9,027	6	13,158	8	16,823	8
35 to 44 years.....	323,536	-	49,057	1	11,709	1	9,746	3	22,802	2
45 to 54 years.....	166,143	1	23,554	1	6,160	1	7,194	1	14,842	1
55 to 64 years.....	100,531	4	10,863	3	3,573	4	4,123	9	9,696	3
No degree.....	381,318	3	29,325	4	5,007	8	11,158	9	8,611	9
Bachelor's.....	259,863	1	32,236	3	5,362	5	7,004	9	6,129	10
Bachelor's plus[2].....	144,939	2	24,973	2	3,716	7	5,294	6	6,162	5
Master's.....	70,055	1	24,075	4	7,881	5	9,042	7	22,881	6
Ph. D.....	10,056	1	24,055	3	10,507	2	4,790	3	24,140	2
MALE										
Total[1].....	873,416	2	127,082	2	27,748	3	27,836	4	52,024	3
25 to 34 years.....	242,409	1	41,046	2	7,429	2	10,404	3	13,433	3
35 to 44 years.....	320,961	-	46,361	1	10,362	-	7,322	1	18,884	1
45 to 54 years.....	164,301	-	22,320	-	5,207	-	5,223	-	10,582	1
55 to 64 years.....	99,963	4	10,314	3	2,985	3	2,774	5	6,451	2
No degree.....	377,411	3	27,578	3	3,795	5	6,673	5	6,308	7
Bachelor's.....	258,937	1	29,411	1	4,076	1	4,610	1	3,999	1
Bachelor's plus[2].....	144,419	2	23,375	2	2,995	3	4,331	2	4,892	4
Master's.....	69,324	1	22,280	3	6,767	4	7,394	5	15,766	3
Ph. D.....	9,938	1	23,396	2	9,820	1	4,514	3	20,713	1
FEMALE										
Total[1].....	6,326	15	8,740	15	5,131	15	9,897	19	16,307	13
25 to 34 years.....	1,114	52	3,227	22	1,598	23	2,754	29	3,390	26
35 to 44 years.....	2,575	9	2,696	11	1,347	10	2,424	10	3,918	9
45 to 54 years.....	1,842	8	1,234	5	953	7	1,971	3	4,260	3
55 to 64 years.....	568	-	549	4	588	11	1,349	19	3,245	5
No degree.....	3,907	18	1,747	16	1,212	18	4,485	16	2,303	12
Bachelor's.....	926	14	2,825	22	1,286	19	2,394	26	2,130	27
Bachelor's plus[2].....	520	17	1,598	11	721	20	963	24	1,270	10
Master's.....	731	1	1,795	9	1,114	11	1,648	16	7,115	13
Ph. D.....	118	27	659	11	687	6	276	7	3,427	6

- Indicates less than 0.5 percent.
[1]Includes age group under 25 years and 65 years and over and associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 23.--Occupation in 1960 and 1962 for Employed Engineers and Scientists by Educational Attainment: 1962

(Sums of the percentages may not equal 100 because of rounding)

Occupation in 1962	Occupation in 1960 and educational attainment in 1962														
	Total[1]	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.	Total[1]	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.	Total[1]	No degree	Bachelor's
	Engineers						Physical scientists						Biological scientists		
Total employed in 1962[3]	852,680	364,751	254,491	141,398	68,675	9,964	129,993	27,499	30,943	24,142	22,977	23,391	31,114	4,497	5,044
Occupation in 1962 same as in 1960	803,494	339,348	244,482	132,968	64,631	9,258	118,418	24,255	27,881	21,532	21,452	22,505	28,182	3,897	4,385
Occupation in 1962 different from 1960	48,536	24,863	9,983	8,390	4,044	706	11,489	3,200	3,062	2,568	1,525	886	2,921	589	659
Percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Engineers	(X)	(X)	(X)	(X)	(X)	(X)	25	15	29	37	24	18	4	1	3
Physical scientists	3	-	2	6	13	19	(X)	(X)	(X)	(X)	(X)	(X)	9	2	4
Biological scientists	-	-	-	-	-	-	4	1	4	2	7	15	(X)	(X)	(X)
Mathematicians	1	-	3	2	-	13	1	-	1	2	2	1	-	1	-
Social scientists	2	1	3	3	7	1	1	-	2	-	-	6	5	-	1
Medical scientists	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
College personnel[3]	-	-	-	-	1	13	1	1	-	-	3	10	1	-	-
Teachers: Secondary school	2	-	2	6	2	12	6	1	8	10	13	-	7	-	21
Elementary school	1	-	1	3	-	-	-	-	-	-	3	-	2	-	5
Foresters	-	-	-	-	-	-	-	-	-	-	-	-	3	1	6
Technicians	12	17	6	5	6	2	14	18	20	10	6	12	11	14	14
Other professional, technical, and kindred workers	16	10	17	22	34	21	14	4	7	22	22	30	17	4	7
Managers, officials, and proprietors	28	24	33	33	30	16	8	5	15	5	11	4	12	15	15
Clerical workers	7	10	5	5	1	-	4	10	1	-	-	5	4	11	6
Sales workers	7	7	12	4	-	-	6	14	5	5	-	-	4	4	5
Craftsmen, foremen, and kindred workers	16	23	12	9	4	3	8	16	4	5	8	-	8	11	7
Operatives	2	3	2	-	1	-	4	9	4	2	-	-	2	7	-
Service workers, except private household	-	1	-	-	-	-	2	6	-	-	1	-	2	7	-
Laborers, except farm	1	1	-	-	-	-	-	-	-	-	-	-	2	7	-
Farmers and farm managers	1	1	1	1	-	-	1	1	1	-	1	-	3	8	5
Farm laborers	1	1	-	1	-	-	-	-	-	-	-	-	2	8	-

X Not applicable.
- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.
[3]Includes data for 2,741 persons who were members of the Armed Forces in 1962. The same data are also included in the universe described in tables 24 through 36. See table 21 for the distribution of these persons by occupation in 1960.
[4]Includes college presidents, deans, and professors and instructors in subjects other than those associated with the occupations shown separately.

Table 23.--Occupation in 1960 and 1962 for Employed Engineers and Scientists by Educational Attainment: 1962--Continued

(Sums of the percentages may not equal 100 because of rounding)

Occupation in 1962	Occupation in 1960 and educational attainment in 1962--Continued														
	Bachelor's plus[2]	Master's	Ph. D.	Total[1]	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.	Total[1]	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.
	Biological scientists--Con.			Mathematicians						Social scientists					
Total employed in 1962[3]	3,432	7,484	10,284	34,544	9,970	6,326	4,889	8,279	4,623	64,042	7,640	5,388	5,842	21,189	23,601
Occupation in 1962 same as in 1960	3,119	6,629	9,833	29,519	8,239	5,370	3,840	7,318	4,360	57,465	6,558	4,377	4,659	18,989	22,529
Occupation in 1962 different from 1960	313	855	451	4,991	1,731	956	1,043	957	263	6,510	1,046	1,011	1,160	2,200	1,064
Percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Engineers	4	8	-	12	7	7	22	11	21	8	9	20	4	6	3
Physical scientists	14	7	27	6	-	2	10	13	11	1	-	-	1	-	3
Biological scientists	(X)	(X)	(X)	1	-	-	-	-	11	1	-	-	1	2	1
Mathematicians	-	1	-	(X)	(X)	(X)	(X)	(X)	(X)	2	3	4	1	-	3
Social scientists	9	8	10	7	2	1	6	15	43	(X)	(X)	(X)	(X)	(X)	(X)
Medical scientists	3	3	7	-	-	-	-	-	-	1	-	-	-	-	5
College personnel[3]	-	1	8	1	-	-	-	2	8	5	-	-	-	5	23
Teachers: Secondary school	11	1	1	4	-	8	-	8	-	7	1	12	7	9	3
Elementary school	5	1	-	1	-	-	1	3	-	2	-	4	1	3	-
Foresters	2	3	1	-	-	-	-	-	-	1	2	-	-	2	-
Technicians	7	5	16	6	11	8	1	1	-	1	1	-	3	-	-
Other professional, technical, and kindred workers	14	27	24	25	18	29	35	28	2	36	16	19	45	46	42
Managers, officials, and proprietors	8	16	-	11	18	7	7	13	2	19	22	19	24	17	13
Clerical workers	3	1	-	10	18	16	-	6	2	7	16	7	9	6	-
Sales workers	-	8	-	7	11	9	5	-	-	5	13	10	4	1	-
Craftsmen, foremen, and kindred workers	15	8	1	6	7	7	8	-	-	3	8	2	1	2	3
Operatives	-	1	-	2	6	-	-	-	-	-	-	-	-	-	-
Service workers, except private household	2	1	-	1	3	-	-	-	-	2	7	3	-	-	-
Laborers, except farm	-	1	-	-	-	-	-	-	-	-	1	-	-	-	2
Farmers and farm managers	-	-	4	1	-	7	-	-	-	-	-	-	-	-	-
Farm laborers	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 24.--Class of Worker for Employed Engineers and Scientists: 1962

(Sums of the percentages may not equal 100 because of rounding)

Class of worker	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total number	852,680	129,993	31,114	34,544	64,042
Percent	100	100	100	100	100
Private wage and salary workers	78	72	30	61	44
Government workers[1]	19	25	67	38	52
Self-employed workers	3	4	2	1	4

Note: Comparable data on 1960 employment are in table 11.
[1]Includes employees of publicly controlled educational institutions.

Table 25.--Industry Group of Employed Engineers and Scientists: 1962

(Sums of the percentages may not equal 100 because of rounding)

Industry of employment, 1962	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
All industries	852,680	129,993	31,114	34,544	64,042
Percent	100	100	100	100	100
Agriculture, forestry, fisheries	-	-	6	-	-
Mining	1	9	-	1	1
Construction	10	1	1	1	-
Manufacturing	55	48	9	23	11
Transportation, communications, public utilities	9	2	-	5	2
Wholesale and retail trade	3	2	2	3	3
Finance, insurance, and real estate	1	-	-	12	3
Service industries					
Business and repair services	3	4	1	4	3
Professional and related services					
Educational institutions					
Colleges and universities	2	13	42	22	49
Secondary schools	-	1	1	1	2
Elementary schools	-	-	-	-	1
Other educational institutions	-	-	1	-	4
Other professional and related services	7	9	14	8	10
Other services	-	-	-	1	-
Public administration	9	12	22	19	13

Note: Comparable data on 1960 employment are in table 12.
- Indicates less than 0.5 percent.

Table 26.--Continuity of Employer, 1960-62, for Engineers and Scientists Employed in 1962, by Sex, Age, and Educational Attainment in 1960

Sex, age, and highest degree held in 1960	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	852,680	129,993	31,114	34,544	64,042
Percent working for same organization in 1962 as in 1960[1]	94	92	94	91	92
Male	94	92	94	90	92
Female	99	87	92	92	94
25 to 34 years	92	89	89	86	88
35 to 44 years	95	94	97	96	93
45 to 54 years	96	97	98	99	96
No degree	95	94	93	92	91
Bachelor's	94	95	94	89	93
Bachelor's plus[2]	92	88	88	36	84
Master's	94	91	94	92	92
Ph. D	93	93	97	94	95

[1]Includes age groups under 25 years and 55 years and over and associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 27.--Median Years of Job Tenure for Employed Engineers and Scientists, by Educational Attainment: 1962

Highest degree held in 1962	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	852,680	129,993	31,114	34,544	[illegible]
Median years[1]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
No degree	12	11	10	11	1[illegible]
Bachelor's	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bachelor's plus[2]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Master's	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ph. D.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note: Comparable 1960 data are in table 14.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 28.--Median Number of Hours Worked Per Week for Employed Engineers and Scientists, by Sex and Educational Attainment: 1962

Occupation in 1960 and sex	Highest degree held in 1962					
	Total[1]	No degree	Bachelor's	Bachelor's plus[2]	Master's	Ph. D.
ENGINEERS						
Total	852,680	364,751	254,491	141,398	[illegible]	[illegible]
Median hours worked	41	41	41	41	41	41
Male	41	41	41	41	41	41
Female	41	41	40	40	40	39
PHYSICAL SCIENTISTS						
Total	129,993	27,499	30,943	24,142	22,977	23,391
Median hours worked	41	41	41	41	41	41
Male	41	41	41	41	41	41
Female	40	40	40	40	40	40
BIOLOGICAL SCIENTISTS						
Total	31,114	4,497	5,744	3,432	7,424	[illegible]
Median hours worked	41	41	41	41	41	42
Male	41	41	41	41	41	42
Female	40	40	40	40	40	41
MATHEMATICIANS						
Total	34,544	[illegible]	[illegible]	4,288	[illegible]	4,423
Median hours worked	40	40	41	41	40	41
Male	41	40	40	41	41	41
Female	40	40	40	40	39	40
SOCIAL SCIENTISTS						
Total	[illegible]	[illegible]	9,328	9,242	[illegible]	[illegible]
Median hours worked	41	41	41	41	41	41
Male	41	41	41	41	41	41
Female	40	40	40	40	41	41

[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 29.--Employed Engineers and Scientists by Field of Work Specialization and Educational Attainment: 1962

(Sums of the percentages may not equal 100 because of rounding)

Occupation in 1960 and highest degree held in 1962	Total		Field of work specialization in 1962											
	Number	Percent	Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Education	Health fields	Other fields
ENGINEERS														
Total[1]	852,680	100	90	1	1	-	-	-	1	-	-	-	-	7
No degree	364,751	100	87	-	-	-	-	-	1	-	-	-	1	11
Bachelor's	254,491	100	93	-	1	-	-	-	1	-	-	-	-	5
Bachelor's plus[2]	141,398	100	92	1	1	1	-	-	1	-	-	-	-	4
Master's	68,675	100	88	1	1	1	-	-	2	-	1	-	1	5
Ph. D.	9,964	100	79	4	3	3	-	-	2	1	-	1	-	6
PHYSICAL SCIENTISTS														
Total[1]	129,993	100	14	10	50	16	1	1	1	-	-	1	2	5
No degree	27,499	100	21	3	51	10	1	-	2	-	-	-	3	9
Bachelor's	30,943	100	14	4	56	17	1	1	1	-	-	1	2	3
Bachelor's plus[2]	24,142	100	17	9	43	18	1	1	1	-	1	1	4	4
Master's	22,977	100	13	14	41	22	1	-	2	-	1	1	2	3
Ph. D.	23,391	100	4	23	55	12	2	1	1	-	1	-	1	1
BIOLOGICAL SCIENTISTS														
Total[1]	31,114	100	3	-	3	-	51	29	-	1	1	2	6	3
No degree	4,497	100	5	-	2	1	30	35	1	-	-	-	13	12
Bachelor's	5,044	100	4	-	3	1	34	44	-	-	1	5	6	3
Bachelor's plus[2]	3,432	100	2	-	3	1	41	33	1	1	2	2	9	5
Master's	7,484	100	3	-	3	-	47	33	1	2	1	3	3	3
Ph. D.	10,284	100	1	1	3	-	73	17	-	1	1	1	2	-
MATHEMATICIANS														
Total[1]	34,544	100	6	1	1	1	-	-	68	1	2	2	1	18
No degree	9,970	100	9	-	-	-	-	-	53	-	2	1	2	32
Bachelor's	6,326	100	4	-	1	1	-	1	72	-	-	1	1	19
Bachelor's plus[2]	4,889	100	7	2	1	1	-	-	65	-	1	5	1	18
Master's	8,297	100	5	2	1	1	-	1	75	1	3	4	-	8
Ph. D.	4,623	100	2	1	1	1	-	-	87	2	2	2	-	3
SOCIAL SCIENTISTS														
Total[1]	64,042	100	3	-	1	-	1	1	3	22	30	8	1	31
No degree	7,640	100	11	-	-	-	1	1	8	5	16	3	1	53
Bachelor's	5,388	100	9	-	-	-	1	2	5	3	17	7	2	53
Bachelor's plus[2]	5,842	100	4	-	2	-	1	1	5	11	23	5	-	49
Master's	21,189	100	1	-	1	-	1	1	1	22	29	8	2	33
Ph. D.	23,601	100	1	-	1	-	1	1	1	34	41	8	1	12

Note: Comparable data for 1960 are in table 15.
- Indicates less than 0.5 percent.
[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Some graduate work but no graduate degree.

Table 30.--Rate of Coincidence of 1962 Field of Work Specialization With 1960 Occupation for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962

Occupation in 1960, sex, and age in 1962	Highest degree held in 1962				
	No degree	Bachelor's	Bachelor's plus[1]	Master's	Ph.D.
ENGINEERS					
Total[2]	364,751	254,491	141,398	68,675	9,964
Rate of coincidence of 1962 field of work specialization with 1960 occupation[3]	87	93	92	88	79
Male	88	93	92	89	79
Female	32	45	56	39	7
25 to 34 years	85	92	90	88	86
35 to 44 years	89	94	94	90	81
45 to 54 years	87	94	89	84	65
PHYSICAL SCIENTISTS					
Total[2]	27,499	30,943	24,142	22,977	23,391
Rate of coincidence of 1962 field of work specialization with 1960 occupation[3]	64	78	70	77	89
Male	64	77	71	77	90
Female	44	87	56	80	94
25 to 34 years	60	76	69	76	93
35 to 44 years	62	80	72	86	88
45 to 54 years	70	82	73	63	84
BIOLOGICAL SCIENTISTS					
Total[2]	4,497	5,044	3,432	7,484	10,284
Rate of coincidence of 1962 field of work specialization with 1960 occupation[3]	64	78	74	80	90
Male	72	80	77	81	91
Female	38	68	57	74	86
25 to 34 years	58	79	70	75	91
35 to 44 years	70	80	74	83	92
45 to 54 years	69	85	81	83	90
MATHEMATICIANS					
Total[2]	9,970	6,326	4,889	8,297	4,623
Rate of coincidence of 1962 field of work specialization with 1960 occupation[3]	53	72	65	75	87
Male	43	68	64	75	87
Female	68	84	69	74	92
25 to 34 years	37	72	66	71	88
35 to 44 years	58	74	65	71	81
45 to 54 years	63	80	68	81	92
SOCIAL SCIENTISTS					
Total[2]	7,640	5,388	5,842	21,189	23,601
Rate of coincidence of 1962 field of work specialization with 1960 occupation[3]	21	20	34	51	76
Male	18	18	33	55	(4)
Female	31	23	38	43	74
25 to 34 years	22	18	35	53	87
35 to 44 years	22	17	34	56	76
45 to 54 years	16	25	36	44	75

Note: Comparable data for 1960 are in table 16.

[1]Some graduate work but no graduate degree.

[2]Includes age groups under 25 years and 55 years and over not shown separately.

[3]Percent reporting a 1962 field of work specialization which was one of those associated with the occupation reported in 1960. The fields of specialization included in each occupation are as follows: Engineers--engineering; Physical scientists--physics, chemistry, other physical sciences; Biological scientists--biological sciences, agricultural sciences; Mathematicians--mathematics, statistics; Social scientists--psychology, other social sciences.

[4]No data.

Table 31.--Median Number of Years in Field of Work Specialization for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962

1960 occupation, sex, age, and highest degree held in 1962	Number	Median number of years of specialization in 1962[1]														
		Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Elementary school teaching	Secondary school teaching	Education	Health fields	Humanities	Technical specialties	Other fields
ENGINEERS																	
Total[2]	852,680	12	(B)	11	(B)	(B)	(B)	6	(B)	(B)	(B)	(B)	(B)	(B)	5	11	9
No degree[3]	364,751	15	(B)	(B)	(B)	-	(B)	14	(B)	(B)	(B)	(B)	(B)	14	3	12	10
Male	361,822	15	(B)	(B)	(B)	-	(B)	13	(B)	(B)	(B)	(B)	(B)	14	3	12	10
Female	2,929	11	(B)	(B)	(B)	-	(B)	15	(B)	(B)	(B)	(B)	(B)	-	-	8	9
25 to 34 years	64,149	8	(B)	(B)	(B)	-	(B)	5	(B)	(B)	(B)	(B)	(B)	8	-	10	6
35 to 44 years	126,066	13	(B)	(B)	(B)	-	(B)	13	(B)	(B)	(B)	(B)	(B)	8	3	13	11
45 to 54 years	94,148	20	(B)	(B)	(B)	-	(B)	15	(B)	(B)	(B)	(B)	(B)	21	-	15	13
Bachelor's[3]	254,491	11	(B)	11	(B)	-	(B)	5	(B)	(B)	(B)	(B)	(B)	(B)	13	8	8
Male	253,696	11	(B)	11	(B)	-	(B)	5	(B)	(B)	(B)	(B)	(B)	(B)	-	8	8
Female	795	16	(B)	-	(B)	-	(B)	3	(B)	(B)	(B)	(B)	(B)	(B)	13	8	3
25 to 34 years	87,849	7	(B)	5	(B)	-	(B)	4	(B)	(B)	(B)	(B)	(B)	(B)	-	5	4
35 to 44 years	104,350	12	(B)	12	(B)	-	(B)	4	(B)	(B)	(B)	(B)	(B)	(B)	13	10	11
45 to 54 years	34,792	22	(B)	25	(B)	-	(B)	7	(B)	(B)	(B)	(B)	(B)	(B)	-	10	18
Bachelor's plus[3 4]	141,39[illegible]	11	4	12	9	(B)	(B)	4	(B)	(B)	(B)	(B)	(B)	(B)	8	18	6
Male	140,966	11	4	12	9	(B)	(B)	4	(B)	(B)	(B)	(B)	(B)	(B)	8	18	6
Female	432	9	-	-	-	(B)	(B)	-	(B)	(B)	(B)	(B)	(B)	(B)	-	-	8
25 to 34 years	52,225	6	3	8	8	(B)	(B)	3	(B)	(B)	(B)	(B)	(B)	(B)	-	7	4
35 to 44 years	56,117	12	5	16	7	(B)	(B)	11	(B)	(B)	(B)	(B)	(B)	(B)	8	12	9
45 to 54 years	21,480	21	-	17	24	(B)	(B)	3	(B)	(B)	(B)	(B)	(B)	(B)	-	26	9
Master's[3]	68,675	11	3	8	5	(B)	(B)	6	(B)	9	(B)	(B)	(B)	10	9	10	7
Male	67,957	11	6	8	4	(B)	(B)	5	(B)	6	(B)	(B)	(B)	14	8	12	7
Female	718	8	-	-	30+	(B)	(B)	7	(B)	25	(B)	(B)	(B)	3	25	8	17
25 to 34 years	25,948	7	4	-	4	(B)	(B)	3	(B)	3	(B)	(B)	(B)	4	6	5	3
35 to 44 years	26,399	12	8	7	7	(B)	(B)	7	(B)	18	(B)	(B)	(B)	4	10	11	8
45 to 54 years	9,406	21	17	9	3	(B)	(B)	18	(B)	-	(B)	(B)	(B)	25	23	9	14
Doctor of Philosophy[3]	9,964	12	10	14	12	-	-	8	12	24	-	8	13	(B)	4	25	10
Male	9,878	12	10	14	12	-	-	8	12	24	-	8	10	(B)	3	25	10
Female	86	8	-	-	-	-	-	8	-	-	-	-	25	(B)	13	-	18
25 to 34 years	3,062	7	6	3	10	-	-	4	-	-	-	-	8	(B)	3	-	8
35 to 44 years	4,323	14	22	14	12	-	-	8	-	-	-	-	13	(B)	10	-	7
45 to 54 years	1,591	22	25	15	4	-	-	10	-	24	-	8	25	(B)	18	25	13

See footnotes at end of table.

Table 31.--Median Number of Years in Field of Work Specialization for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962--Continued

1960 occupation, sex, age, and highest degree held in 1962	Number	Median number of years of specialization[1]															
		Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Elementary school teaching	Secondary school teaching	Education	Health fields	Humanities	Technical specialties	Other fields
PHYSICAL SCIENTISTS																	
Total[2]	129,993	11	9	12	12	8	9	8	(B)	(B)	6	4	22	9	17	9	7
No degree[3]	27,499	14	10	14	16	8	(B)	6	-	(B)	(B)	(B)	-	10	21	9	11
Male	26,081	14	11	14	16	10	(B)	8	-	(B)	(B)	(B)	-	9	23	10	12
Female	1,418	16	7	14	13	5	(B)	3	-	(B)	(B)	(B)	-	16	3	3	7
25 to 34 years	6,575	9	7	8	8	8	(B)	3	-	(B)	(B)	(B)	-	7	8	8	30
35 to 44 years	8,196	14	12	14	15	7	(B)	9	-	(B)	(B)	(B)	-	16	20	11	10
45 to 54 years	6,850	21	17	25	22	18	(B)	13	-	(B)	(B)	(B)	-	23	-	15	24
Bachelor's[3]	30,943	10	7	11	12	5	5	7	(B)	(B)	18	4	-	7	-	4	7
Male	28,763	10	7	11	12	5	5	7	(B)	(B)	-	4	-	8	-	4	7
Female	2,180	3	6	9	9	3	-	9	(B)	(B)	18	3	-	5	-	-	-
25 to 34 years	11,771	5	5	6	8	4	4	7	(B)	(B)	-	3	-	6	-	3	3
35 to 44 years	11,725	12	12	13	13	8	3	11	(B)	(B)	18	8	-	11	-	13	11
45 to 54 years	4,431	22	19	21	19	24	28	9	(B)	(B)	-	25	-	17	-	-	24
Bachelor's plus[3 4]	24,142	10	8	11	13	10	11	7	-	13	8	3	-	10	10	13	4
Male	22,713	10	8	11	13	9	11	7	-	20	3	3	-	8	10	13	4
Female	1,429	18	8	8	12	16	8	7	-	13	24	3	-	13	-	-	18
25 to 34 years	9,045	5	5	7	7	7	3	6	-	-	3	3	-	7	8	13	3
35 to 44 years	9,067	11	12	13	13	9	12	8	-	10	8	5	-	11	16	-	4
45 to 54 years	3,753	21	17	19	22	18	18		-	-	-	-	-	25	-	-	12
Master's[3]	22,977	11	8	11	11	6	(B)	11	(B)	8	3	12	13	9	28	13	7
Male	21,383	11	8	12	11	8	(B)	11	(B)	15	-	14	13	9	28	13	9
Female	1,594	-	4	9	12	3	(B)	14	(B)	8	3	10	-	-	3	-	8
25 to 34 years	8,347	6	5	6	7	4	(B)	5	(B)	7	3	9	-	4	-	3	4
35 to 44 years	8,296	12	11	13	13	6	(B)	12	(B)	18	-	-	13	9	12	-	8
45 to 54 years	3,730	23	13	20	22	14	(B)	13	(B)	-	-	12	-	14	30+	13	30+
Doctor of Philosophy[3]	23,391	12	11	12	12	9	6	9	(B)	20	-	(B)	(B)	5	23	8	7
Male	22,803	12	11	12	12	9	6	9	(B)	20	-	(B)	(B)	5	23	8	7
Female	588	-	17	15	17	8	-	-	(B)	-	-	(B)	(B)	4	-	-	-
25 to 34 years	2,095	8	6	7	8	6	3	8	(B)	-	-	(B)	(B)	3	-	-	3
35 to 44 years	10,470	9	11	12	12	8	10	10	(B)	17	-	(B)	(B)	5	18	8	6
45 to 54 years	4,067	21	20	22	24	5	-	10	(B)	25	-	(B)	(B)	22	-	-	13

See footnotes at end of table.

Table 31.--Median Number of Years in Field of Work Specialization for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962--Continued

1960 occupation, sex, age, and highest degree held in 1962	Number	Median number of years of specialization[1]															
		Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Elementary school teaching	Secondary school teaching	Education	Health fields	Humanities	Technical specialties	Other fields
BIOLOGICAL SCIENTISTS																	
Total[2]	31,114	7	(B)	11	(B)	12	13	(B)	9	9	4	4	13	9	21	13	8
No degree[3]	4,497	10	(B)	21	8	13	15	8	-	(B)	-	(B)	(B)	9	21	14	8
Male	3,548	10	(B)	23	8	14	15	7	-	(B)	-	(B)	(B)	11	23	14	7
Female	949	-	(B)	12	-	9	12	20	-	(B)	-	(B)	(B)	8	14	13	8
25 to 34 years	824	5	(B)	-	8	4	8	-	-	(B)	-	(B)	(B)	7	-	15	6
35 to 44 years	1,179	12	(B)	12	8	11	14	25	-	(B)	-	(B)	(B)	13	-	13	12
45 to 54 years	1,043	25	(B)	30+	-	20	22	7	-	(B)	-	(B)	(B)	15	13	21	8
Bachelor's[3]	5,044	8	(B)	9	14	9	12	-	(B)	13	3	3	12	9	-	13	6
Male	4,027	8	(B)	9	14	10	12	-	(B)	13	3	3	12	7	-	13	7
Female	1,017	-	(B)	7	13	7	9	-	(B)	-	3	3	-	10	-	-	4
25 to 34 years	1,796	7	(B)	5	3	5	7	-	(B)	8	3	4	-	7	-	-	3
35 to 44 years	1,783	9	(B)	11	13	12	12	-	(B)	8	-	3	12	11	-	13	7
45 to 54 years	776	16	(B)	10	-	20	20	-	(B)	19	-	-	-	18	-	-	22
Bachelor's plus[3] [4]	3,432	5	(B)	8	12	10	12	4	5	9	3	4	8	9	30+	8	4
Male	2,876	5	(B)	8	12	10	12	25	5	10	3	5	-	9	30+	-	4
Female	556	-	(B)	10	13	7	-	3	-	3	3	3	7	9	-	8	3
25 to 34 years	1,130	3	(B)	6	4	6	6	3	3	8	3	3	-	5	-	-	3
35 to 44 years	1,047	-	(B)	12	13	11	12	-	13	8	3	12	-	13	8	-	4
45 to 54 years	858	-	(B)	18	-	18	21	25	8	8	-	-	-	23	30+	-	11
Master's[3]	7,484	7	(B)	10	(B)	11	13	3	8	3	9	13	8	12	4	5	8
Male	6,507	7	(B)	9	(B)	11	13	3	8	3	10	11	8	9	25	5	9
Female	977	-	(B)	13	(B)	14	18	-	11	-	8	30+	-	17	3	-	4
25 to 34 years	2,391	5	(B)	7	(B)	5	7	3	3	3	8	3	-	3	3	3	3
35 to 44 years	2,774	10	(B)	10	(B)	12	12	5	10	15	11	12	8	15	-	-	11
45 to 54 years	1,293	8	(B)	20	(B)	19	20	-	9	-	8	30+	25	22	2[illegible]	-	18
Doctor Philosophy[3]	10,284	8	8	14	(B)	13	13	-	15	11	-	3	18	16		-	(B)
Male	9,661	8	8	14	(B)	13	13	-	12	11	-	3	18	16	-	-	(B)
Female	623	-	-	11	(B)	14	25	-	20	-	-	3	-	-	-	-	(B)
25 to 34 years	2,215	8	8	4	(B)	7	8	-	7	8	-	-	-	3	-	-	(B)
35 to 44 years	4,498	8	-	13	(B)	12	12	-	11	11	-	3	-	13	-	-	(B)
45 to 54 years	2,075	-	-	21	(B)	21	23	-	17	13	-	-	18	24	-	-	(B)

See footnotes at end of table.

Table 31.--Median Number of Years in Field of Work Specialization for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962--Continued

1960 occupation, sex, age, and highest degree held in 1962	Number	Median number of years of specialization[1]															
		Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Elementary school teaching	Secondary school teaching	Education	Health fields	Humanities	Technical specialties	Other fields
MATHEMATICIANS																	
Total[2]	34,544	8	5	3	12	(B)	(B)	10	6	12	5	7	9	16	8	8	10
No degree[3]	9,970	9	(B)	(B)	(B)	-	(B)	10	-	24	3	10	8	18	-	8	15
Male	6,320	9	(B)	(B)	(B)	-	(B)	10	-	28	-	10	-	-	-	7	17
Female	3,650	6	(B)	(B)	(B)	-	(B)	9	-	10	3	-	8	18	-	12	11
25 to 34 years	1,992	7	(B)	(B)	(B)	-	(B)	6	-	-	3	8	-	3	-	4	7
35 to 44 years	2,333	9	(B)	(B)	(B)	-	(B)	8	-	25	-	13	8	18	-	23	16
45 to 54 years	2,832	22	(B)	(B)	(B)	-	(B)	14	-	10	-	-	-	19	-	21	23
Bachelor's[3]	6,326	9	(B)	3	11	-	13	9	-	(B)	3	4	-	25	3	30+	7
Male	4,556	9	(B)	-	10	-	13	9	-	(B)	-	8	-	25	-	30+	8
Female	1,770	18	(B)	3	13	-	-	9	-	(B)	3	3	-	-	3	-	4
25 to 34 years	3,002	3	(B)	-	7	-	13	6	-	(B)	3	3	-	-	-	-	5
35 to 44 years	1,481	8	(B)	-	15	-	-	12	-	(B)	-	8	-	-	-	-	13
45 to 54 years	898	25	(B)	-	13	-	-	17	-	(B)	-	-	-	-	-	-	25
Bachelor's plus[3] [4]	4,889	7	4	3	5	-	(B)	7	(B)	8	3	4	8	3	-	8	8
Male	4,153	7	4	3	5	-	(B)	7	(B)	8	-	4	8	3	-	8	9
Female	736	5	3	-	10	-	(B)	8	(B)	-	3	4	-	-	-	-	6
25 to 34 years	2,307	5	3	-	3	-	(B)	5	(B)	-	-	4	6	3	-	-	5
35 to 44 years	1,258	9	8	-	11	-	(B)	10	(B)	8	-	7	-	-	-	13	9
45 to 54 years	670	25	-	-	13	-	(B)	15	(B)	-	-	-	18	-	-	8	14
Master's[3]	8,297	7	4	4	13	(B)	3	10	5	10	30+	9	-	(B)	8	10	6
Male	6,931	7	4	4	13	(B)	3	9	5	10	30+	12	-	(B)	8	10	7
Female	1,366	13	8	-	15	(B)	-	15	-	10	3	7	-	(B)	-	-	6
25 to 34 years	3,157	4	3	3	3	(B)	3	6	3	7	3	8	-	(B)	8	-	4
35 to 44 years	2,577	9	3	-	13	(B)	3	11	8	13	13	12	-	(B)	8	10	10
45 to 54 years	1,505	30+	22	25	-	(B)	-	20	-	23	-	3	-	(B)	-	-	20
Doctor of Philosophy[3]	4,623	4	11	13	22	(B)	-	13	11	11	-	30+	18	-	17	-	7
Male	4,367	4	11	13	22	(B)	-	13	11	11	-	30+	18	-	15	-	7
Female	256	-	-	-	-	(B)	-	18	-	-	-	-	-	-	25	-	-
25 to 34 years	1,313	8	10	-	13	(B)	-	7	3	13	-	-	-	-	8	-	-
35 to 44 years	1,633	3	12	13	24	(B)	-	13	14	13	-	-	18	-	18	-	8
45 to 54 years	1,032	4	-	-	-	(B)	-	22	-	3	-	-	-	-	-	-	5

See footnotes at end of table.

Table 31.--Median Number of Years in Field of Work Specialization for Employed Engineers and Scientists by Sex, Age, and Educational Attainment: 1962--Continued

1960 occupation, sex, age, and highest degree held in 1962	Number	Median number of years of specialization[1]															
		Engineering	Physics	Chemistry	Other physical sciences	Biological sciences	Agricultural sciences	Mathematics and statistics	Psychology	Social sciences	Elementary school teaching	Secondary school teaching	Education	Health fields	Humanities	Technical specialties	Other fields
SOCIAL SCIENTISTS																	
Total[2]	64,042	11	(B)	16	(B)	15	9	9	11	13	15	10	12	16	14	13	11
No degree[3]	7,640	12	(B)	-	(B)	30+	20	12	13	15	5	14	18	11	13	20	12
Male	5,686	12	(B)	-	(B)	30+	20	12	10	15	3	21	16	10	14	24	13
Female	1,954	8	(B)	-	(B)	-	-	13	17	13	8	13	30+	11	13	8	9
25 to 34 years	1,026	3	(B)	-	(B)	-	-	8	7	3	8	-	3	3	-	-	7
35 to 44 years	2,124	10	(B)	-	(B)	-	-	12	11	12	-	12	17	10	14	8	9
45 to 54 years	2,185	18	(B)	-	(B)	-	8	29	18	18	-	25	30+	21	13	25	14
Bachelor's[3]	5,388	10	-	-	-	30+	7	7	3	11	9	8	5	11	9	12	8
Male	3,869	10	-	-	-	30+	7	7	3	12	3	12	3	15	10	13	7
Female	1,519	-	-	-	-	3	-	23	4	5	16	7	7	8	3	3	11
25 to 34 years	2,064	9	-	-	-	-	6	5	3	4	3	6	5	-	4	-	5
35 to 44 years	1,461	8	-	-	-	13	13	13	3	12	3	9	3	13	8	7	11
45 to 54 years	1,041	22	-	-	-	3	-	20	3	18	8	18	-	9	24	20	13
Bachelor's plus[3] [4]	5,842	13	-	17	(B)	8	8	7	9	9	3	3	8	(B)	15	15	9
Male	4,694	13	-	20	(B)	8	8	8	9	8	3	3	8	(B)	15	9	8
Female	1,148	-	-	18	(B)	-	-	4	8	11	-	30+	15	(B)	-	18	15
25 to 34 years	1,992	3	-	5	(B)	-	-	4	4	4	3	3	8	(B)	5	-	5
35 to 44 years	1,618	12	-	18	(B)	8	8	9	10	11	-	3	3	(B)	3	9	11
45 to 54 years	1,094	18	-	18	(B)	-	-	-	16	15	-	-	18	(B)	18	20	12
Master's[3]	21,189	7	(B)	11	(B)	12	9	7	9	11	14	13	11	18	4	10	12
Male	15,052	7	(B)	11	(B)	12	9	7	9	10	9	16	11	19	5	11	10
Female	6,137	-	(B)	-	(B)	20	-	-	10	14	17	9	11	16	4	8	16
25 to 34 years	6,295	5	(B)	3	(B)	8	8	5	5	4	3	6	5	2	3	12	6
35 to 44 years	7,185	5	(B)	13	(B)	14	4	9	11	11	12	13	10	10	13	3	12
45 to 54 years	4,309	8	(B)	-	(B)	13	18	8	13	18	25	30+	13	19	-	-	21
Doctor of Philosophy[3]	23,601	13	(B)	17	-	22	11	15	12	15	25	8	13	20	17	22	14
Male	20,398	13	(B)	17	-	12	11	16	12	15	25	8	13	21	17	22	14
Female	3,203	-	(B)	13	-	30+	-	3	13	20	25	-	10	8	-	-	16
25 to 34 years	3,788	-	(B)	8	-	8	8	6	7	7	-	3	6	8	8	8	8
35 to 44 years	9,664	12	(B)	17	-	8	12	13	12	12	-	5	11	18	15	14	13
45 to 54 years	5,850	-	(B)	17	-	18	13	18	18	19	25	-	13	25	23	-	18

B Median not shown when base is less than 0.5 percent of total.
- Indicates less than 0.5.
[1]Based on the distribution shown in table 29.
[2]Includes associate, first professional, and registered nurse degrees not shown separately.
[3]Includes age groups under 25 years and 55 years and over not shown separately.
[4]Some graduate work but no graduate degree.

Table 32.--Major Work Activities of Employed Engineers and Scientists: 1962

Work activity[1]	All activities performed					Two most time-consuming activities				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total	852,680	129,993	31,114	34,544	64,042	852,680	129,993	31,114	34,544	64,042
Percent[2]	100	100	100	100	100	100	100	100	100	100
Teach courses	9	16	43	30	55	2	11	31	21	45
Recruit, train people in the organization	29	25	28	23	27	2	2	3	2	2
Engage in basic research	10	39	55	27	37	3	22	34	13	18
Engage in applied research, product development	35	49	37	26	20	15	29	18	14	6
Administer, supervise research, development	18	27	32	18	24	6	10	8	5	6
Consult, advise clients, customers on technical matters	40	28	28	24	23	12	7	8	8	6
Make drawings, blueprints, models	40	13	8	6	3	12	2	1	2	-
Make forecasts, estimate markets	17	7	5	18	17	2	1	-	4	4
Exploration, field work	17	20	24	5	10	4	9	8	2	1
Design, modify equipment, machinery, production processes	39	16	8	4	2	17	3	-	1	-
Supervise work of subordinates	64	57	61	46	48	31	25	19	21	14
Quality control, set precision standards	13	26	8	7	2	3	13	2	1	-
Public relations, publicity work, speeches	13	10	34	11	33	1	1	3	1	4
Budgeting, costing, controlling, allocating expenditures	25	13	17	17	17	5	1	1	4	2
Test new, experimental equipment	28	24	14	4	4	5	3	1	1	-
Travel	42	33	39	22	35	3	1	2	1	2
Construct equipment, apparatus, prosthetic devices	8	8	5	1	2	1	1	-	-	-
Treat patients	-	1	2	-	9	-	-	1	-	6
Counsel clients, students	5	9	27	17	50	1	2	6	7	22
Supervise production, construction	27	11	7	3	3	11	3	2	1	1
Write technical, general reports on projects	52	56	55	38	41	12	15	11	11	11
Coordinate activities of professional peers	26	15	18	15	23	6	2	3	3	4
Keep records	41	41	55	40	41	5	7	8	13	6
Statistical analysis	15	13	25	49	33	2	1	1	26	6
Technical sales	12	4	2	2	3	6	1	1	1	1
Negotiate contracts, raise funds	11	6	5	3	7	1	-	-	-	1
Brief superiors on own work	58	49	45	41	41	3	2	1	3	1
Plan future operations	43	35	46	29	38	6	3	3	5	4
Compile and annotate bibliography, search and select literature	4	17	29	7	27	-	1	1	1	2
Other	10	9	11	15	14	9	7	9	13	12

- Indicates less than 0.5 percent.

[1]Respondents were asked to indicate the activities which were a part of their work in their major current position of employment and to further indicate on which two of these activities they spent the most time. For comparable data on two most time-consuming work activities in 1960, see table 17.

[2]Sums of individual percentages exceed 100 because of multiple responses.

Table 33.--Two Most Important Work Activities of Employed Engineers and Scientists by Sex and Educational Attainment: 1962

Occupation in 1960 and work activity in 1962[1]	Both sexes						Male		
	Total[2]	No degree	Bachelor's	Bachelor's plus[3]	Master's	Ph. D.	Total[2]	No degree	Bachelor's
Total percent[4]	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
ENGINEERS									
Total[5]	852,680	364,751	254,491	141,398	68,675	9,964	847,596	361,822	253,696
Supervise work of subordinates	31	29	34	33	32	17	31	29	34
Design, modify equipment, machinery, production processes	17	18	18	16	14	5	17	18	18
Engage in applied research, product development	15	9	16	20	28	27	15	9	16
Consult, advise clients on technical matters	12	11	14	14	12	11	12	11	14
Make drawings, blueprints, models	12	15	12	8	6	-	12	15	12
Write technical, general reports on projects	12	9	14	16	18	16	12	9	14
Supervise production, construction	11	11	13	9	6	1	11	11	13
PHYSICAL SCIENTISTS									
Total[5]	129,993	27,499	30,943	24,142	22,977	23,391	122,676	26,081	28,763
Supervise work of subordinates	25	22	33	24	22	19	25	23	34
Engage in applied research, product development	29	24	31	31	32	25	29	24	32
Write technical, general reports on projects	15	7	18	19	18	15	15	7	19
Engage in basic research	22	11	13	16	21	53	21	11	11
Quality control, set precision standards	13	22	18	12	7	1	13	23	18
Teach courses	11	2	2	7	17	29	10	2	2
Administer, supervise research, development	10	3	7	11	11	20	10	3	7
BIOLOGICAL SCIENTISTS									
Total[5]	31,114	4,497	5,044	3,432	7,484	10,284	26,895	3,548	4,027
Supervise work of subordinates	19	25	26	23	21	11	18	21	26
Engage in applied research, product development	18	12	17	21	21	19	19	13	18
Write technical, general reports on projects	11	4	17	18	14	6	11	4	21
Engage in basic research	34	16	15	25	28	58	34	15	12
Teach courses	31	7	6	15	31	58	31	6	5
MATHEMATICIANS									
Total[5]	34,544	9,970	6,326	4,889	8,297	4,623	26,641	6,320	4,556
Supervise work of subordinates	21	20	28	24	21	12	23	21	31
Engage in applied research, product development	14	4	14	24	19	17	15	4	13
Write technical, general reports on projects	11	7	13	18	14	3	11	9	12
Engage in basic research	13	4	11	9	12	43	14	2	9
Teach courses	21	1	3	11	37	70	23	2	2
Statistical analysis	26	38	36	26	17	4	23	33	35
Keep records	13	27	14	6	4	2	8	19	10
SOCIAL SCIENTISTS									
Total[5]	64,042	7,640	5,388	5,842	21,189	23,601	50,013	5,686	3,869
Supervise work of subordinates	14	19	22	12	15	12	15	21	27
Write technical, general reports on projects	11	9	15	19	13	7	12	9	17
Engage in basic research	18	6	7	13	12	31	20	5	6
Teach courses	45	10	18	26	46	67	43	8	6
Counsel clients, students	22	9	11	17	29	25	21	10	9

- Indicates less than 0.5 percent.

[1]Respondents were asked to indicate the activities which were a part of their work in their major current position of employment and to further indicate on which two of these activities they spent the most time. The work activities shown separately on this table include those designated as one of two "most time-consuming" by at least 10 percent of the respondents in a occupation except activities classified as "other," but unspecified (see last item of table 32).

[2]Includes associate, first professional, and registered nurse degrees not shown separately.

[3]Some graduate work but no graduate degree.

[4]Sums of individual percentages exceed 100 because of multiple responses.

[5]Includes most time-consuming activities designated by fewer than 10 percent of respondents in occupation. See table 32.

Table 33.--Two Most Important Work Activities of Employed Engineers and Scientists by Sex and Educational Attainment: 1962--Continued

Occupation in 1960 and work activity in 1962[1]	Male--Continued			Female					
	Bachelor's plus[3]	Master's	Ph. D.	Total[2]	No degree	Bachelor's	Bachelor's plus[3]	Master's	Ph. D.
Total percent[4]	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
ENGINEERS									
Total[5]	140,966	67,957	9,878	5,084	2,929	795	432	718	86
Supervise work of subordinates	33	33	17	12	14	44	-	25	7
Design, modify equipment, machinery, production processes	16	14	5	2	2	-	-	6	-
Engage in applied research, product development	20	28	27	5	4	6	10	6	-
Consult, advise clients on technical matters	14	12	11	6	11	-	-	-	-
Make drawings, blueprints, models	8	6	-	6	5	10	-	5	-
Write technical, general reports on projects	16	18	17	17	18	17	42	12	-
Supervise production, construction	9	7	1	-	-	-	-	-	-
PHYSICAL SCIENTISTS									
Total[5]	22,713	21,383	22,803	7,317	1,418	2,180	1,429	1,594	588
Supervise work of subordinates	24	22	19	16	14	19	13	14	20
Engage in applied research, product development	31	33	26	21	19	23	30	18	-
Write technical, general reports on projects	19	18	14	12	8	18	6	15	25
Engage in basic research	15	20	53	31	21	32	30	22	66
Quality control, set precision standards	12	7	1	9	6	16	3	7	-
Teach courses	7	16	29	18	5	7	17	39	7
Administer, supervise research, development	12	12	21	3	-	3	6	3	9
BIOLOGICAL SCIENTISTS									
Total[5]	2,876	6,507	9,661	4,219	949	1,017	556	977	623
Supervise work of subordinates	22	21	10	25	24	28	28	23	23
Engage in applied research, product development	21	22	20	13	8	21	32	7	5
Write technical, general reports on projects	20	15	6	6	4	4	7	7	7
Engage in basic research	23	27	59	32	20	26	35	35	41
Teach courses	15	29	59	25	11	13	20	41	51
MATHEMATICIANS									
Total[5]	4,153	6,931	4,367	7,903	3,650	1,770	736	1,366	256
Supervise work of subordinates	21	22	12	18	19	20	14	15	13
Engage in applied research, product development	24	21	7	10	3	14	27	11	4
Write technical, general reports on projects	19	13	3	10	4	18	16	17	-
Engage in basic research	9	13	45	10	7	17	9	8	12
Teach courses	10	35	69	14	-	6	19	47	79
Statistical analysis	25	17	3	36	46	38	27	18	11
Keep records	5	3	2	29	42	22	16	11	8
SOCIAL SCIENTISTS									
Total[5]	4,694	15,052	20,398	14,029	1,954	1,519	1,148	6,137	3,203
Supervise work of subordinates	15	16	12	12	15	8	10	12	12
Write technical, general reports on projects	20	16	7	8	8	8	13	8	8
Engage in basic research	14	15	31	11	7	8	9	6	25
Teach courses	24	40	68	51	19	49	37	60	61
Counsel clients, students	16	25	24	29	7	14	23	39	29

Table 34.--Two Most Important Work Activities of Employed Engineers and Scientists, by Age and Educational Attainment: 1962

Occupation in 1960 and work activity in 1962[1]	No degree				Bachelor's				Bachelor's plus[2]	
	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	25 to 34 years	35 to 44 years
ENGINEERS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	23	31	32	32	26	38	41	39	22	40
Design, modify equipment, machinery, production processes	20	18	19	15	20	17	15	16	19	16
Engage in applied research, product development	11	11	7	6	23	14	9	8	26	18
Consult, advise clients on technical matters	11	11	11	12	11	15	15	19	12	13
Make drawings, blueprints, models	17	16	12	13	12	11	11	15	11	7
Write technical, general reports on projects	10	10	8	6	17	14	12	8	18	15
Supervise production, construction	10	11	12	14	13	13	10	11	9	8
PHYSICAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	17	24	31	24	26	36	46	47	20	26
Engage in applied research, product development	32	24	19	14	33	28	27	39	37	29
Write technical, general reports on projects	7	8	7	7	21	13	14	8	25	16
Engage in basic research	16	12	10	3	18	10	7	6	21	11
Quality control, set precision standards	20	21	26	21	17	17	21	19	7	15
Teach courses	2	3	1	3	2	2	1	1	5	6
Administer, supervise research, development	1	4	4	1	4	9	11	7	9	14
BIOLOGICAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	23	23	32	30	24	29	31	29	21	24
Engage in applied research, product development	12	15	12	10	17	16	19	17	24	20
Write technical, general reports on projects	7	3	3	3	19	22	18	6	22	16
Engage in basic research	21	19	12	11	18	14	10	10	26	27
Teach courses	4	8	7	9	8	4	2	8	9	20
MATHEMATICIANS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	19	20	21	27	27	20	35	51	27	25
Engage in applied research, product development	9	3	1	-	17	12	3	10	27	25
Write technical, general reports on projects	8	9	9	7	15	16	13	-	16	28
Engage in basic research	3	6	2	7	10	12	6	14	9	9
Teach courses	2	1	1	-	4	2	2	-	7	11
Statistical analysis	29	37	46	37	31	43	47	36	23	24
Keep records	23	34	26	31	12	14	6	22	5	5
SOCIAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	15	24	23	17	20	26	21	26	9	13
Write technical, general reports on projects	12	7	5	14	18	11	12	12	17	21
Engage in basic research	2	4	4	10	6	4	8	11	17	10
Teach courses	6	11	10	8	16	16	19	29	21	16
Counsel clients, students	7	8	9	13	12	3	17	16	14	17

- Indicates less than 0.5 percent.

[1] Respondents were asked to indicate the activities which were a part of their work in their major current position of employment and to further indicate on which two of these activities they spent the most time. The work activities shown separately on this table include those designated as one of two "most time-consuming" by at least 10 percent of the respondents in an occupation except activities classified as "other," but unspecified (see last item of table 32).

[2] Some graduate work but no graduate degree.

[3] Sums of individual percentages may exceed 100 because of multiple responses.

Table 34.--Two Most Important Work Activities of Employed Engineers and Scientists, by Age and Educational Attainment: 1962--Continued

Occupation in 1960 and work activity in 1962[1]	Bachelor's plus[2]--Con.		Master's				Ph. D.			
	45 to 54 years	55 to 64 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years
ENGINEERS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	45	36	28	36	42	29	14	17	18	26
Design, modify equipment, machinery, production processes	11	9	16	14	8	5	7	3	11	-
Engage in applied research, product development	10	14	35	23	22	24	36	24	21	20
Consult, advise clients on technical matters	14	14	7	14	14	17	4	12	21	6
Make drawings, blueprints, models	7	7	7	4	7	4	-	-	-	-
Write technical, general reports on projects	13	17	23	18	10	9	14	18	12	25
Supervise production, construction	11	13	6	6	6	15	-	2	-	4
PHYSICAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	30	26	16	26	24	28	17	20	21	22
Engage in applied research, product development	29	15	36	32	33	23	27	24	23	30
Write technical, general reports on projects	9	16	22	18	13	12	18	15	15	7
Engage in basic research	10	1	29	17	14	6	69	57	36	26
Quality control, set precision standards	16	13	5	9	7	1	-	2	-	7
Teach courses	3	12	16	13	22	24	26	28	29	41
Administer, supervise research, development	15	6	5	15	15	19	12	25	28	13
BIOLOGICAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	23	27	15	23	32	16	13	10	14	7
Engage in applied research, product development	21	13	21	23	15	16	23	21	17	13
Write technical, general reports on projects	18	9	19	14	10	8	6	6	5	5
Engage in basic research	19	28	37	25	19	24	76	61	48	42
Teach courses	18	20	26	28	40	41	51	59	64	60
MATHEMATICIANS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	22	39	16	27	24	17	5	10	18	31
Engage in applied research, product development	9	43	28	21	8	9	18	20	15	12
Write technical, general reports on projects	14	-	15	15	19	4	5	2	2	1
Engage in basic research	4	9	20	8	6	6	72	44	25	14
Teach courses	13	25	29	31	45	54	67	68	70	81
Statistical analysis	35	44	18	14	26	10	5	2	8	-
Keep records	14	-	5	6	4	1	-	2	4	-
SOCIAL SCIENTISTS										
Work activity, percent[3]	100	100	100	100	100	100	100	100	100	100
Supervise work of subordinates	20	8	11	17	15	15	8	12	13	12
Write technical, general reports on projects	19	21	19	13	9	10	11	7	6	4
Engage in basic research	12	6	15	13	8	12	46	33	25	20
Teach courses	28	43	38	40	57	59	59	65	71	72
Counsel clients, students	19	25	24	30	33	34	19	23	26	35

Table 35.--Median Earnings From Major Job in 1961 for Employed Engineers and Scientists, by Sex, Age, and Educational Attainment: 1962

Sex, age, and highest degree held in 1962	Median earnings reported, 1961				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total[1]	852,680	129,993	31,114	34,544	64,042
Median income	$9,400	$8,400	$7,500	$7,700	$8,500
NO DEGREE					
Total[2]	8,600	7,000	5,500	6,100	7,500
Male	8,615	7,100	5,700	7,000	8,100
Female	6,975	4,700	4,600	4,900	4,900
25 to 34 years	7,600	6,200	5,000	6,000	5,900
35 to 44 years	8,800	7,400	5,900	6,400	7,600
45 to 54 years	9,100	7,600	6,100	7,000	7,900
BACHELOR'S					
Total[2]	9,800	8,100	6,700	7,600	7,800
Male	9,816	8,200	7,000	8,000	8,700
Female	6,075	6,200	5,600	6,700	6,300
25 to 34 years	8,500	7,300	5,800	7,400	6,700
35 to 44 years	10,600	9,000	7,300	8,100	8,400
45 to 54 years	10,900	9,500	7,800	8,200	9,300
BACHELOR'S PLUS[3]					
Total[2]	10,100	8,200	6,800	7,900	8,200
Male	10,184	8,400	7,000	8,200	8,700
Female	6,341	6,100	5,500	6,700	6,000
25 to 34 years	8,600	7,300	5,800	7,700	6,200
35 to 44 years	10,900	9,100	6,900	9,100	9,300
45 to 54 years	11,500	9,300	8,200	9,200	9,900
MASTER'S					
Total[2]	10,700	8,900	7,200	8,300	7,700
Male	10,731	9,100	7,300	8,800	8,200
Female	7,624	6,200	6,000	6,100	6,500
25 to 34 years	9,600	7,700	6,100	7,200	6,600
35 to 44 years	12,000	10,200	7,500	9,800	8,400
45 to 54 years	12,400	10,400	8,000	8,600	8,500
DOCTOR OF PHILOSOPHY					
Total[2]	12,700	11,500	9,300	10,600	9,500
Male	12,725	11,600	9,400	10,600	9,700
Female	13,023	7,700	7,300	8,900	8,200
25 to 34 years	11,400	10,100	7,700	9,600	8,100
35 to 44 years	13,700	12,000	9,200	10,900	9,600
45 to 54 years	14,300	13,100	10,700	11,500	10,200

[1]Includes associate, first professional, and registered nurse degrees not shown separately.
[2]Includes age groups under 25 years and 55 years and over not shown separately.
[3]Some graduate work but no graduate degree.

Table 36.--Sources of Secondary Income in 1961 for Employed Engineers and Scientists, by Sex and Educational Attainment: 1962

Source of secondary income in 1961 and highest degree in 1962	Both sexes					Male					Female				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
Total percent[1]	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
ALL ENGINEERS AND SCIENTISTS															
Total[2]	852,680	129,933	31,114	34,544	64,042	847,596	122,676	26,895	26,641	50,013	5,084	7,317	4,219	7,903	14,029
No secondary income	87	82	72	77	56	87	81	70	72	52	95	92	84	91	71
Consulting	4	6	8	7	16	4	6	9	8	18	-	1	2	1	9
Publications	1	2	4	2	9	1	2	4	2	10	-	-	2	1	5
Lectures	1	3	7	5	14	1	3	7	6	16	-	3	4	2	8
Other professional activities	3	5	8	6	15	3	5	9	7	16	-	2	5	3	10
Other job	6	7	10	10	11	6	7	10	11	13	4	2	6	4	6
NO DEGREE															
Total	364,751	27,499	4,497	9,970	7,640	361,822	26,081	3,548	6,320	5,686	2,929	1,418	949	3,650	1,954
No secondary income	88	99	82	89	81	88	87	81	85	79	95	96	90	96	89
Consulting	3	2	4	2	6	3	2	5	3	7	-	1	-	-	4
Publications	1	-	1	1	1	1	-	1	1	1	-	-	-	-	-
Lectures	-	-	1	-	4,	-	-	2	1	4	-	.	-	-	4
Other professional activities	3	2	3	2	3	3	3	2	3	4	-	-	6	1	-
Other job	6	8	11	8	8	6	8	12	10	9	5	4	4	3	4
BACHELOR'S															
Total	254,491	30,943	5,044	6,326	5,388	253,696	28,763	4,027	4,556	3,869	795	2,180	1,017	1,770	1,519
No secondary income	89	89	85	86	87	89	88	82	83	86	100	99	93	92	91
Consulting	3	3	1	4	1	3	3	2	5	1	-	-	-	1	2
Publications	-	-	1	-	1	1	-	1	-	1	-	-	-	-	-
Lectures	-	1	1	1	1	-	1	1	1	-	-	-	1	-	2
Other professional activities	3	2	4	2	4	3	2	5	2	4	-	-	2	3	2
Other job	5	6	10	7	7	5	7	13	9	8	-	1	5	4	3
BACHELOR'S PLUS[3]															
Total	141,398	24,142	3,432	4,889	5,842	140,966	22,713	2,876	4,153	4,694	432	1,429	556	736	1,148
No secondary income	86	84	77	82	71	86	83	78	80	68	100	92	76	94	82
Consulting	4	4	5	5	7	4	4	5	6	8	-	3	4	-	4
Publications	1	2	3	1	4	1	2	3	1	5	-	-	-	1	2
Lectures	1	2	3	3	5	1	2	3	3	6	-	3	2	-	1
Other professional activities	3	4	5	4	9	3	4	4	5	10	-	1	6	1	4
Other job	6	7	13	10	11	6	8	11	11	11	-	-	21	5	10
MASTER'S															
Total	68,675	22,977	7,484	8,297	21,189	67,957	21,383	6,507	6,931	15,052	718	1,594	977	1,366	6,137
No secondary income	82	78	76	67	59	82	78	74	65	54	89	83	91	79	72
Consulting	6	6	7	7	14	6	6	8	7	16	-	-	1	2	9
Publications	2	1	2	1	4	2	1	2	1	5	-	2	-	2	3
Lectures	3	3	4	7	10	3	3	5	8	11	1	5	1	4	6
Other professional activities	4	7	6	13	16	4	7	7	14	17	1	5	3	8	14
Other job	7	8	10	13	14	7	8	11	14	18	10	5	4	8	4
DOCTOR OF PHILOSOPHY															
Total	9,964	23,391	10,284	4,623	23,601	9,878	22,803	9,661	4,367	20,398	86	588	623	256	3,203
No secondary income	58	66	59	50	36	58	66	59	49	34	82	74	63	70	46
Consulting	18	14	15	22	27	18	14	15	22	28	-	5	8	18	20
Publications	6	5	8	11	18	6	5	8	11	19	-	1	12	18	15
Lectures	12	10	14	18	27	12	10	14	19	28	9	11	17	9	20
Other professional activities	8	10	15	11	22	8	10	15	11	23	-	9	7	12	15
Other job	9	5	7	11	11	9	6	7	12	12	9	-	3	-	7

- Indicates less than 0.5 percent.

[1]Sums of individual percentages may exceed 100 because of multiple responses.

[2]Includes associate, first professional, and registered nurse degrees not shown separately.

[3]Some graduate work but no graduate degree.

APPENDIX A

Questionnaire and
Fields of Specialization List

Budget Bureau No. 41-6249; Expires December 31, 1962

This inquiry is authorized by Act of Congress (13 U. S. C.). The report you submit to the Census Bureau is confidential and may be seen only by sworn Census employees. It may not be used for purposes of taxation, investigation, or regulation.

Control No. (56)

FORM 1-56 (5-1-62)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

POSTCENSAL STUDY OF PROFESSIONAL AND TECHNICAL MANPOWER

Section I - CURRENT EMPLOYMENT

In this section we are interested in finding out about your work, the people you work with, and your attitudes toward work.

A. YOUR WORK STATUS

1. What were you doing last week? *(Check one)*

1 ☐ Working full time
2 ☐ Working part time
3 ☐ With a job but not at work (on vacation, sick leave, etc.)
(Skip to Question 3)

4 ☐ Not employed, but looking for work
5 ☐ Not in labor force (retired, housewife, student, etc.)
(Go to Question 2)

2. If you were not working last week, when did you last work?

Month | Year

(Answer and go to Section II beginning on Page 4.) →

OR 0 ☐ Never worked *(Skip to Page 6, Section III)*

ANSWER QUESTIONS 3 – 7 IN TERMS OF YOUR MAJOR CURRENT EMPLOYMENT ONLY

DO NOT WRITE HERE

3. YOUR JOB OR BUSINESS

a. For whom did you work last week? *(Name of company, business, organization or other employer.)*

b. In what kind of business, industry, or organization were you working? (For example: city hospital, state university, road construction firm, county junior high school.)

c. Were you working - - *(Check one)*

1 ☐ **For a PRIVATE employer for wages, salary, commission or tips?**
2 ☐ **For GOVERNMENT?** (Federal, State, local, public school system, etc.)
(Go to Question d)

3 ☐ **In OWN business or profession or farm for profit or fees?**
4 ☐ **WITHOUT PAY on family farm or business?**
(Skip to Question e)

d. What is your current yearly salary rate? *(Omit cents)* ..... Salary rate $ .00

e. What kind of work were you doing? (For example: civil engineer, nuclear physicist, professor of economics, 9th grade social studies teacher.)

f. In what field of specialization was this? *(Fill in the code number from the enclosed list which best describes your field.)* Code

g. If you were working in a subspecialty within this field, what was it called?

h. Describe what you did in your job. (For example: "Designer of electronic mechanisms in the industrial instrument industry; supervise six other engineers whom I have hired for my unit; prepare reports on the work of my unit.")

i. What was the formal title of your job?

4. How many hours a week do you work in this job or business? ..... Hours per week

5. How many years have you been working in this company, business or organization? ..... No. of years

OR 0 ☐ Less than one year

6. How many weeks did you work in 1961 at all jobs either full-time or part-time?
(Count paid vacation, paid sick leave, and military service as weeks worked.) (Check one)

1 ☐ 13 weeks or less
2 ☐ 14 to 26
3 ☐ 27 to 39
4 ☐ 40 to 47
5 ☐ 48 to 49
6 ☐ 50 to 52
OR 0 ☐ Did not work in 1961

7. YOUR EARNINGS IN 1961:

a. How much did you earn in 1961 in salary and commissions from your major position (before taxes and other deductions)? If you did not work the entire year at this job, give what would have been your yearly salary.

OR--IF YOU ARE SELF-EMPLOYED:

How much did you earn in 1961 in profits or fees from working in your own business, professional practice or partnership (net income after business expenses)?

$ .00
(Estimate to the nearest hundred dollars) (Omit cents)
OR 0 ☐ None

b. **In addition to your major position, did you receive any earnings in 1961 from any of the following sources?**
(Check as many as apply)

1 ☐ Consulting
2 ☐ Publications
3 ☐ Lectures
4 ☐ Other professional activities
5 ☐ Other secondary job

Estimate to the nearest hundred dollars the amount you received from all of these sources in 1961 (before taxes and other deductions but after deducting any business expenses.)

$ .00
(Omit cents)
OR 0 ☐ None

B. YOUR ACTIVITIES

8. Here is a list of activities which may be part of your work in your major current position.
(Please check all activities which you perform in this position.)

Code No.

01 ☐ Teach courses
02 ☐ Recruit, train people in the organization
03 ☐ Engage in basic research
04 ☐ Engage in applied research, or product development
05 ☐ Administering or supervising research or development
06 ☐ Consult or advise clients or customers on technical matters
07 ☐ Make drawings, blueprints, models
08 ☐ Make forecasts, estimate markets
09 ☐ Exploration; or field work
10 ☐ Design or modify equipment, machinery, processes of production
11 ☐ Supervise the work of assistants or subordinates
12 ☐ Quality control; set precision standards
13 ☐ Public relations, publicity work, speeches
14 ☐ Budgeting, costing, controlling, allocating expenditures
15 ☐ Test new or experimental equipment

Code No.

16 ☐ Travel
17 ☐ Constructing equipment, apparatus, prosthetic devices
18 ☐ Treating patients
19 ☐ Counselling clients, students
20 ☐ Supervising production or construction
21 ☐ Writing technical and general reports on projects
22 ☐ Coordinating activities of professionals at my level in the organization
23 ☐ Keep records
24 ☐ Statistical analysis
25 ☐ Technical sales
26 ☐ Negotiating contracts or raising funds
27 ☐ Briefing superiors on my work
28 ☐ Plan future operations
29 ☐ Compile and annotate bibliography; search and select literature
30 ☐ Other. What? _____

9. Of all those you checked above, which TWO do you spend the most time doing?
(Fill in their code numbers and write in the approximate percent of total time spent in each of these activities.)

Activity	Code number	Percent of time
FIRST		%
SECOND		%

C. PEOPLE YOU WORK WITH

10. About how many people work in the smallest organizational unit to which you belong in the business, industry, or organization in which you work?
Elementary and secondary teachers: check the number of teachers in your school. *(Check one)*

1 [ ] Less than 10
2 [ ] 10 to 24
3 [ ] 25 to 49
4 [ ] 50 to 99
5 [ ] 100 to 249
6 [ ] 250 to 499
7 [ ] 500 or more

11. How many employees are DIRECTLY responsible to you? *(Include both professional and nonprofessional.)*

Number of people

OR 0 [ ] None

12. Are you - - *(Check one)*

1 [ ] An administrator (concerned mainly with policy making, planning, overall supervision)
2 [ ] A supervisor (concerned mainly with technical matters)
3 [ ] A coordinator (concerned mainly with liaison)
4 [ ] Other. **What?** _____

13a. Do you - - *(Check as many as apply)*

Code No.

1 [ ] Work with other specialists in your field
2 [ ] Work individually, with little or no consultation with others
3 [ ] Work as an individual consultant to others
4 [ ] Work as a member of a team made up of specialists from your field and other fields
5 [ ] Work as a member of a team made up of specialists in other fields
6 [ ] Other. **What?** _____

b. Of all those you checked above, which ONE do you spend the most time doing? *(Write in the box the code number from 13a)*

Code

14. This question is about your immediate supervisor. If you have no immediate supervisor, check here [ ] 0 and skip to Question 15.

DO NOT WRITE HERE

a. What kind of work does he do? (For example: civil engineer, nuclear physicist, professor of economics, junior high school principal.)

b. In what field of specialization does he work? *(Fill in the code number from the enclosed list.)*

Code

D. ATTITUDES TOWARD WORK

15. Listed below are some characteristics which occupations may have.

a. Please indicate by checking the appropriate box how important each one is to you.

b. Also check the appropriate box to indicate how well your current major employment satisfies you with respect to each characteristic.

Occupational Characteristics		a. Importance to you			b. Degree of satisfaction		
		Very (1)	Somewhat (2)	Little or none (3)	Very (4)	Somewhat (5)	Little or none (6)
Opportunity to be original and creative	1						
Opportunity to be helpful to others or useful to society	2						
Relative independence in doing my work	3						
A chance to exercise leadership	4						
A nice community or area in which to live	5						
Opportunity to work with things	6						
Social standing and prestige in my community	7						
A chance to earn enough money to live comfortably	8						
Pleasant people to work with	9						
Freedom from pressures to conform in my personal life	10						
Opportunity to work with people	11						
Freedom to select areas of research	12						
Opportunity to work with ideas	13						

E. CURRENT ADDITIONAL JOB OR BUSINESS

(Defined as a job not with your primary employer)

16. Did you have a second regular job or business last week? *(Exclude any work with your major current employer.)*

1 ☐ Yes 2 ☐ No *(Skip to Section II)*

DO NOT WRITE HERE

17. In your second regular job or business:

a. What kind of business or industry were you working in?
(For example: city hospital, state university, road construction firm, retail drug store.)

b. Were you working - - *(Check one)*

1 ☐ **For a PRIVATE employer for wages, salary, commission or tips?**
2 ☐ **For GOVERNMENT?** (Federal, State, local, public school system, etc.)
3 ☐ **In OWN business or profession or farm for profit or fees?**
4 ☐ **WITHOUT PAY on family farm or business?**

c. What kind of work were you doing?
(For example: medical technician, research assistant in chemistry, civil engineer, sales clerk.)

d. In what field of specialization did you work? *(Fill in the code number which best describes your field from the enclosed list.)* Code

18a. Does your additional job involve - - *(Check one)*

1 ☐ Year-round employment 2 ☐ Seasonal employment only

b. How many hours a week do you usually work in this job or business? Hours per week

Section II - PAST EMPLOYMENT

In this section we are interested in your past work history, especially your work situation in April 1960 (when the Decennial Census was taken) and your first full-time job after reaching age 24.

A. APRIL 1960

1. What were you doing in April 1960? *(Check one)*

1 ☐ Working (include part-time work)
2 ☐ With a job but not at work (on vacation, sick leave, etc.)
3 ☐ Looking for work *(Skip to Question 7 on Page 5)*
4 ☐ Not in labor force, e.g., retired, keeping house, student, etc. *(Skip to Question 7 on Page 5)*

DO NOT WRITE HERE

2. Were you working for the same company, business, or organization in April 1960 as you were in your major employment last week (including self employment)?

1 ☐ Yes *(Skip to Question 3)* 2 ☐ No *(Please answer Questions a to d)*

a. For whom did you work in April 1960? *(Name of company, business, organization or other employer)*

b. What kind of business or industry were you working in?
(For example: city hospital, state university, road construction firm, county junior high school.) Kind of business

c. Were you working - - *(Check one)*

1 ☐ **For a PRIVATE employer for wages, salary, commission or tips?**
2 ☐ **For GOVERNMENT?** (Federal, State, local, public school system, etc.)
3 ☐ **In OWN business or profession or farm for profit or fees?**
4 ☐ **WITHOUT PAY on family farm or business?**

d. How many years did you work in this company, business or organization? No. of years

3. In April 1960, were you doing the same kind of work as you described for last week on Page 1, Item 3e?

1 ☐ Yes *(Skip to next question)*
2 ☐ No (Please describe what kind of work you were doing. For example: civil engineer, nuclear physicist, professor of economics, 9th grade social studies teacher.) →

4a. In April 1960, were you working in the same field of specialization as you were last week?
1 [ ] Yes (Skip to Question 5) 2 [ ] No (Go to 4b)

DO NOT WRITE HERE

b. What field of specialization was this? (Fill in the code number which best describes your field from the enclosed list.) | Code

5. In April 1960, which two activities did you spend the most time doing? (Consult the list on Page 2, Item 8, and fill in the code numbers.) | First activity | Second activity

6. Your immediate supervisor in April 1960-- If you have no immediate supervisor check here [ ] 0 and skip to Question 7.

What kind of work did he do? (For example: civil engineer, nuclear physicist, professor of economics, junior high school principal.) | Kind of work

B. PLEASE THINK BACK TO THE FULL-TIME CIVILIAN JOB HELD UPON REACHING AGE 24 OR IF NOT WORKING THEN--THE FIRST ONE HELD THEREAFTER.

0 [ ] Check here and skip to Question 11 if you are now under age 24.

7. Was your first full-time civilian job after reaching age 24--
a. The same as in April 1960? ..... 1 [ ] Yes 2 [ ] No
b. The same as your job last week? ..... 1 [ ] Yes 2 [ ] No
(If you answered "No" in BOTH "a" and "b", please complete this section. Otherwise skip to Question 11.)

DO NOT WRITE HERE

8. In what year did you enter this job (the job held upon reaching age 24 or the first one held thereafter)? | Year

9a. What kind of business, industry, or organization were you working in? (For example: city hospital, state university, road construction firm, county junior high school.) | Kind of business

b. Were you working at that time -- (Check one)
1 [ ] For a PRIVATE employer for wages, salary, commission or tips?
2 [ ] For GOVERNMENT? (Federal, State, local, public school system, etc.)
3 [ ] In OWN business or profession or farm for profit or fees?
4 [ ] WITHOUT PAY on family farm or business?

c. What kind of work were you doing? (For example: civil engineer, nuclear physicist, professor of economics, 9th grade social studies teacher.) | Kind of work

d. In what field of specialization was this? (Fill in the code number which best describes your field from the enclosed list.) | Code

e. Describe what you did in your full-time job at that time:

10. How many years did you work in this company, business, or organization? | No. of years

C. GENERAL EMPLOYMENT

11. How many years have you ever worked either full-time or part-time in your present field of specialization? | No. of years

12. How many different employers have you ever had in your present field of specialization? | No. of employers

13. Are there any other fields of specialization in which you worked for at least one year besides those you have already listed? (Fill in their code numbers from the enclosed list.)

	Field	Code
FIRST		
SECOND		

14. Did you ever work full-time for at least six months in any of the following? (Check as many as apply)

01 [ ] Federal Government (includes all civilian employees of Federal Government agencies; also Federal hospitals. Does not include military service.)
02 [ ] State or local government (includes state or municipal hospitals, but excludes public schools or universities)
03 [ ] Public college or university
04 [ ] Private college or university
05 [ ] Public elementary or secondary school
06 [ ] Private elementary or secondary school
07 [ ] Research organization or institute (except government or university)
08 [ ] Hospital, clinic, welfare organization (except government)
09 [ ] Professional partnership
10 [ ] Other private business or industry
11 [ ] Independent consulting work
12 [ ] Other self-employment
13 [ ] Foreign government or international agency
14 [ ] Career in Armed Forces
15 [ ] Other (not mentioned) (Specify)

Section III - YOUR TRAINING

1. How many years of education and formal training have you had? *(Check the highest year completed)*

Never attended school ☐ 0

Elementary and high school ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

All school's attended beyond the high school level, including college, technical institute, etc. (academic years) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more

2. Which of the following types of elementary and high schools did you attend? *(Check as many as apply)*

1 ☐ Public 2 ☐ Parochial 3 ☐ Other private

3. While you attended high school, did you receive any G.I. Bill or Vocational Rehabilitation financial aid from the U.S. Veterans Administration?

1 ☐ Yes 2 ☐ No 3 ☐ Never attended high school *(Skip to 6)*

4. During your senior year in high school, was your curriculum - - (Check one)

1 ☐ Academic
2 ☐ General
3 ☐ Technical
4 ☐ Vocational
5 ☐ Commercial
6 ☐ Other *(Specify)* _____
7 ☐ Did not attend through senior year *(Skip to 6)*

5. How large was your high school graduating class? *(Check one)*

1 ☐ Less than 50
2 ☐ 50 to 99
3 ☐ 100 to 199
4 ☐ 200 to 299
5 ☐ 300 to 399
6 ☐ 400 to 499
7 ☐ 500 or more
8 ☐ Did not graduate

6. List below in order of attendance, each institution from which you obtained or are currently obtaining formal training beyond the high school level, and give the other information as requested.

NOTE: If training was taken abroad, enter the name of the foreign country under "Location".

Use a separate line for each degree granted, worked for, or for any change in major field of specialized study. Refer to the enclosed list for the code numbers of fields of specialized study.

Institution		Major field of study (Code)	Year work ended	Type of degree granted (if any)	No. of months of study completed		
Name	Location (State)				Total number of months	With G.I. Bill or Voc. Rehab. aid from VA	
						Yes (No. of months)	No (Check)
1.			19___				
2.			19___				
3.			19___				
4.			19___				

7. How did you finance this post-high school training? *(Check as many as apply)*

Source		Undergraduate (1)	Graduate or professional (2)
A scholarship or fellowship* from:			
College or university	01	☐	☐
Federal agency:			
National Science Foundation	02	☐	☐
Public Health Service - National Institutes of Health	03	☐	☐
Office of Education	04	☐	☐
Other *(Specify)* _____	05	☐	☐
A research or teaching assistantship	06	☐	☐
Loans	07	☐	☐
Own earnings from employment while attending school (except assistantship)	08	☐	☐
Own savings from previous employment (including that earned between school terms)	09	☐	☐
Employer paid for the training	10	☐	☐
Aid from my parents, relatives, spouse, or spouse's parents	11	☐	☐
Veterans Administration Benefits: G.I. Bill or Vocational Rehabilitation	12	☐	☐
Other sources	13	☐	☐
(WRITE IN THE BLANKS THE CODE NUMBER OF THE SINGLE MOST IMPORTANT SOURCE.)		_____	_____

* Defined as a financial grant for which no services are required; does not include loans which require repayment.

8. Which of the following items listed below contributed most significantly to your becoming qualified for your present job? *(Check as many as apply)*

- v ☐ Check here if you are not currently employed
- 1 ☐ Experience in present or related field of employment
- 2 ☐ Course work at a college or university without a degree
- 3 ☐ Acquired a B.A., B.Sc., etc.
- 4 ☐ Acquired a graduate or professional degree
- 5 ☐ Course work at a technical institute
- 6 ☐ Course work at Junior or Community College
- 7 ☐ Post-high school courses at a vocational or technical high school
- 8 ☐ Correspondence courses
- 9 ☐ Special training or course given by employer
- 0 ☐ Other *(Please specify)* _____

9. Do the qualifications for your present job require a license or a certificate?

1 ☐ Yes → 2 ☐ No *(Skip to Question 11)*

10a. Do you presently have such a license or certificate?

1 ☐ Yes → 2 ☐ No *(Skip to Question 11)*

b. Is this a standard license or certificate representing full qualifications?

1 ☐ Yes 2 ☐ No

11. Have you ever received or are you currently receiving any of the following types of training?

1 ☐ Yes

2 ☐ No *(Skip to Question 12)*

Code No.		Code No.	
01	Apprenticeships	06	Home study correspondence courses
02	Company training programs (other than apprenticeships)	07	Agricultural training courses
03	Military training applicable to civilian occupations	08	United States Armed Forces Institute courses
04	On-the-job training	09	Work-Study Programs
05	High school extension courses	10	Workshops, Seminars, etc.

(If "Yes," give the name of the organization or institution providing this training received and enter the other information as requested. Do not repeat the training listed in Question 6, Page 6.)

Name of sponsoring institution or organization	Type of training *(Code No. from above list)*	Subject of training	Weeks of training	Year ended	Did you complete the course?		With G.I. Bill or Voc. Rehab. aid from VA	
					Yes	No	Yes	No
				19___				
				19___				
				19___				
				19___				
				19___				
				19___				

12. This question is for United States Veterans of World War II or the Korean Conflict.

☐ Not a veteran of either *(Check here and go to Section IV)*

a. Did you receive any formal vocational counseling, including aptitude testing, from - - (Check one)

1 ☐ Veterans Administration or VA Guidance Center
2 ☐ A source other than VA
3 ☐ Both VA and other source
(Please answer "b")

4 ☐ Never had any such vocational counseling *(Please skip to Section IV)*

b. Was this counseling significantly useful to your career?

1 ☐ Yes 2 ☐ No

Section IV - BACKGROUND INFORMATION

In order to aid us in interpreting the information elsewhere in the questionnaire, we need now to know something about your background and personal characteristics.

1. Age (at last birthday) . . . . . Years

2. Sex
1 ☐ Male 2 ☐ Female

3. Citizenship: *(Check one)*
1 ☐ Citizen of the United States
2 ☐ Not a citizen of the United States but have taken out first citizenship papers
3 ☐ Not a citizen of the United States and have not taken out papers for citizenship

4. Where is your residence? . . . . . State _____ County _____

5. Where did you grow up? *(Where did you live most of the time before age 16?)*
1 ☐ In a large city (100,000 population or more)
2 ☐ In a suburb near a large city
3 ☐ In a small or middle-sized city or town (under 100,000 population) but not in a suburb of a large city
4 ☐ Open country (not on a farm)
5 ☐ On a farm

DO NOT WRITE HERE

6. What kind of work did your father do when you were about 16 years old?
(For example: 8th grade English teacher, paint sprayer, farm hand, civil engineer.)

_____

7. How many people (including your spouse, children or other relatives, as applicable) are now financially dependent upon you? Number of people _____

8a. What is your present marital status?
1 ☐ Never married *(Skip to Question 9)*
2 ☐ Married
3 ☐ Separated or divorced
4 ☐ Widowed

b. How many children do you have?
(Enter the number in the appropriate spaces.)

If none, check here . . . . . 0 ☐

Children	Boys	Girls
1. Under 5 years		
2. 5 through 10 years		
3. 11 through 18 years		
4. Over 18 years		

9. Are you currently a member of any professional society or association?
(For example: American Physiological Society, Michigan Engineering Society, New Orleans Academy of Sciences.)
1 ☐ Yes → Please list the names of all these organizations.
2 ☐ No *(Go to Question 10)*

_____

_____

10. Have you published any professional articles or books OR have you delivered any papers at professional meetings?
1 ☐ Yes 2 ☐ No

Please use this space to further explain any of the preceding answers.

_____

_____

_____

FOR CENSUS USE ONLY	A.	B.	C.

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FORM 1-61
(5-1-62)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

FIELDS OF SPECIALIZATION LIST

POSTCENSAL STUDY OF PROFESSIONAL AND SKILLED MANPOWER

INSTRUCTIONS

This list is to be used in answering questions about fields of specialization in Section I (Current Employment), Section II (Past Employment), and Section III (Training).

Note: Elementary and Secondary School teachers should code their employment specialization under "Teaching". Junior College, Technical Institute, and College and University teachers should code their specialization for employment purposes according to the **subject matter** they teach, **not** as "Teaching".

When you have chosen from the list the field which is your answer to the questions, please write the two numbers or the letters of that field in the blank provided below each of the questions.

100 **TEACHING** - Elementary Education (including Kindergarten and Nursery School)

TEACHING - Secondary Education (including Junior High School)

101 English
102 Foreign Languages
103 History, Social Studies
104 Natural Science (General, Physics, Chemistry, Biology, etc.)
105 Mathematics
106 Other Secondary Fields

ENGINEERING

110 Aeronautical (including Astronautics, Aerospace)
111 Agricultural
112 Ceramics
113 Chemical (including Plastics)
114 Civil (including Structural and Architectural; Transportation)
115 Electrical (including Power and Communication)
116 Electronics
117 Engineering Science (including Engineering Mechanics, Engineering Physics)
118 Industrial (including Engineering Management)
119 Materials
120 Mechanical
121 Metallurgical
122 Mining and Petroleum (including Geological, Geophysical)
123 Nuclear
124 Sanitary
125 Engineering, General
126 Engineering, Other (Describe in a word or two under the question where it applies)

MATHEMATICS AND STATISTICS *(NOTE: Secondary School teaching is classified under TEACHING)*

130 Algebra and Number Theory
131 Analysis and Functional Analysis
132 Geometry
133 Logic
134 Mathematics of Resource Use (including Actuarial Mathematics, Operations Research)
135 Number Theory
136 Numerical Methods (including computers and scientific data processing)

MATHEMATICS AND STATISTICS--Continued

137 Topology
138 Probability
139 Statistics (including Mathematical Statistics)
140 Mathematics, General
141 Mathematics, Other (Describe in a word or two under the question when it applies)

PHYSICAL SCIENCES *(NOTE: Secondary School teaching is classified under TEACHING)*

Physics

150 Theoretical Physics
151 Mechanics
152 Optics
153 Electromagnetic Waves and Electron Physics
154 Acoustics
155 Thermal Phenomena
156 Solid State
157 Elementary Particle Physics
158 Nuclear Structure
159 Atomic and Molecular
160 General Physics
161 Physics, Other (Describe in a word or two under the question where it applies)

Chemistry

170 Analytic
171 Agriculture and Food
172 Inorganic
173 Organic
174 Biochemistry
175 Physical
176 General Chemistry
177 Chemistry, Other (Describe in a word or two under the question where it applies)

Other Physical Sciences

180 Geology
181 Oceanography
182 Atmospheric Sciences (including meteorology)
183 Astronomy
184 Metallurgy
185 Geophysics
186 Physical Science, General
187 Physical Sciences, Other (Describe in a word or two under the question where it applies)

FIELDS OF SPECIALIZATION - - Continued

BIOLOGICAL AND AGRICULTURAL SCIENCES AND RELATED FIELDS *(NOTE: Secondary School teaching is classified under TEACHING)*

190 Anatomy
191 Bacteriology
192 Botany and related Plant Sciences
193 Biophysics
194 Ecology
195 Entomology
196 Genetics
197 Immunology
198 Nutrition
199 Pathology
200 Pharmacology
201 Physiology
202 Phytopathology
203 Virology
204 Zoology
205 Biology, General
206 Biology, Other (Describe in a word or two under the question where it applies)
207 Agronomy
208 Animal Husbandry
209 Fish and Wildlife
210 Forestry, and Range Management
211 Horticulture
212 Soil Science and Soil Conservation
213 Agricultural Sciences, Other (Describe in a word or two under the question where it applies)

HEALTH FIELDS

220 Dentistry or Pre-Dentistry
221 Medicine or Pre-Medicine
222 Veterinary medicine
223 Nursing
224 Pharmacy
225 Medical Technology or Hygiene
226 Dental Technology or Hygiene
227 Industrial hygiene and occupational health
228 Other Health Fields (Describe in a word or two under the question where it applies)

PSYCHOLOGY

230 Clinical Psychology
231 Counseling and Guidance
232 Educational Psychology
233 Social Psychology
234 Industrial and Personnel Psychology
235 Experimental Psychology
236 General Psychology
237 Psychology, other (Describe in a word or two under the question where it applies)

SOCIAL SCIENCES, HUMANITIES AND OTHER SPECIALTIES *(NOTE: Secondary School teaching is classified under TEACHING)*

240 Anthropology
241 Archeology
242 Architecture
243 Archival Science
244 Business Administration (including Accounting, Advertising, Marketing, Industrial Relations, Insurance, Finance, etc).
245 City Planning
246 Designing
247 Drafting
248 Economics
249 Education
250 Fine and Applied Arts
251 Foreign Service
252 Geography
253 History
254 Home Economics
255 Journalism, Radio-Television, Other Communications Media
256 Law, Pre-Law
257 Library Science
258 Linguistics
259 Literature
260 Military Service (not contained elsewhere on the list)
261 Music
262 Philosophy
263 Political Science (including International Relations)
264 Public Administration
265 Religion and Theology
266 Social work, Group work
267 Sociology
268 Social Science, General and Other
269 Surveying
270 Technician Specialization (Use this code only if field cannot be chosen from other fields on list - Describe field in a word or two)

280 Other, Field of Study or Job which has no Near Equivalent in this list (if you use this code, please describe your field in a word or two under the question where it applies)

FORM 1-61 (8-1-62)

APPENDIX B

The Postcensal Studies Program: Background and Content

Note: Reprinted from Proceedings of the Social Statistics Section 1963, pp. 150-53. Reproduced by permission of the American Statistical Association and of the author.

THE POSTCENSAL STUDIES PROGRAM: BACKGROUND AND CONTENT

Norman Seltzer
National Science Foundation

The need for data on the Nation's resources of all types of manpower has become more urgent as an awareness grows that such information is vital in planning and evaluating many economic, educational, and scientific policies and programs in all sectors of the economy. In particular, our concern regarding our resources of high-level manpower required to carry out the multitude of tasks in science and technology has been reflected in the National Science Foundation's programs of scientific manpower studies. These programs have been in effect since the establishment of the National Science Foundation more than a decade ago, and although the number and variety of studies and surveys supported by the Foundation in recent years has been quite extensive, the realization that we have yet much to accomplish is with us at all times.

The genesis of the Postcensal Studies Program goes back to 1957 when the Foundation together with the President's Committee on Scientists and Engineers appointed a special advisory panel to review requirements for scientific manpower data. In its report[1] issued in 1958, this panel found, not surprisingly, that on the whole, data on the number, demand, supply, utilization, and other economic and social characteristics of scientific and technical personnel were not adequate for formulating policies and undertaking programs related to the welfare and security of the Nation. Among the projects recommended as highly urgent was "a special survey of a large sample of persons recorded in the 1960 Census enumeration as college graduates or as persons currently or last employed in scientific and technical positions, whether college graduates or not, to determine relationships between training and subsequent occupations." It was reasoned that the 1960 Census would provide a rare opportunity (not available again for possibly another 10 years) to obtain valuable data directly and efficiently from the individuals classified in scientific and technical occupations regarding their demographic, economic, and social characteristics. In addition, by surveying all types of college graduates, regardless of occupation, comparable data would be provided on other highly trained personnel in other professions (such as law and medicine), in the humanities, in business, and in managerial and administrative positions in business and government as well as those currently not in the labor force.

With the knowledge that Census Bureau data processing would have available by 1962 a tape with the occupational sample information, the National Science Foundation in 1960 began to consider the feasibility of undertaking such a major project, and requested that the National Opinion Research Center, affiliated with the University of Chicago, prepare a planning statement on a series of postcensal studies of scientific and professional workers and college graduates. A detailed planning statement was prepared which provided the initial basis for the proposed studies. During the first part of 1961, the Foundation, aware of the interests and missions of other Federal agencies, initiated a series of meetings with these agencies to acquaint them with the proposed studies and provide them with the opportunity to participate in or cosponsor the nation-wide survey under consideration. By late fall, 1961, four other Federal agencies--the U.S. Office of Education, National Institutes of Health, Bureau of Labor Statistics, and the Veterans' Administration--had made definite commitments to participate in the survey and provide the necessary support.

Beginning in the Spring of 1961, the National Opinion Research Center with the aid and consultation of the National Science Foundation and the Bureau of the Census began to develop a basic mail questionnaire which would be used as the primary survey instrument for the Postcensal Studies Program. Since another paper has developed in detail the mechanics and operation of the survey itself, the remainder of this paper will discuss the content of the questionnaire and some of the possible uses of the data which we were seeking.

The availability of a large sample based on the entire population was very attractive bait for requesting information on an extremely wide variety of subjects which could well have covered numerous economic, demographic, sociological, and psychological areas. The temptation to run wild, so to speak, was held in check by the very obvious realizations that the burden imposed on the respondents might be such as to obviate any possible success in obtaining a meaningful rate of response. In addition, of course, was the fact that the Foundation's program of manpower studies enables us to obtain data from a variety of sources, much of which would both complement and supplement data derived through the Postcensal Studies Program. These manpower studies include among others, the National Register of Scientific and Technical Personnel, employment surveys of scientific and technical personnel in various economic sectors, followup studies of college graduates, and pilot efforts dealing with the labor market behavior and mobility of persons in selected occupations.

The content of the Postcensal Studies Program can be reviewed in some detail through an examination of the survey questionnaire itself. Even with self-imposed limitations, the final version of the basic questionnaire ran to eight "fully-packed" pages with an additional sheet enclosed containing a list of precoded fields of specialization to be used in answering questions dealing with employment and training. For a small sample of persons in occupations in which the National Institutes of Health had particular interest, another one-page supplemental questionnaire was added dealing in detail with questions of financial support received by the respondent for both training and research purposes.

To begin with, among the main focuses of interest were questions pertaining to the employment, occupation, and job activities of persons classified in selected professional, scientific, and technical occupations during the 1960 census. In the 1960 census schedule, the amount of information available pertaining to a person's work activities is quite limited. In fact, the only direct questions deal with what a person does (in terms of an occupational classification) and what type of employer he works for. Even information collected by both Government and nongovernment organizations for studies dealing with job analysis or vocational guidance have provided largely some general outlines when dealing with professional and technical personnel. The occupational label used in classifying personnel such as "engineer," "chemist," or "college professor" actually covers persons in a wide range of specializations.

Therefore, we were interested in determining first, for the most current period possible, how many engineers, for example, were working in civil compared to nuclear engineering; how many chemists considered themselves to be in organic chemistry compared to physical chemistry; and, what fields college teachers considered their primary area of specialization. Beyond this, we were hopeful of obtaining some insight into the extent to which interdisciplinary work in science and

[1] A Program for National Information on Scientific and Technical Personnel, NSF 58-28, National Science Foundation, 1958.

technology has resulted in engineers working in an area of the physical or life sciences, physicists concerning themselves primarily with some aspect of the medical sciences, or mathematicians calling astronomy their field of work specialization.

Another equally important area of job information is the activities or duties that are actually performed; that is, what do people classified in professional and technical occupations of interest to us "really do" in their jobs. Most of our information in this area, currently, comes from other surveys which give us only an indication of the functions in which an individual is primarily engaged; for example, the National Register and the employment surveys mentioned earlier. Although we may have some indication that a certain number of physicists may be involved in "research," what the varied job requirements or duties of these personnel are has not really been known. For some, this may mean that aside from engaging in applied research, the job may entail consulting customers on technical matters, coordinating a team of other professional personnel, and writing technical reports; for others, there may be administrative duties, and making estimates of markets for new products. For persons in other occupations, such as engineers, mathematicians, economists, and college teachers, there are of course a similar wide range of activities which make up the different types of jobs in which such personnel are engaged. In addition to obtaining an overview of the varied activities making up the jobs of professional and technical workers, respondents in the study were also requested to indicate which two activities were primary in the sense of most time being spent on them.

The organization of work in professional and technical occupations and the interpersonal relationships in the work environment are other areas in which little information has been developed. Although in the past, the professional, in particular, was either self-employed or worked largely alone even when employed in an organization, the development of the professions and the complexities of scientific and technical work in an increasingly industrialized setting have resulted in considerable changes in the organizational environment. In order to obtain some understanding of this environment, a series of questions were directed at the respondent regarding the size of organizational unit in which employed; the number of employees being supervised, if any; whether he works as part of a team, either with personnel from his own field of specialization or from others; whether he has an immediate supervisor, and if so, if the supervisor's field of specialization is similar to his.

If our knowledge concerning the current employment and job activities of professional and technical personnel has been rather limited, this has been even more so about the process over time by which such highly trained persons are allocated to various jobs and employers, the career paths which may characterize different professions, and the movement of professional and technical personnel between various employers, occupations, and work specializations. It was determined that some insight into this complex area would be helpful in dealing with an assortment of problems including the supply and demand of scientific and technical personnel. To this end, questions on employment and job activities were related to three points in time--current employment (e.g., mid-1962 when the survey schedules were sent out), April 1960 (the date of the decennial census when the persons in these occupations were originally enumerated), and the first full-time job held at age 24. It was obvious, of course, that such information could not provide complete work histories, but it would give us a broad overview of mobility patterns. For these time periods, it will be possible to analyze many factors in relation to changers and nonchangers among the various occupational groups; for example, there are those who have always had the same occupation with the same employer, those who have changed employers one or more times but remained in the same occupations, those who have remained with the same type of employer and occupations but whose area of work specialization has shifted during their careers, etc.

What insights can be provided by such data? The period 1960-1962 has been marked by, among other things, an increase in vast Federal Government expenditures for research and development, a build up of activities in both government and industry for the space program, an increase in existing as well as new programs for medical and health research, an increased emphasis on the development of new products in many science-oriented industries, and an expansion of college and university facilities to accomodate the influx of new students and provide for expanding research programs. Against this background, the recent mobility data will provide an evaluation of the movement between employers, jobs, activities, and fields of specializations. For example, are more scientists moving from academic employers to industrial jobs than vice versa? Are a greater proportion of engineers concerned with administrative or supervisory duties than heretofore? Are certain industries attracting a higher proportion of the mobile personnel? Does there appear to be a shifting or upgrading of persons in nonprofessional jobs (the technician occupations) to professional occupations?

By going back to the age 24 starting point for job histories, it may be possible to establish typical and variant career histories for specific occupations and occupational groups, for respondents with specific levels and types of training, and for those with certain demographic characteristics. Several additional general questions on employment which were included will provide some further insights into the overall work history patterns: Respondents were asked to indicate all the different types of employers worked for; the number of different employers for the current field of work specialization as well as the total number of years worked in the present field of specialization; and finally, some data on the different fields of work specialization in which the respondent was engaged during his career other than those already indicated for the specific points in time requested.

Turning now to our third main area of inquiry--training--an intensive effort has been made to obtain a considerable amount of detail on various facets of both formal education and informal types of training. Most persons in the occupations covered in this survey have a fairly high level of training, especially when compared to the general population. Not only is some information in this area available from a variety of other studies, but we are also aware that the requirements for employment in these professional, scientific, and technical occupations require this background--even more so in the past several decades.

To begin with, since information on training was obtained as of 1962, we were able to update the Census occupational information on number of years of formal training completed. However, our primary interest lay beyond these data in that we wanted to determine some of the specifics of higher education obtained in relation to subsequent employment. Data were therefore requested on major fields of specialization for undergraduate and graduate study at every institution attended, as well as the different types of degrees granted, where appropriate. As a subsidiary question, we requested information on sources of financial support received by respondents for undergraduate and graduate or professional training. This will provide some historical insights on the varied sources of support obtained by persons who received their training in different fields of study. In addition, because of our general knowledge that a substantial amount of training takes place outside of the formal educational system, several questions were included about informal types of training received, such as company training programs, military training applicable to civilian occupations, home study correspondence

courses, special workshops and seminars, etc. Some of the more apparent uses of this information includes: A detailed description of the formal education and training of persons in various professional, scientific, and technical occupations; an analysis of current occupation and field of work specialization as well as overall job histories in relation to major fields of study at both undergraduate and graduate levels; the extent to which persons with less than a college degree are employed in professional occupations, and what types of informal training as well as experience may have contributed to their attaining such positions; and, an analysis of the personal and other background characteristics of the respondents to determine whether any insight can be obtained regarding differences in levels of training and subject matter studied.

Lastly, as previously indicated, some information was sought on background and personal characteristics both to supplement data available from other sources and as factors to relate to data obtained in the areas dealing with employment and training.

The information obtained in several of these areas includes: (1) Attitudes toward work in terms of the respondent's current occupation--respondents were asked to indicate the relative importance of and degree of satisfaction with selected characteristics of occupations. Information provided here may aid in identifying clusters of values which characterize specific occupations or groups of occupations. In addition, we may obtain clues regarding continuity of employment and future turnover among persons in various occupations, and in relation to such factors as age, geographic location, and training background. (2) Marital status and fertility--this includes both the marital status of the respondent as well as the number and ages of the respondent's children as possible factors in job mobility. Also, we are provided with a measure of the reproductive rates of an important segment of the population. (3) Professional characteristics--this area covers membership in professional associations and data on publication of articles or books and presentation of papers at professional meetings. Obviously, these two characteristics are only a few of the many which could be explored regarding status or professionalism among the occupations being studied.

The second major group covered in the Postcensal Survey encompasses a sample of all college graduate broken into a number of subgroups. The two main subgroups included: (1) Those in the labor force in 1960 employed in all other occupations not covered in what might be called our target occupation sample; and (2) those in the labor reserve in 1960 (employed at some time between 1950 and 1960 in occupations covered in our professional and technical occupations sample). For all these respondents, information was also obtained on their work and career histories, training background, and various personal characteristics. Not only will the data provided by the persons in this group result in a comparative analysis of the Nation's college-educated population, but in terms of our own particular interests, we will be able to determine in large measure the extent to which persons trained in scientific and technical fields were, in 1960, working in occupations seemingly unrelated to this training; the same for persons who started their careers in professional, scientific, and technical occupations and were employed elsewhere in 1960; and finally, what potential exists among those in the professional and technical labor reserve in 1960 for possible reemployment in professional, scientific, and technical fields.

In closing, I should like to reiterate our hope that the program of postcensal studies outlined here will provide many insights helpful in contending with manpower problems affecting all sectors of the economy and the national welfare. The data and information culled from these studies and added to information from other past, current, and future studies will hopefully bring us closer to the day when the formulation of policies affecting our highly trained manpower will be undertaken with much greater assurance and confidence than heretofore.

APPENDIX C

The Postcensal Study: Data Collection, Processing, and Tabulating

Note: Reprinted from Proceedings of the Social Statistics Section 1963, pp. 154-62. Reproduced by permission of The American Statistical Association and of the authors.

THE POSTCENSAL STUDY: DATA COLLECTION, PROCESSING, AND TABULATING

Stanley Greene and David L. Kaplan*
Bureau of the Census

The Postcensal Study of Professional and Technical Manpower represents a major survey undertaking of the Bureau of the Census. There were various tasks involved covering a wide range of technical activities.

The major tasks associated with this project presently completed by the Bureau of the Census are as follows:

1. Design and printing of questionnaires and other forms.
2. A pretest covering 600 cases.
3. Sample selection of some 70,000 persons covering 45 specified professional and technical occupations and college-graduate groups from the 1960 Census of Population records.
4. Matching of selected sample cases to the 1960 Population Census schedules to obtain name and address for mailing purposes.
5. Mailing operation consisting of an original mail-out, followup as required by two reminder letters and, finally, a reminder letter under the National Science Foundation letterhead.
6. Independent subsampling of the two classes of nonresponses--(1) those returned by the post office as nondeliverable, and (2) those apparently delivered but not answered. The two groups were subsampled for further followup by, respectively, (a) addressing new questionnaires to the "postal rejects" in care of their employers (requiring a search and match of the 1960 Census of Population returns for "names of employers" and a directory search for the corresponding address) and (b) having the "nonanswer" cases telephoned by Census Bureau enumerators in the areas covered by the Current Population Survey.
7. Manual editing and coding of the returned questionnaires.
8. Card punching the information (requiring six punch cards per case).

The following phases of the project remain to be implemented although much of the planning work has been completed:

1. Transfer of punch card data to computer tape.
2. Preparation of the computer tape record for each case and weighting of same.
3. Tallying the required tabulations.

Details of the various phases of the planning, implementation, and results are discussed in this paper.

Universe

Several major classes of people comprised the universe included in the survey. The largest class consisted of persons who were reported as being in the experienced civilian labor force in specified professional occupations in the 1960 census.[1] This included those who were employed in the specified occupations and those who were unemployed, but whose last job was in one of the selected occupations.

The original planning called for 33 professional occupations. Three of these were dropped[2] before the survey was taken, whereas librarians were limited to those employed in public libraries, and elementary or secondary schools and sampled as separate groups. Thus there were 31 distinct professional categories in the survey. These are listed on table 1.

A second major class included in the survey comprised those persons in the "experienced civilian labor force" in seven technical occupation groups. The occupations included were designers, draftsmen, surveyors, medical and dental technicians, electrical and electronic technicians, other engineering and physical sciences technicians, and technicians not elsewhere classified.

In addition to the two major classes of occupations listed above, the survey included a sample of persons who had completed four or more years of college. This last major class was subdivided into the following seven groups. The first three groups were in the labor reserve[3] in 1960. The three labor reserve groups covered:

1. Female, ages 20 to 54 years, with experience in one of the selected professional or technical occupations.
2. Other persons with experience in one of the selected professional or technical occupations.
3. All persons in labor reserve with experience in occupations not selected for the survey.

*The authors wish to acknowledge the assistance of Mr. John Priebe in preparing this paper.

[1]For information on the classification of occupations in the 1960 census, see U.S. Bureau of the Census, 1960 Census of Population, Alphabetical Index of Occupations and Industries, Revised Edition, Washington, D.C., 1960, and its companion volume U.S. Bureau of the Census, 1960 Census of Population, Classified Index of Occupations and Industries, Washington, D.C., 1960. For information on the definition of concepts used by the Bureau of the Census, see the text in the following reports: U.S. Census of Population: 1960, Detailed Characteristics, United States Summary, Final Report PC(1)-1D, Washington, D.C., 1963, and U.S. Census of Population: 1960, Occupational Characteristics, Final Report PC(2)-7A, Washington, D.C., 1963.

[2]Professional nurses, pharmacists, and physicians and surgeons who were employed by any level of government, but not working in hospitals.

[3]In the 1960 census the term labor reserve was used for those persons who had worked sometime during the period of 1950 to 1960, but were not in the labor force at the time of the census.

The persons in the "experienced civilian labor force" who were in occupations other than those selected for the survey were subdivided into the following three groups:

1. Managers, officials, and proprietors (not elsewhere classified) who were working in the following industries:

   Agriculture, forestry and fisheries
   Mining
   Construction
   Manufacturing
   Transportation, communications, and other public utilities
   Entertainment and recreation services
   Professional and related services
   Public administration

2. Balance--Females, ages 20 to 54 years

3. All others

The remaining group consists of the remaining noninstitutional population, 20 years old and over not in the Armed Forces.

The complete list of 45 classes and the detailed components are outlined in table 1.

Design and Printing of Questionnaires and Other Forms

The original questionnaire was designed by the National Opinion Research Center. This questionnaire was reviewed for feasibility by the Bureau of the Census. These two organizations in consultation with the sponsoring agencies, developed the questionnaire that was used in the Census Bureau pretest.

The questionnaire used in the pretest consisted of eight pages divided into four sections. The first section dealt with current employment, asking questions on their present employment status, and, if working, on the respondent's occupation, industry, earnings, job activities, work attitudes, and the holding and nature of a second job.

The second section asked questions on the employment status as of April 1, 1960 (the date of the Decennial Census) and the respondent's first full-time job after reaching age 25 (an age where most persons had completed their formal education).

Section III inquired about the educational and training level of the respondent. It asked questions on the colleges attended, field of study, type of degree granted and year work was ended. This section also asked about the source of finances for their post-high school training and other types of training they may have received, such as company training programs, home study correspondence courses, and military training applicable to civilian occupations.

The last section requested background information such as age, sex, type of residence when growing up, marital status and number of dependents. An analysis of the results of the pretest questionnaire was the basis for redesigning the questionnaire. Most of the changes were in the format, but some changes were made in the items with several additions being made to the section IV on background information.

Three variations of the questionnaire were designed and used in the survey. The basic questionnaire was used for the selected professional occupations, and the three "experienced civilian labor force" classes. A variation of the basic questionnaire was used for the technicians. The major changes in this questionnaire were in the list of job activities, and the technicians were not asked work attitudes. A second variation of the questionnaire was used for the labor reserve and the last class of those not in the labor force or the labor reserve. The major difference in this questionnaire was in the method of asking for past work experience.

A supplementary questionnaire was sent to a portion of the biologists and psychologists on sources of research support they may have received during their graduate studies.

Pretests

A feasibility pretest of this survey, covering 275 cases, was conducted in the Chicago area by the National Opinion Research Center. Another pretest was conducted by the Bureau of the Census beginning in the fall of 1961. Persons in professional and technical occupations used in this survey were selected from a special evaluation project file which provided the names and addresses of respondents. Approximately 600 cases were selected for the pretest. An original mailing was followed by two reminder mailings sent to the nonrespondents. The response rates of this pretest are given below.

Mailing	Number mailed	Responses	
		Number	Percent
Total.....	591	419	70.9
Original mailing.....	591	254	43.0
First followup.....	445	116	26.0
Second followup.....	229	49	21.4

A subsample of the nonresponse cases, amounting to 51 cases, was drawn for further followup activity. This work consisted of a personal phone call reminder to the nonrespondent and produced 23 additional returns. Therefore the final number of completed questionnaires received in the pretest was 442 or 74.8 percent. (A figure quite similar to our results in the main study.)

These completed questionnaires were then analyzed and tabulated focusing on the problem of nonresponse by item and inconsistency between items. The result of this analysis was the final determinant in preparing the format and wording of the questionnaires.

Sample Selection

The Bureau, in consultation with the sponsoring agencies, selected the sample for the survey. First, within the limits of financing and statistical reliability, the number of sample cases required for each occupation and other group in the universe was determined. (See col. 1 of table 2.) Estimates were made--since the universe counts were not yet available at the time--of the number of cases of each of these groups that would appear on the 1960 census 25-percent-sample tape file. These two figures provided the basis for determining a differential sampling ratio for each group to supply the required number of sample cases (col. 3). Since the basic universe was not known but had to be estimated, a very liberal sampling ratio was adopted to assure that a sufficient number of sampling cases would be selected from the census 25-percent-sample file. Using these sampling ratios, the first selection (and count of the total in each category) was made by the computer on a sample "every K case" basis. The computer identified and selected by the predetermined sampling ratio each category of the sample universe (shown in col. 4).

Revisions in the groups to be surveyed were also made. For example, pharmacists were deleted from the study and became the basis of a special project.

Such revisions in the groups were cause for increasing the *number* of sample cases required for certain of the remaining groups (col. 2). The revised number of sample cases required for the study was then compared to the first sample selection based upon the liberal sampling fraction. A division of these two figures for each group provided a subsampling fraction (col. 5). The computer then applied the subsampling fraction to the first sample selection and selected the final sample (col. 6). This was accomplished in the following manner. A random start between zero and the final sampling fraction was selected for each category. To this random start the sampling fraction (to five decimal places) was added for each case in the first sample selection. When this sum exceeded or equaled "one" the case thus identified was selected and the sum reduced by one. If the sum for the case did not equal or exceed "one" the case was not selected and the next addition was made.

The computer thus identified the sample cases and also selected for high-speed printouts, pertinent data for the sample case, providing a basis for searching original census records for purposes of matching and name and address determination for mailing the questionnaires.

A subsample of 1,500 biologists and 1,000 psychologists was selected to receive the supplementary questionnaire on research support. These cases were selected by using a random start and every "n"th case thereafter. "n" was computed by dividing the number of cases selected to receive the supplementary questionnaire by the total number of cases in the survey with the specified occupational code.

Matching and Mailing Operations

When the sample was selected from the 1960 census tapes, certain identification items were selected for each case and printed out on a listing. Some of the identification items used were the codes for State, county, enumeration district (ED), occupation, industry, age, and highest school grade completed. Each case was also assigned a control number. With this information the census schedule books were searched to ascertain the name and address of the individual.

At the same time the names and addresses were being located, punch cards were being prepared for control purposes. These cards noted the control number, State, and a code indicating the type of questionnaire required. The name and address, as ascertained from the match of census records, was also typed on the card. This typed address was reproduced by a Xerox process and used for the address labels. The card itself was used for check-in control (those not showing a notation of receipt of schedule being sent additonal mailings as required).

Although there were 45 independent samples comprising the survey, they broke down into three major components for purposes of schedule design and into four separate groups for purposes of the mailing operation.

The mailing operation consisted of an original mailing and three followup mailings. Each mailing--the original and followup--was color coded by varying the color of the schedule. This was done primarily for control of the mail-out sequence. The mail-outs were divided into four groups as determined by the respondents' status in the 1960 Census. The first group represented selected *professional workers* in the labor force (excluding 2,500 biological scientists and psychologists).

All biological scientists and psychologists were sorted from the professional group described above. A sample of about 1,500 biological scientists and 1,000 psychologists was then merged into one group. The portion of the biological scientists and psychologists not selected in the sample was returned to their original file.

Another group consists of those persons with technical occupations. The last group is composed of the labor reserve.

The mailing pieces to each of these groups consisted of (1) the respective questionnaire, (the biological scientists and psychologists also received a supplementary questionnaire), (2) an introductory letter, (3) a "Fields of Specialization List," (4) a return envelope.

Receipts

The endeavors described in the mailing operation elicited 51,505 completed questionnaires from the original panel of 71,300. The rate of receipt amounted to 72.2 percent. This figure compares favorably with our pretest experience where the return rate amounted to 70.9 percent.

Variations in the categories may be noted in table 1. (This table shows rates of receipt by each of the 45 classes.) For the professional group, the highest receipt rate was achieved, amounting to 72.6 percent, whereas the technical worker group--somewhat under the average return rate--amounted to 63.9 percent. Among the professional workers, it may be noted that the highest return rate is 82 percent (foresters and conservationists).

Field Followup Procedures

About 12,500 of the original cases did not respond to any of the four original mailings and constituted the "nonanswer" file of nonrespondents. This group was sampled at approximately a 1 in 4 rate for personal followup. Thus about 3,000 cases required followup, all of which, by design, fell into Primary Sampling Units of the Bureau's Current Population Survey and thus an existing field staff was available to implement the procedure. The procedure called for all sample cases to be selected in the Bureau's central office and identified by their PSU number and other relevant information (name, address, phone number, appropriate schedule). This information was packaged along with required forms and instructions and sent to the Bureau's Regional Offices. The Regional Offices in turn transmitted the materials to the proper interviewers. The interviewers contacted each nonrespondent by telephone, asking them to complete a questionnaire. Those cases indicating cooperation were mailed one by the interviewer, along with a Regional Office return envelope. Those cases indicating a refusal to complete a questionnaire were asked eight basic questions on the phone.

When the interviewer completed this phase of the work, she sent a record of the results of her assignment to the Regional Office. The Regional Office matched the completed questionnaires received to the record of results. The unmatched forms for those who were mailed questionnaires were returned to the interviewers, who again called the person and proceeded to ask the basic questions.

In regard to the "postal reject" file (that group never delivered by the post office), amounting to 7,100 cases, a sample of 1,000 random cases was drawn. A further attempt to locate these cases was made through their last known employer. Since the 1960 Census results provided the name of the employer, we had a basis for operation.

The steps required to implement this followup required a matching and searching of the original census record. After the case was located, the company name entered on the schedule was transcribed to a special listing. The address of the

establishment was then obtained by checking through city directories and other reference material. The questionnaires were then mailed to the respondent in care of his employer using the normal mailing procedures with provision made for the followup mailings. These activities resulted in a return rate of about 30 percent.

Coding and Editing of Schedules

The processing work was accomplished by dividing the work into two major portions, namely "General Coding" and "Occupation and Industry Coding." The schedules were designed to minimize coding by annotating the entry boxes where possible with predetermined punching codes. Where this was not possible, as in the cases of "institution attended," "type of degree granted," "name of sponsoring institution," "subject of training," and "State and county of residence," codes had to be predetermined and, as in the case of "subject of training," a three-digit code was formulated and a special publication prepared noting the subject field content of each broad three-digit field. Also, during the "General Coding" phase, extensive editing rules were applied to the items to account for some blanks, obvious inconsistencies, consideration of fractions, improper placement of entries, dual entries, finding midpoints of ranges (if given), conversion of income entries to codable items, conversion of improper time basis to acceptable basis. Further editing of this nature will also be implemented in the computer.

The "Occupation and Industry Coding" phase of the work was done in accordance with the 1960 Census of Population classification scheme, with some minor modifications. All clerical work was verified completely on a dependent basis.

Preparing the Record and Weighting

Prior to tallying the tabulations in the Postcensal Study, certain programing activities are required to prepare the computer tape record.

Each questionnaire required six 80-column punch cards to accommodate the data. This information must first be transferred from punch cards to computer tape and the six cards for each case must be consolidated into a single record for a person (eliminating the duplication of identification items required on each punch card).

Each of the 45 occupations receives a differential weight. The methodology involved in this weighting calls for a consideration of the three following classes of responses:

1. Initial responses
2. Responses from a field followup program
3. Responses from a file of "postal rejects"

The latter two classes have to be weighted to the totals from which they are drawn.[4] The determination of these weights will be done clerically and incorporated in the punch card. After these intermediate weights are on the record and are applied to the latter two classes, this file will be merged with the initial responses (class 1). The final weights to be applied to each occupation group would be the proportions these merged totals bear to their respective *grand total* as determined by the 1960 census results.

[4]The methodology outlined herein is subject to review of the reliability of the followup data by Bureau sampling experts.

Table C1.--Detailed Components of the Universe and Receipts in the Postcensal Study of Professional and Technical Manpower

Occupations and other groups sampled	Number of cases in survey	Cases returned: Number	Cases returned: Percent
Occupations in the survey and their census codes	71,[illegible]	[1]51,505	[1]72.2
A. Selected professional occupations	5[illegible]	40,768	7[illegible].6
021 Chemists	[illegible]	1,839	73.[illegible]
College presidents, deans, and professors and instructors, nonscientific subjects	1,2[illegible]	905	71.[illegible]
030 College presidents and deans			
054 Professors and instructors, nonscientific subjects			
Professors and instructors, natural science	2,501	1,856	74.2
031 Professors and instructors, agricultural sciences			
032 Professors and instructors, biological sciences			
034 Professors and instructors, chemistry			
041 Professors and instructors, geology and geophysics			
042 Professors and instructors, mathematics			
043 Professors and instructors, medical sciences			
045 Professors and instructors, physics			
052 Professors and instructors, natural sciences, n.e.c.			
Professors and instructors, social science	1,494	1,155	77.3
035 Professors and instructors, economics			
050 Professors and instructors, psychology			
051 Professors and instructors, statistics			
053 Professors and instructors, social sciences, n.e.c.			
040 Professors and instructors, engineering	2,000	1,529	76.5
060 Professors and instructors, subject not specified	1,249	873	69.9
080 Engineers, aeronautical	1,999	1,383	69.2
081 Engineers, chemical	1,270	974	76.7
082 Engineers, civil	1,948	1,354	69.5
083 Engineers, electrical	3,499	2,533	72.4
084 Engineers, industrial	2,000	1,457	72.9
085 Engineers, mechanical	1,999	1,399	70.0
090 Engineers, metallurgical and metallurgists	1,000	726	72.6
091 Engineers, mining	1,000	708	70.8
092 Engineers, sales	1,000	682	68.2
093 Engineers, n.e.c.	2,782	1,971	70.8
103 Foresters and conservationists with 4 years or more of college	1,000	820	82.0
111 Librarians--elementary and secondary schools; 111 Librarians--public libraries } with 4 years or more of college	1,751	1,335	76.2
130 Agricultural scientists	1,991	1,494	75.0
131 Biological scientists	3,502	2,528	72.2
134 Geologists and geophysicists	2,000	1,351	67.6
135 Mathematicians	1,909	1,321	69.2
140 Physicists	2,295	1,714	74.7
145 Miscellaneous natural scientists	1,022	787	77.0
172 Economists	1,136	805	70.9
173 Psychologists	2,150	1,570	73.0
174 Statisticians and actuaries	1,000	716	71.6
175 Miscellaneous social scientists	878	613	69.8
182 Teachers, elementary schools (public schools only)	2,999	2,164	72.2
183 Teachers, secondary schools	3,003	2,206	73.5
B. Selected technical occupations	7,999	5,108	63.9
072 Designers	1,000	673	67.3
074 Draftsmen	1,000	701	70.1
181 Surveyors	1,000	587	58.7
185 Technicians, medical and dental	1,000	619	61.9
190 Technicians, electrical and electronic	999	636	63.6
191 Technicians, other engineering and physical sciences	2,000	1,274	63.7
192 Technicians, n.e.c.	1,000	618	61.8
Persons with an educational attainment of 4 years or more of college			
A. In experienced civilian labor force and not in the selected professional or technical occupations	2,948	1,903	64.6
1. Managers, officials, and proprietors, n.e.c.[2]	943	} 1,903 (items 1–3)	} 64.6 (items 1–3)
2. Balance--females, ages 20 to 54 years }	} 2,005 (items 2–3)		
3. All others }			
B. Labor reserve	3,313	2,160	65.2
1. Females, ages 20 to 54 years, with experience in one of the selected professional or technical occupations	2,000	} 1,681 (items 1–2)	} 74.2 (items 1–2)
2. Other persons with experience in one of the selected professional or technical occupations	267		
3. All persons in the labor reserve with experience in occupations not selected for the survey	1,046	479	45.8
C. Persons 20 years old or older not in the labor force, labor reserve, or institutions	903	600	66.4

n.e.c. Not elsewhere classified.
[1]Figures include 966 cases received after the tally by occupation, thus detail will not add to total.
[2]Included are those working the following industries:

Agriculture, forestry, and fisheries	Transportation, communications, and other public utilities
Mining	Professional and related services
Construction	Public administration
Manufacturing	

Table C2.--Sample Selection for the Postcensal Study of Professional and Technical Manpower

Occupation or classification	Original number of sample cases required (1)	Final number of sample cases required (2)	Original liberal sampling fraction (3)	Original sample count (4)	Sub-sampling ratio (5)	Final sample selected (6)
Total in survey	73,000	76,869	-	152,510	-	71,300
Total professional occupations	55,000	59,869	-	90,774	-	56,137
Total college presidents, deans and professors	7,000	8,500	-	11,230	-	8,504
College presidents, deans, and professors and instructors, nonscientific subjects	1,000	1,250	1/4	2,465	0.50710	1,260
Professors and instructors, natural science	2,000	2,500	1/4	2,548	0.98117	2,501
Professors and instructors, social science	1,000	1,500	1/4	2,167	0.69221	1,494
Professors and instructors, engineering	2,000	2,000	1/1	2,359	0.84782	2,000
Professors and instructors, subject not specified	1,000	1,250	1/8	1,691	0.73921	1,249
Total engineers	18,000	20,282	-	32,654	-	18,497
Engineers, aeronautical	1,500	2,000	1/4	3,284	0.60902	1,999
Engineers, chemical	2,000	2,000	1/8	1,270	1.0	1,270
Engineers, civil	2,500	2,500	1/20	1,948	1.0	1,948
Engineers, electrical	2,500	3,500	1/10	4,618	0.75791	3,499
Engineers, industrial	2,000	2,000	1/8	3,095	0.64621	2,000
Engineers, mechanical	2,500	2,500	1/20	1,999	1.0	1,999
Engineers, metallurgical and metallurgist	1,000	1,000	1/2	2,305	0.43384	1,000
Engineers, mining	1,000	1,000	1/2	1,526	0.65531	1,000
Engineers, sales	1,000	1,000	1/2	7,170	0.13948	1,000
Engineers, n.e.c.	2,000	2,782	1/4	5,438	0.51159	2,782
Foresters and conservationists (4 years of college)	1,000	1,000	1/1	2,936	0.34060	1,000
Librarians	2,000	2,000	1/4	5,250	(1)	1,751
Total natural scientists	15,000	16,800	-	19,237	-	15,219
Agricultural scientists	2,000	2,000	1/1	1,991	1.0	1,991
Biological scientists	4,000	4,000	1/1	3,502	1.0	3,502
Chemists	2,000	2,500	1/8	2,617	0.95530	2,500
Geologists and geophysicists	2,000	2,000	1/1	4,695	0.42599	2,000
Mathematicians	2,000	2,000	1/1	1,909	1.0	1,909
Physicists	2,000	2,300	1/1	3,501	0.65696	2,295
Miscellaneous natural scientists	2,000	2,000	1/1	1,022	1.0	1,022
Total social scientists	5,000	5,287	-	10,080	-	5,164
Economists	1,000	1,137	1/1	4,814	0.23619	1,136
Psychologists	2,000	2,150	1/1	3,014	0.71334	2,150
Statisticians and actuaries	1,000	1,000	1/4	1,373	0.72834	1,000
Miscellaneous social scientists	1,000	1,000	1/1	879	1.0	878
Teachers, elementary public schools	3,000	3,000	1/50	4,197	0.71480	2,999
Teachers, secondary schools	3,000	3,000	1/25	5,190	0.57804	3,003
Total technicians	7,000	8,000	-	32,934	-	7,999
Designers	1,000	1,000	1/10	1,672	0.59809	1,000
Draftsmen	1,000	1,000	1/50	1,061	0.94251	1,000
Surveyors	1,000	1,000	1/5	2,291	0.43650	1,000
Technicians, medical and dental	1,000	1,000	1/20	1,734	0.57671	1,000
Technicians, electrical and electronic	1,000	1,000	1/1	23,176	0.04315	999
Technicians, other engineering and physical science	1,000	2,000	1/10	4,684	0.42699	2,000
Technicians, n.e.c.	1,000	1,000	1/5	3,340	0.29941	1,000
Persons in "other" groups with 4 years of college	11,000	9,000	-	23,778	-	7,164
Experienced civilian labor force not in target occupations	3,000	3,000	-	16,522	-	2,948
Selected managers	1,000	1,000	1/100	943	1.0	943
Balance females, ages 20 to 54	1,000	1,000	1/20	8,207	0.10309	2,005
All others	1,000	1,000	1/100	7,373	0.13211	
Labor reserve	5,000	4,000	-	6,353	-	3,313
Females, ages 20 to 54 in target occupations	4,000	2,000	1/25	2,950	0.67797	2,000
All others in target occupations	1,000	1,000	1/100	267	1.0	267
Not in target occupations	-	1,000	-	3,136	0.33333	1,046
Persons 20 years old or over not in the labor force, labor reserve, or institutions	2,000	2,000	1/200	903	1.0	903

- Represents zero. n.e.c. Not elsewhere classified.

[1] Of the original sample count, only those cases with four years of college were selected for the final sample.

APPENDIX D

Selected Universe Estimates

Table D1.--Universe Estimates of Civilian Labor Force and Employed, 1960 and 1962, by Sex, Educational Attainment, and Age

Occupation	Experienced civilian labor force		Employed	
	1960	1962[1]	1960	1962[1]
ENGINEERS				
Total	879,742	860,883	867,874	852,680
Sex				
Male	873,416	855,535	861,935	847,596
Female	6,326	5,348	5,939	5,084
Educational attainment				
No degree	395,568	369,122	387,864	364,751
Associate	12,364	13,130	12,186	13,130
Bachelor	249,196	256,824	247,407	254,491
Bachelor's plus	150,359	142,421	149,122	141,398
Masters	53,715	69,085	53,266	68,675
Doctorate	7,701	9,964	7,695	9,964
Professional	245	337	245	271
No report	10,594	-	10,089	-
Age				
Under 20 years	1,639	249	1,131	249
20 to 24 years	48,145	16,246	45,603	16,161
25 to 34 years	283,413	241,184	280,949	239,799
35 to 44 years	293,257	322,966	291,232	321,198
45 to 54 years	149,450	165,393	147,905	163,455
55 to 64 years	86,387	96,345	84,929	94,541
65 years and over	17,451	18,500	16,125	17,277
PHYSICAL SCIENTISTS				
Total	135,822	131,449	132,919	129,993
Sex				
Male	127,082	124,015	124,590	122,676
Female	8,740	7,434	8,329	7,317
Educational attainment				
No degree	31,827	28,109	30,773	27,499
Associate	814	905	814	852
Bachelor	30,529	31,225	30,192	30,943
Bachelor's plus	28,164	24,365	27,277	24,142
Master	20,604	23,206	20,237	22,977
Doctorate	20,567	23,450	20,525	23,391
Professional	149	189	149	189
No report	3,168	-	2,952	-
Age				
Under 20 years	618	68	516	68
20 to 24 years	11,426	4,158	10,239	4,158
25 to 34 years	48,270	42,735	47,512	42,411
35 to 44 years	43,258	48,552	42,933	48,168
45 to 54 years	20,893	23,425	20,696	22,971
55 to 64 years	9,276	10,508	9,147	10,279
65 years and over	2,081	2,003	1,876	1,938
BIOLOGICAL SCIENTISTS				
Total	32,879	31,389	31,533	31,114
Sex				
Male	27,748	27,041	26,779	26,895
Female	5,131	4,348	4,754	4,219
Educational attainment				
No degree	5,703	4,590	5,116	4,497
Associate	139	101	113	101
Bachelor	4,926	5,095	4,835	5,044
Bachelor's plus	4,939	3,470	4,673	3,432
Masters	7,194	7,519	6,907	7,484
Doctorate	8,844	10,342	8,778	10,284
Professional	241	272	229	272
No report	893	-	882	-
BIOLOGICAL SCIENTISTS--Continued				
Age				
Under 20 years	291	29	151	29
20 to 24 years	2,731	993	2,305	911
25 to 34 years	9,926	8,501	9,388	8,453
35 to 44 years	10,643	11,541	10,536	11,439
45 to 54 years	5,556	6,091	5,525	6,066
55 to 64 years	2,977	3,423	2,932	3,365
65 years and over	755	811	696	801
MATHEMATICIANS				
Total	37,733	34,904	36,408	34,544
Sex				
Male	27,836	26,851	26,958	26,641
Female	9,897	8,053	9,450	7,903
Educational attainment				
No degree	12,524	10,113	11,906	9,970
Associate	345	403	345	403
Bachelor	6,215	6,346	6,109	6,326
Bachelor's plus	6,505	4,962	6,125	4,889
Masters	7,605	8,402	7,478	8,297
Doctorate	3,615	4,642	3,615	4,623
Professional	9	36	9	36
No report	915	-	821	-
Age				
Under 20 years	470	38	423	38
20 to 24 years	4,640	1,787	4,097	1,750
25 to 34 years	12,424	12,076	12,063	11,988
35 to 44 years	9,634	9,419	9,475	9,354
45 to 54 years	6,354	7,144	6,342	7,066
55 to 64 years	3,500	3,739	3,360	3,647
65 years and over	711	701	648	701
SOCIAL SCIENTISTS				
Total	68,331	64,721	66,575	64,042
Sex				
Male	52,024	50,502	50,949	50,013
Female	16,307	14,219	15,626	14,029
Educational attainment				
No degree	9,633	7,862	9,024	7,640
Associate	260	222	207	222
Bachelor	5,606	5,492	5,427	5,388
Bachelor's plus	8,301	5,872	7,945	5,842
Masters	21,596	21,431	21,137	21,189
Doctorate	20,039	23,682	20,016	23,601
Professional	133	160	119	160
No report	2,763	-	2,700	-
Age				
Under 20 years	194	6	139	6
20 to 24 years	3,072	634	2,634	557
25 to 34 years	18,761	15,499	18,103	15,300
35 to 44 years	21,696	22,341	21,411	22,147
45 to 54 years	14,154	14,664	14,025	14,560
55 to 64 years	8,526	9,410	8,433	9,355
65 years and over	1,928	2,167	1,830	2,117

[1]The apparent decline from 1960 to 1962 in the number of persons in the experienced civilian labor force (and the number of employed persons) is due to the sample design. The sample was selected from persons in the experienced civilian labor force in 1960; this total is affected by retirement of persons from the labor force, but no allowance is made for new entrants into the labor force.

Table D2.--Number of Persons Reporting Selected Variables in 1962

Item	Occupation in 1960				
	Engineers	Physical scientists	Biological scientists	Mathematicians	Social scientists
1960 EXPERIENCED CIVILIAN LABOR FORCE					
Number in universe	879,742	135,822	32,879	37,733	68,331
Number reporting selected variables					
Occupation in 1962	879,092	135,736	32,868	37,699	68,264
Marital status in 1962	873,384	135,136	32,766	37,384	67,990
Citizenship in 1962	806,539	133,401	32,117	36,809	67,314
Residence in 1962	871,203	134,677	32,686	37,215	67,576
Father's occupation	851,037	131,662	31,838	36,255	66,641
Class of worker in 1960	865,683	132,630	31,400	36,228	66,403
Industry in 1960	861,189	131,841	31,299	36,038	66,159
1960 EMPLOYED					
Number in universe	867,874	132,919	31,533	36,408	66,575
Number reporting selected variables					
Job tenure in 1960	850,307	129,270	30,460	35,110	64,552
Field of work specialization in 1960	817,194	126,055	29,896	34,002	63,161
Major work activity in 1960	619,650	93,096	22,535	23,980	48,074
Occupation at age 24	824,430	127,521	29,780	33,839	63,783
1962 EMPLOYED					
Number in universe	852,680	129,993	31,114	34,544	64,042
Number reporting selected variables					
Occupation in 1962	852,030	129,907	31,103	34,510	63,975
Class of worker in 1962	850,961	129,667	31,077	34,459	63,867
Industry in 1962	851,496	129,726	31,073	34,487	63,975
Organization worked for in 1960	837,777	126,647	29,816	33,298	62,534
Job tenure in 1962	849,290	129,065	30,773	34,158	63,217
Weekly hours worked in 1962	852,030	129,907	31,103	34,510	63,975
Work specialization in 1962	819,836	125,990	29,994	33,095	62,111
Years in field of work specialization in 1962	802,294	123,329	29,125	32,201	60,832
Major work activity in 1962	833,995	126,643	30,157	33,507	62,978
Earnings in 1961	825,521	125,646	30,069	33,211	61,447
Secondary income in 1961	770,815	117,298	28,373	31,575	57,402

APPENDIX E

Standard Errors of Absolutes and Percentages

Table E1a.--Standard Errors of Absolutes for Engineers

Size of estimate	Standard error
5,000	560
10,000	740
25,000	1,220
50,000	1,680
100,000	2,310
250,000	3,280
350,000	3,570
500,000	3,620
750,000	2,600
850,000	1,240

Table E1b.--Standard Errors of Percentages for Engineers

Estimated percentage	Base of percentage						
	25,000	50,000	100,000	250,000	500,000	750,000	850,000
2 or 98....	0.6	0.5	0.3	0.2	0.2	0.1	0.1
5 or 95....	0.9	0.6	0.5	0.3	0.2	0.2	0.2
10 or 90...	1.2	1.1	0.7	0.5	0.3	0.3	0.2
25 or 75...	1.6	1.4	1.1	0.6	0.4	0.4	0.4
50.....	2.2	1.8	1.2	0.8	0.6	0.4	0.4

Table E2a.--Standard Errors of Absolutes for Physical Scientists

Size of estimate	Standard error
2,500	210
5,000	330
7,500	400
10,000	430
15,000	530
25,000	640
50,000	810
75,000	840
100,000	740
125,000	460

Table E2b.--Standard Errors of Percentages for Physical Scientists

Estimated percentage	Base of percentage					
	7,500	10,000	25,000	50,000	75,000	100,000
2 or 98....	0.8	0.6	0.4	0.3	0.2	0.2
5 or 95....	1.2	1.0	0.6	0.4	0.4	0.3
10 or 90...	1.5	1.3	0.8	0.6	0.5	0.4
25 or 75...	2.0	1.8	1.3	0.8	0.7	0.6
50.....	2.9	2.5	1.4	1.0	0.8	0.8

Table E3a.--Standard Errors of Absolutes for Biological and Agricultural Scientists

Size of estimate	Standard error
100	30
500	70
1,000	80
2,500	120
5,000	170
7,500	200
10,000	220
15,000	240
25,000	200

Table E3b.--Standard Errors of Percentages for Biological and Agricultural Scientists

Estimated percentage	Base of percentage			
	5,000	7,500	10,000	25,000
2 or 98.....	0.5	0.4	0.4	0.3
5 or 95.....	0.8	0.7	0.6	0.4
10 or 90.....	1.3	1.0	0.8	0.5
25 or 75.....	1.6	1.3	1.1	0.7
50.....	1.8	1.6	1.3	0.8

Table E4a.--Standard Errors of Absolutes for Mathematicians and Statisticians

Size of estimate	Standard error
100	40
500	80
1,000	130
2,500	190
5,000	260
7,500	310
10,000	340
15,000	380
25,000	370
35,000	200

Table E4b.--Standard Errors of Percentages for Mathematicians and Statisticians

Estimated percentage	Base of percentage			
	5,000	7,500	10,000	25,000
2 or 98.....	0.8	0.6	0.5	0.3
5 or 95.....	1.1	0.9	0.8	0.6
10 or 90.....	1.4	1.3	1.3	0.7
25 or 75.....	2.5	1.9	1.6	1.1
50.....	2.6	2.2	2.0	1.2

Table E5a.--Standard Errors of Absolutes for Social Scientists

Size of estimate	Standard error
100	40
500	90
1,000	110
2,500	210
5,000	290
7,500	350
10,000	400
15,000	460
25,000	540
50,000	500

Table E5b.--Standard Errors of Percentages for Social Scientists

Estimated percentage	Base of percentage				
	5,000	7,500	10,000	25,000	50,000
2 or 98.....	0.7	0.6	0.5	0.4	0.2
5 or 95.....	1.1	1.0	0.9	0.5	0.4
10 or 90.....	1.8	1.3	1.0	0.8	0.6
25 or 75.....	2.2	2.1	1.8	1.2	0.8
50.....	3.0	2.4	2.0	1.4	1.0

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