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occupational employment statistics 1960-66

Bulletin 1579
U.S. DEPARTMENT
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Bulletin 1579

**U.S. DEPARTMENT OF LABOR
Willard Wirtz, Secretary**

**BUREAU OF LABOR STATISTICS
Arthur M. Ross, Commissioner**



JANUARY 1968

Preface

This bulletin is the second in a series. The first, Occupational Employment Statistics, Sources and Data, (Report 305, June 1966), presented information on occupational employment for the Nation and for selected industries through 1964 and when available, for 1965. The present bulletin has two objectives. First, statistics thought to be of continuing importance are updated and whenever possible include the year 1966. Second, new occupational employment data of potential interest to researchers and students of the social sciences are presented.

This bulletin was prepared by Arthur J. Gartaganis.

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Occupational Employment Statistics 1960-66

Chapter I. Introduction

Significant changes in occupational employment patterns have occurred since World War II. Professional and technical employment has more than doubled; employment in clerical and service occupations has increased more than 60 percent; blue-collar workers have increased only 15 percent; and employment in the agricultural sector has dropped one-half. Within each of these groups the detailed occupations exhibit diverse movements. These changes affect future employment opportunities and concern government officials and educators interested in reducing unemployment and preparing workers for the acquisition of skills required in the future.

The manpower analyst is confronted with two problems: What are the present, and what will be the future occupational patterns? This bulletin may be helpful in coping with these problems. It presents a substantial body of data on occupational employment by detailed industry and for the national economy. Special emphasis is placed on the more important and fast-growing white-collar occupations such as scientists, engineers, technicians, teachers, and health workers. Previously published data have been updated, and newly published or previously unpublished material appear for the first time. Knowledge of past trends is of great importance in attempting to forecast future occupational employment patterns. Historical employment series are shown, and sources of additional historical information are cited. Finally, mention is made of the results of occupational employment studies due to be published in the near future.

Tables 1 through 6 of this bulletin present occupational employment data based on statistics collected from a nationwide sample of households in the monthly survey of the labor force and indicate their reliability. The occupational data from the survey are comprehensive and include self-employed and agricultural workers as well as those on payrolls. Workers who have two jobs or more are counted only in their primary occupation. The monthly estimates from the survey of total employment and unemployment are critical measures of the performance of the

economy. Total employment distributed among a number of occupational groups is shown for 1947-66 in tables 1 and 2. Similar data for 1958-66, which conform to the new definition of the labor force established in 1967 (excluding 14- and 15-year-olds), are presented in table 3. Table 6 presents the first published detailed occupational employment data based on the labor force survey of households. Because of sampling error, (tables 4 and 5) estimates of employment in numerically smaller occupations are not as reliable as estimates for occupations which have high employment. Response error also is likely to be significant for some occupations. Consequently, data for 1962-66 are shown for about 60 occupations each employing at least 200,000 at some time during this period.

Data developed from licensing statistics and from membership records and estimates of professional societies provide employment information for the nine professional occupations shown in table 7. Most of the statistics in this table are not subject to sampling error, and response errors are generally small. Also, data are presented for some occupations having fewer than 200,000 workers which, if based on the monthly household survey, would be subject to relatively high sampling error. Although not included in this report, licensing records may also provide information on the geographical distribution of workers in some occupations.

Tables 8 through 14 and 18 through 24 present data on employment by occupation collected from industry establishments. These include both sample surveys of employers and almost complete counts of employment in a limited number of industries. Table 8 presents statistics on teachers and librarians collected from school systems by the Office of Education. Employment by occupation in regulated interstate industries such as railroads, airlines, and telephone communications, is described in table 9. Employment figures for engineers, scientists, and technicians in industry and occupational detail during 1961-66 are presented in tables 10 through 14. Tables 18 through 21 show employment in these professional occupations

by universities and other research organizations in 1961 and 1965. White-collar occupational employment through 1966 in Federal Government is presented in detail in tables 22-23. State government employment in 1964 and local government employment in 1963 are shown in table 24.

The data from employers provide information on the industrial distribution of some occupations, and, conversely, partial or complete occupational patterns for some industries. Information of the latter type is particularly useful in estimating future occupational employment requirements, since projections of output and total employment by industry are made periodically. Expansion

of the Bureau's program to collect occupational information from employers is expected to yield additional information on the occupational composition of industry employment.

Data in this bulletin compiled from employer reports and those based on licensing statistics and membership records of professional societies are considered more accurate than estimates for the same occupations obtained through the monthly labor force survey, because of the size of the sampling error in the latter survey and because occupational data from employers probably has less response error than occupational information supplied by households.

Chapter 2. Occupational Data Based on Monthly Household Surveys of the Labor Force

Occupational statistics based on nationwide surveys of households are collected monthly¹ by the Bureau of Census for the Bureau of Labor Statistics. Occupational employment estimates based upon these data are published monthly in the Department of Labor publication Employment and Earnings and Monthly Report on the Labor Force. These figures include farm workers and the self-employed and are the only comprehensive estimates of occupational employment in the United States between decennial years.

Tables 1-4 and 6 present annual averages of these monthly data. Employment in the United States from 1947-56 for 11 occupational groupings is presented in table 2. During 1947-53 this information was obtained by interviewing 21,000 households in 68 sample areas distributed throughout the continental United States. In February 1954 the number of sample areas was increased to 230, and in May 1956 these estimates were further improved when the sample was expanded to include 35,000 interviewed households located in 330 sample areas. In January 1960 Alaska and Hawaii were added to the sample, and in December 1961 the number of sample areas was increased slightly to 357.² The expansion in coverage permitted a breakdown into 23 different occupational groupings. The 1957-66 occupational employment series in table 1 reflect these changes and improvements.

Commencing with January 1967 two revisions influence these occupational employment series.³ First, there has been another improvement in the employment estimates since the sample size has been increased to 52,500 interview households distributed over 449 sample areas. Second, the lower age limit for official statistics on employment and other manpower concepts has been raised from 14 to 16 years of age. Employment of 14- and 15-year-olds is not very large and is concentrated primarily in certain occupational groupings. They are now excluded from these occupational groupings. However, separate series for employment of these youngsters, by major occupation, are now being published. For purposes of comparison, table 3 presents employment excluding 14- and 15-year-olds for selected occupational groupings from 1958-66.

Annual averages of these data for 1967 will appear in the January 1968 issue of the Employment and Earnings and Monthly Report on the Labor Force. This monthly publication appears about the middle of each month and contains occupational group and industry data as of the previous month. Less detailed employment information may be obtained somewhat earlier from the U.S. Department of Labor monthly news release, The Employment Situation. This publication appears about the 10th of each month and contains employment and unemployment data for broad occupational groupings, industry employment data, and analysis of current labor force trends.

The monthly occupational estimates are subject to response and to sampling errors. Response errors arise because the respondent, frequently a housewife, does not have sufficient information about the job title or job duties of working family members, or because occupational upgrading occurs. In the latter case for example, machine-tool operators are identified as machinists and engineering aids as engineers.⁴

Continued improvements in survey techniques and sampling characteristics during the last 20 years have reduced the sampling error as illustrated in tables 4 and 5.⁵ These tables present two aspects of the improving reliability. As size of the occupational category increases, the standard error will tend to increase absolutely but to decrease as a percent of the estimates. Further, the reliability of the larger estimates has improved faster than that of the smaller estimates.

¹ Previous to 1958, occupational data were collected on a quarterly basis.

² A description of the methodology of these surveys is contained in BLS Report 313 and Current Population Reports, Series P-23, No. 22, Concepts and Methods Used in Manpower Statistics from the Current Population Survey, June 1967.

³ Employment and Earnings and Monthly Report on the Labor Force, February 1967, pp. 3-13, U.S. Department of Labor, Bureau of Labor Statistics contains a detailed analysis of the extent and effect of these revisions.

⁴ Additional discussion of this topic is contained in Occupational Employment Statistics, Sources and Data, Report 305 U.S. Department of Labor, Bureau of Labor Statistics, 1966, pp. 15 and 24-29.

⁵ These tables provide information on the sampling error for the average of the 12 monthly estimates. Sampling error for monthly estimates is available in the Technical Note sections of Employment and Earnings and Monthly Report on the Labor Force.

Commencing in 1962, annual average employment information from the monthly household survey has been tabulated into about 300 occupations or occupational groupings. The smaller occupations are subject

to considerable sampling variability. Consequently, only about 60 occupations and occupational categories which employed at least 200,000 in any year from 1962-66 are presented in table 6.

Table 1. Average Annual Employment, 14 Years of Age and Older, by Occupational Group,
From the Monthly Household Survey of the Labor Force, 1957-66

(In thousands)										
Occupational group	1966	1965	1964	1963	1962	1961	1960	1959	1958	1957
Total -----	74,065	72,179	70,357	68,809	67,846	66,796	66,681	65,581	63,966	65,016
White-collar workers -----	33,332	32,104	31,125	30,182	29,901	29,124	28,726	27,798	27,056	26,451
Professional, technical, and kindred workers -----	9,323	8,883	8,550	8,263	8,040	7,705	7,475	7,143	6,961	6,468
Medical and other health workers -----	1,506	1,486	1,405	1,351	1,353	1,328	1,299	1,240	1,247	1,156
Teachers, except college -----	2,020	1,881	1,878	1,817	1,713	1,642	1,620	1,500	1,494	1,347
Other professional and technical -----	5,797	5,516	5,267	5,095	4,974	4,735	4,555	4,404	4,221	3,968
Managers, officials, and pro- prietors, except farm -----	7,404	7,340	7,452	7,293	7,408	7,119	7,067	6,935	6,785	6,703
Salaried workers -----	4,685	4,427	4,296	4,148	4,053	3,750	3,524	3,416	3,259	3,044
Self-employed workers in retail trade -----	1,263	1,389	1,474	1,441	1,583	1,664	1,767	1,736	1,770	1,834
Self-employed workers, ex- cept retail trade -----	1,456	1,524	1,682	1,704	1,773	1,705	1,776	1,783	1,756	1,824
Clerical workers -----	11,846	11,166	10,667	10,270	10,107	9,861	9,783	9,326	9,137	9,152
Stenographers, typists, and secretaries -----	3,086	2,880	2,708	2,631	2,511	2,405	2,386	2,320	2,241	2,162
Other clerical workers -----	8,760	8,286	7,959	7,639	7,596	7,456	7,397	7,006	6,895	6,990
Salesworkers -----	4,759	4,715	4,456	4,356	4,346	4,439	4,401	4,394	4,173	4,128
Retail trade -----	2,866	2,877	2,635	2,582	2,529	2,586	2,591	2,579	2,468	2,488
Other salesworkers -----	1,893	1,838	1,821	1,774	1,817	1,853	1,810	1,815	1,705	1,640
Blue-collar workers -----	27,167	26,466	25,534	24,982	24,278	23,862	24,211	24,162	23,510	24,874
Craftsmen and foremen -----	9,598	9,221	8,986	8,924	8,678	8,623	8,560	8,561	8,469	8,664
Carpenters -----	853	850	820	814	812	815	832	846	854	900
Construction craftsmen, except carpenters -----	1,978	1,839	1,793	1,796	1,705	1,691	1,722	1,726	1,621	1,675
Mechanics and repairmen -----	2,393	2,337	2,226	2,206	2,145	2,122	2,017	2,047	2,076	2,031
Metal craftsmen, except mechanics -----	1,180	1,112	1,091	1,079	1,046	1,021	1,090	1,082	1,048	1,182
Other craftsmen and kin- dred workers -----	1,849	1,818	1,831	1,786	1,751	1,825	1,762	1,738	1,710	1,709
Foremen, not elsewhere classified -----	1,345	1,265	1,225	1,243	1,218	1,149	1,137	1,122	1,159	1,168
Operatives -----	13,879	13,390	12,924	12,507	12,041	11,762	11,986	11,858	11,441	12,530
Drivers and deliverymen -----	2,580	2,505	2,511	2,446	2,352	2,351	2,375	2,378	2,255	2,330
Other operatives -----	11,299	10,885	10,413	10,061	9,689	9,411	9,611	9,479	9,185	10,200
Durable goods manufac- turing -----	4,645	4,298	3,966	3,862	3,611	3,356	3,477	3,484	3,203	3,802
Nondurable goods manu- facturing -----	3,779	3,700	3,573	3,462	3,314	3,314	3,344	3,215	3,206	3,451
Nonmanufacturing industries -----	2,875	2,887	2,874	2,737	2,764	2,741	2,790	2,780	2,776	2,947
Nonfarm laborers -----	3,690	3,855	3,624	3,551	3,559	3,477	3,665	3,743	3,600	3,680
Construction -----	724	805	787	730	747	750	797	837	806	(¹)
Manufacturing -----	1,098	1,091	1,027	1,003	1,017	986	1,137	1,178	1,079	(¹)
Other industries -----	1,868	1,959	1,810	1,818	1,796	1,741	1,730	1,727	1,715	(¹)
Service workers -----	9,689	9,342	9,256	9,032	8,802	8,640	8,349	8,040	7,809	7,632
Private household workers -----	2,249	2,251	2,322	2,306	2,341	2,317	2,216	2,197	2,204	2,098
Other service workers -----	7,440	7,091	6,934	6,726	6,461	6,323	6,133	5,843	5,605	5,534
Protective service workers -----	886	874	891	846	805	775	766	760	741	742
Waiters, cooks, and barten- ders -----	2,007	1,958	1,911	1,866	1,774	1,715	1,676	1,631	1,539	1,589
Other service workers -----	4,547	4,259	4,132	4,014	3,882	3,833	3,690	3,451	3,324	3,204
Farm workers -----	3,876	4,265	4,444	4,615	4,866	5,170	5,395	5,582	5,591	6,059
Farmers and farm managers -----	2,095	2,244	2,320	2,396	2,595	2,711	2,780	3,019	3,083	3,329
Farm laborers and foremen -----	1,781	2,021	2,124	2,219	2,271	2,459	2,615	2,563	2,508	2,730
Paid workers -----	1,104	1,249	1,324	1,397	1,382	1,489	1,572	1,454	1,439	1,489
Unpaid family workers -----	677	772	800	822	889	970	1,043	1,109	1,069	1,242

¹ Not available.

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 2. Average Annual Employment, 14 Years of Age and Older, by Occupational Group,
From the Monthly Household Survey of the Labor Force, 1947-56¹

(In thousands)										
Occupational group	1956	1955	1954	1953	1952	1951	1950	1949	1948	1947
Total-----	64,928	62,998	61,160	61,778	60,989	60,854	59,648	58,489	59,307	57,843
White-collar workers-----	25,597	24,553	23,891	23,614	23,070	22,413	22,373	21,636	21,400	20,185
Professional, technical, and kindred workers-----	6,096	5,782	5,588	5,448	5,092	4,788	4,490	4,028	3,977	3,795
Managers, officials, and proprietors, except farm-----	6,552	6,442	6,201	6,396	6,182	6,220	6,429	6,433	6,344	5,795
Clerical and kindred workers-----	8,838	8,359	8,168	7,991	8,122	7,655	7,632	7,438	7,438	7,200
Salesworkers-----	4,111	3,970	3,934	3,779	3,674	3,750	3,822	3,737	3,641	3,395
Blue-collar workers-----	25,179	24,729	24,167	24,991	24,802	25,009	23,336	22,770	23,988	23,554
Craftsmen, foremen, and kindred workers-----	8,693	8,315	8,311	8,588	8,743	8,434	7,670	7,625	8,119	7,754
Operatives and kindred workers----	12,816	12,740	12,253	12,747	12,352	12,623	12,146	11,780	12,396	12,274
Laborers, except farm and mine---	3,670	3,674	3,603	3,656	3,707	3,952	3,520	3,365	3,473	3,526
Service workers-----	7,609	7,101	6,755	6,949	6,488	6,533	6,535	6,266	6,040	5,987
Private household workers-----	2,124	1,946	1,760	1,850	1,805	1,869	1,883	1,757	1,754	1,731
Other service workers-----	5,485	5,155	4,995	5,099	4,683	4,664	4,652	4,509	4,286	4,256
Farm workers-----	6,544	6,616	6,348	6,224	6,632	6,900	7,408	7,819	7,881	8,120
Farmers and farm managers-----	3,655	3,782	3,853	3,842	3,963	4,025	4,393	4,703	4,668	4,995
Farm laborers and foremen-----	2,889	2,834	2,495	2,382	2,669	2,875	3,015	3,116	3,213	3,125

¹ Data for 1947-56 have not been adjusted to reflect changes in the definitions of employment and unemployment adopted in January 1957. On the average, total employment declined and unemployment increased by about one-quarter million as a result of the change. The change mainly affected nonagricultural industries, but its impact on any occupational category would be relatively small.

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 3. Average Annual Employment, 16 Years of Age and Older, by Occupational Group,
From the Monthly Household Survey of the Labor Force, 1958-66

(In thousands)									
Occupational group	1966	1965	1964	1963	1962	1961	1960	1959	1958
Total-----	72,898	71,088	69,305	67,762	66,702	65,746	65,778	64,630	63,036
White-collar workers-----	33,068	31,849	30,866	29,943	29,632	28,884	28,516	27,574	26,827
Professional and technical-----	9,309	8,883	8,550	8,263	8,040	7,705	7,474	7,143	6,961
Managers, officials, and proprietors-----	7,406	7,340	7,451	7,293	7,408	7,119	7,067	6,935	6,785
Clerical workers-----	11,812	11,129	10,629	10,237	10,065	9,828	9,759	9,297	9,104
Salesworkers-----	4,541	4,497	4,237	4,150	4,118	4,232	4,216	4,199	3,977
Blue-collar workers-----	26,950	26,246	25,331	24,778	24,048	23,683	24,067	24,009	23,356
Craftsmen and foremen-----	9,585	9,222	8,986	8,925	8,678	8,623	8,560	8,561	8,469
Operatives-----	13,831	13,336	12,866	12,456	11,979	11,712	11,950	11,813	11,392
Nonfarm laborers-----	3,534	3,688	3,479	3,397	3,391	3,348	3,557	3,635	3,495
Service workers-----	9,211	8,936	8,890	8,670	8,383	8,261	8,031	7,720	7,515
Private household workers-----	1,904	1,957	2,040	2,029	2,023	2,036	1,980	1,966	1,991
Other service workers-----	7,307	6,980	6,851	6,641	6,360	6,226	6,051	5,754	5,524
Farm workers-----	3,670	4,057	4,219	4,372	4,639	4,917	5,163	5,327	5,338
Farmers and farm managers-----	2,094	2,244	2,320	2,396	2,595	2,711	2,781	3,019	3,083
Farm laborers and foremen-----	1,576	1,814	1,899	1,976	2,045	2,206	2,383	2,309	2,255

NOTE: Because of rounding, sums of individual items may not equal totals.

Table 4. The Standard Error¹ of the Annual Average of the Monthly Estimates
From the Household Survey, 1950-51, 1955-56, and 1967

(In thousands)					
Annual average employment	1950	1951	1955	1956	1967
10 -----	4	5	3	2	2
50 -----	12	13	6	5	4
100 -----	17	17	8	7	5
250 -----	(²)	(²)	13	11	9
300 -----	33	30	(²)	(²)	(²)
500 -----	43	39	19	15	13
1,000 -----	64	54	27	21	18
2,500 -----	107	85	40	34	27
5,000 -----	170	121	58	45	38
10,000 -----	241	165	76	63	51
20,000 -----	376	224	103	80	67
30,000 -----	(²)	(²)	116	94	76
40,000 -----	572	277	125	98	80

¹ The standard error is a measure of sampling variability, that is, the variations that might occur by chance because only a sample of the population is surveyed. The chances are about 2 out of 3 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are 19 out of 20 that the difference would be less than twice the standard error.

² Not available in source report.

SOURCE: 1950-56 from the U.S. Department of Commerce publications Current Population Reports, Annual Report on the Labor Force, Series P-50, No. 31, 1950; *ibid.*, No. 40, 1951; *ibid.*, No. 67, 1955; *ibid.*, No. 72, 1956.

1967 from U.S. Department of Labor Employment and Earnings and Monthly Report on the Labor Force, February 1967.

Table 5. The Standard Error of the Annual Average as a Percent of Estimated
Annual Average Employment, 1950-51, 1955-56, and 1967

(In thousands)					
Annual average employment	1950	1951	1955	1956	1967
10 -----	40.0	50.0	30.0	20.0	20.0
50 -----	24.0	26.0	12.0	10.0	8.0
100 -----	17.0	17.0	8.0	7.0	5.0
250 -----	(¹)	(¹)	5.2	4.4	3.6
300 -----	11.0	10.0	(¹)	(¹)	(¹)
500 -----	8.6	7.8	3.8	3.0	2.6
1,000 -----	6.4	5.4	2.7	2.1	1.8
2,500 -----	4.3	3.4	1.6	1.4	1.1
5,000 -----	3.4	2.4	1.2	.9	.9
10,000 -----	2.4	1.7	.8	.6	.5
20,000 -----	1.9	1.1	.5	.4	.3
30,000 -----	(¹)	(¹)	.4	.3	.3
40,000 -----	1.4	.7	.3	.2	.2

¹ Not available in source report.

SOURCE: See table 4.

Table 6. Employment in Numerically Important Occupations, 1962-66

(In thousands)					
Occupation	1966	1965	1964	1963	1962
Professional workers:					
Engineers, technical, total	1,117	1,055	1,059	1,041	1,004
Engineers, electrical	279	266	272	255	248
Engineers, mechanical	215	204	206	201	210
Engineers, other	623	585	581	585	546
Natural scientists	193	206	192	188	180
Draftsmen	270	264	240	260	266
Technicians, other engineering and physical science	261	237	227	220	229
Nurses, professional	637	644	594	558	591
Physicians and surgeons	277	252	247	248	238
Technicians, medical and dental	224	206	189	171	171
College presidents, professors, and instructors, not elsewhere classified	266	256	232	189	172
Teachers, elementary schools	1,148	1,034	1,069	1,058	977
Teachers, secondary schools	739	697	678	649	597
Accountants and auditors	606	574	573	564	518
Clergymen	187	194	199	219	220
Lawyers and judges	260	269	260	239	247
Clerical workers:					
Secretaries, stenographers, and typists	3,072	2,875	2,717	2,630	2,500
Secretaries	2,159	2,024	1,845	1,760	1,655
Stenographers	207	208	230	249	245
Typists	706	643	642	621	600
Office-machine operators	470	437	417	410	399
Bookkeepers and accounting clerks	1,204	1,160	1,149	1,100	1,094
Cashiers	688	657	604	551	544
Mail carriers	239	219	201	208	206
Postal clerks	257	242	226	230	244
Shipping and receiving clerks	352	327	356	336	331
Telephone operators	373	346	351	319	328
Craftsmen, foremen, and kindred workers:					
Carpenters	860	851	830	811	819
Brickmasons, stonemasons, and tile setters	193	207	195	183	191
Electricians	439	391	370	385	388
Excavating, grading, and road machinery operators	304	273	273	285	248
Painters, construction and maintenance	474	455	428	435	395
Plumbers and pipefitters	334	301	305	295	280
Foremen, not elsewhere classified	1,349	1,292	1,241	1,251	1,227
Machinists	459	430	414	418	402
Toolmakers, diemakers, and die setters	207	185	201	192	175
Linemen and servicemen, telephone, telegraph, and power	372	337	350	322	312
Mechanics and repairmen	2,403	2,331	2,234	2,213	2,155
Mechanics, motor vehicle	784	791	761	734	676
Stationary engineers	184	189	181	200	181
Operatives and kindred workers:					
Truck and tractor drivers	1,635	1,582	1,571	1,568	1,544
Deliverymen and routemen	579	577	601	538	492
Welders and flame-cutters	507	464	423	408	366
Attendants, auto service and parking	394	391	416	390	390
Laundry and drycleaning operatives	408	417	391	392	399
Meat cutters, except slaughter and packinghouse	173	194	198	203	196
Mine operatives and laborers, not elsewhere classified	179	204	208	202	201
Assemblers	784	712	657	635	596
Inspectors	573	543	538	534	518
Sewers and stitchers, manufacturing	872	819	797	764	707
Service workers, except private household:					
Guards, watchmen, and doorkeepers	315	287	314	295	300
Policemen and detectives	316	330	319	303	281
Cooks, except private household	647	657	604	615	571
Counter and fountain workers	237	206	204	173	163
Waiters and waitresses	953	940	939	938	913
Attendants, hospital and other institutions	663	605	558	532	509
Charwomen and cleaners	289	259	248	246	216
Janitors and sextons	856	794	762	725	677
Practical nurses	270	285	287	273	254

SOURCE: Monthly Household Survey of the Labor Force conducted by the Bureau of Labor Statistics. Survey results not published.

Chapter 3. Employment Data for Selected Professional Occupations

Professional societies compile occupational statistics from State licensure data, membership lists, and other sources. These estimates are adjusted to correct problems such as overcounting due to multiple licensing (in various States, for example), non-members, and retirees who may be leaving or entering the active ranks. Although not all societies compile data on a systematic or regular basis, reliable estimates are available for a number of professions. Current sources and descriptions of the occupations presented in table 7 are given below.

Dentists

Distribution of Dentists in the United States, by State, Region, District, and County, various editions, an annual report of the American Dental Association based on a count of licensed dentists listed in the American Dental Directory. The employment estimate in table 7 excludes military and retired personnel to conform to a civilian labor force concept.

Nurses

Facts About Nursing, various editions, an annual report of the American Nurses' Association. The interagency Conference on Nursing Statistics, including representatives of The American Nursing Association, the National League for Nursing, and the U.S. Public Health Service, meets biennially to prepare a joint estimate based on their data and on records, registration data, and employment data obtained from the American Hospital Association, American Osteopathic Association, State Boards of Nursing, American Red Cross, National Student Nurses' Association, National Federation of Licensed Practical Nurses, and Bureau of Labor Statistics.

Osteopaths

A Statistical Study of the Osteopathic Professional, an annual report of The American Osteopathic Association. Data in table 7

Table 7. Occupational Employment Data Available From Professional Associations, 1960-66

(In thousands)							
Occupation	1966	1965	1964	1963	1962	1961	1960
Health professions: ¹							
Dentists -----	(2)	91	90	89	89	88	87
Nurses—professional -----	621	(3)	582	(3)	550	(3)	504
Osteopaths -----	(2)	11	11	11	11	12	12
Pharmacists -----	121	118	118	117	117	117	117
Physicians -----	272	265	255	248	239	231	224
Podiatrists -----	(2)	8	8	8	8	(3)	(3)
Veterinarians -----	23	(3)	21	(3)	21	(3)	20
Other professions:							
Architects—registered -----	32	32	30	(3)	27	(3)	26
Foresters -----	23	(3)	(3)	(3)	20	18	(3)

¹ For a detailed and comprehensive presentation of employment and other characteristics of health professions and occupations see Health Resource Statistics, Health, Manpower, 1965, 1966, U. S. Department of Health, Education, and Welfare, Public Health Service.

² Not yet available.

³ No estimates made.

are a count of licensed osteopaths and exclude the retired and those for whom status was not reported.

Note: Approximately 2,200 osteopaths in California were awarded M.D. degrees in 1962, thus decreasing the number of Doctors of Osteopathy in that year.

Pharmacists

N. A. B. P. Bulletin, National Association of Boards of Pharmacy. Employment statistics have been compiled annually in the winter edition. They represent a count of registered pharmacists engaged in practice obtained from N. A. B. P. census and licensing data.

Physicians

A. M. A. Directory Reports Service, a quarterly report of the American Medical Association. Data in table 7 refer to licensed physicians as of the end of each year shown, except for 1966 which are midyear estimates, and exclude military and retired M.D.'s and M.D.'s other than those in Federal employment who have a temporary foreign address.

Podiatrists

American Podiatry Association reports based on State licensing: Podiatry as a Career, by Wilfred E. Belleau revised 1965 edition for 1962 data; Numbers and the Podiatry Professions, by Lloyd E. Blauch, for 1963 data, and Journal of the American Podiatry

Association: March 1965; "1964 Survey of the Podiatry Profession: The Podiatrist; Distribution Education, Organizational Relationships," by Lloyd E. Blauch. Estimate for 1965 furnished by the American Podiatry Association.

Veterinarians

A. V. M. A. Directory, a biennial publication of the American Veterinary Medical Association. Data in table 7 refer to licensed veterinarians, excluding those who are retired.

Architects

Data are an unduplicated count of architects registered in each State compiled by the National Council of Architecture Registration Boards, Architectural Institute of America. Some retired registered architects may be included.

Foresters

Datum for 1961 is from a survey of alumni by colleges granting degrees in forestry plus a count of the nondegree members of the Society of American Foresters. It was published in an article "How Many Foresters" by F.H. Eyre in the Journal of Forestry, 1962. The 1962 and 1966 data are estimates made by the Society. They are based upon the 1961 figure and have been adjusted to include recent entrants (degree recipients) and exclude retired personnel.

Chapter 4. Employment of Teachers and Librarians

The Office of Education in the U.S. Department of Health, Education, and Welfare compiles and publishes statistics relating to the educational system. Recent editions of Projections of Educational Statistics furnished information on the supply

and demand of teachers over the next 10 years. The Digest of Educational Statistics provides data on librarians. The number of employed teachers and librarians from 1959-66 is presented in table 8.

Table 8. Employment of Teachers and Librarians, in Fall of School Year, 1959-60 Through 1965-66

(In thousands)							
Occupation	1965-66	1964-65	1963-64	1962-63	1961-62	1960-61	1959-60
Elementary and secondary ¹ -----	1,942	1,872	1,797	1,717	1,657	1,594	1,531
Elementary school teachers -----	1,120	1,090	1,053	1,026	1,002	984	952
Public -----	968	940	908	886	869	858	832
Nonpublic -----	152	150	145	140	133	126	120
Secondary school teachers -----	823	782	743	690	655	610	580
Public -----	749	708	669	621	592	550	524
Nonpublic -----	74	74	74	69	63	60	56
College instructional staff ² -----	432	389	358	336	313	296	283
Instructors or above -----	367	331	305	287	267	254	245
Full time -----	245	221	205	192	179	170	164
Part time -----	122	110	101	95	88	84	81
Junior instructional staff -----	65	58	53	49	46	42	39
Librarians ³ -----	81	77	73	69	66	63	62
Public elementary and secondary -----	28	27	25	23	22	20	20
Nonpublic elementary and secondary -----	5	5	4	4	4	3	3
College and university -----	14	12	12	11	10	10	9
Public library -----	22	21	21	20	20	20	20
Special library -----	13	12	12	10	10	10	10

¹ Projections of Educational Statistics to 1975-76, 1966 ed., U.S. Department of Health, Education, and Welfare, Office of Education, publication No. OE-10030-66, table 22. Data for 1964-65 were revised. Data for 1965-66 are preliminary.

² Ibid., table 27. Data cover only faculty for resident instruction in degree-credit courses. They do not include professional staff for general administration, student personnel services, or organized research; faculty for resident instruction in other than degree-credit courses; extension staff; professional library staff; instructional staff for elementary or secondary instruction; and other faculty. Data for 1960-61, 1962-63, and 1965-66 are estimates.

³ Digest of Educational Statistics, 1965 ed., U.S. Department of Health, Education, and Welfare, Office of Education, publication No. OE-10024-65, table 128. Ibid., 1966 ed., No. OE-10024-66, table 138.

NOTE: Because of rounding, sums of individual items may not equal totals.

Chapter 5. Occupational Employment Data for Regulated Interstate Industries

Railroad, pipeline, airline, telephone, and telegraph companies which are engaged in interstate commerce file reports with Federal regulatory agencies which include data on employment by occupation. Industry coverage is very comprehensive, since almost all business units in these industries are involved in interstate activities. Selected employment data from these reports are presented in table 9. The sources are described below.

Class I Railroads

Railroad companies which have annual operating revenues of \$5 million or more are classified as Class I railroads. These companies, which include over 95 percent of the railroad industry's employment, submit annual reports to the ICC which summarizes them in Statement No. M-300, Wage Statistics of Class I Railroads in U.S. In these reports employment is divided into 128 occupational categories. A few of these categories are groupings of not entirely related occupations. Only a limited number of divisions which do not contain a mixture of occupations are presented in this bulletin.

Railway Express Agency

Annual issues of Transport Statistics in U.S., Part 3, The Railway Express Agency Inc., Interstate Commerce Commission, Bureau of Transport Economics and Statistics.

Pullman Company

Ibid., Part 2, The Pullman Co.

Oil Pipelines

Ibid., Part 6, Oil Pipelines, the data in this report account for more than 85 percent of industry employment.

Scheduled Airlines

Air Transport Facts and Figures, 1966, 1967 Air Transport Association of America. This Association obtained the data from airlines industry information filed with the Civil Aeronautics Board. The Federal Aviation Agency also obtains and publishes, in great detail, employment and other scheduled airlines information in its annual publication FAA Statistical Handbook of Aviation. These data account for over 80 percent of the airline industry employment.

Telephones

Industry Wage Survey: Communications, published annually by the U.S. Department of Labor, Bureau of Labor Statistics. The data are compiled from annual reports filed with the Federal Communications Commission by telephone carriers which had annual revenues exceeding \$1 million in 1965 and \$250,000 previously. The Annual Statistical Volume, published by the U.S. Independent Telephone Association, presents employment data compiled from an annual survey of independent telephone companies. The data in table 9 represent an unduplicated combination of the two studies. Except for some officials and managerial assistants employed by the Bell System, these data represent, substantially, the whole industry.

Telegraph

Industry Wage Survey: Communications, published annually by the U.S. Department of Labor, Bureau of Labor Statistics. The data are compiled from annual reports filed with the Federal Communications Commission by all companies in the telegraph industry having annual revenues exceeding \$50,000. These represent about 90 percent of industry employment.

Table 9. Employment in Selected Occupations, Regulated Interstate Industries, 1960-65

(In thousands)						
Occupation ¹	1965	1964	1963	1962	1961	1960
Class I railroads (line-haul) -----	640.0	665.0	680.0	700.1	717.5	780.5
Conductors, railroad -----	38.0	37.4	37.1	37.0	36.9	39.0
Office-machine operators -----	6.1	6.0	6.0	6.3	6.6	7.0
Secretaries -----	3.4	3.4	3.5	3.5	3.6	3.8
Stenographers and typists -----	8.0	8.3	8.6	9.0	9.5	10.4
Telephone operators -----	2.0	2.1	2.3	2.4	2.5	2.8
Carpenters -----	5.7	6.0	6.1	6.3	6.5	7.1
Linemen and servicemen (Telephone and Telegraph) -----	2.2	2.3	2.3	2.3	2.4	2.5
Blacksmiths, forgemen, and hammermen -----	1.8	1.8	1.8	1.8	1.7	2.0
Boilermakers -----	1.8	1.9	2.0	2.0	2.1	2.3
Stationary engineers -----	.7	.8	.8	.9	.9	1.0
Locomotive engineers -----	35.1	34.3	33.9	34.2	34.1	36.2
Locomotive firemen -----	21.8	30.0	35.9	36.5	36.6	38.8
Drivers and deliverymen -----	5.9	5.8	5.8	5.8	5.7	5.9
Railway Express Agency, Inc. -----	32.1	31.4	30.4	30.4	30.4	30.8
Drivers and deliverymen -----	10.4	10.0	9.6	9.4	9.2	9.0
Train messengers -----	.9	1.1	1.1	1.2	1.3	1.5
Warehouse and platform laborers -----	5.9	5.7	5.3	5.2	5.3	5.5
The Pullman Company -----	5.3	5.5	5.9	6.4	6.7	7.3
Conductors -----	.5	.5	.6	.6	.6	.7
Porters -----	2.1	2.2	2.2	2.5	2.6	2.9
Oil pipelines -----	16.9	17.1	18.2	19.2	20.3	21.3
Station engineers and pumpers -----	2.3	2.5	2.5	2.8	3.0	3.3
Gager-deliverymen and oil receivers -----	2.9	2.9	3.1	3.2	3.4	3.6
Pipeline repairmen -----	1.5	1.7	1.8	2.0	2.1	2.3
Other mechanics -----	.7	.7	.7	.7	.7	.8
Laborers -----	1.1	1.1	1.2	1.2	* 1.1	1.1
Scheduled airlines -----	205.9	191.8	178.9	172.8	169.9	166.1
Airline pilots and copilots -----	16.3	15.1	14.3	13.8	13.9	13.5
Airline stewardesses and pursers -----	17.1	14.5	13.1	12.2	11.9	10.6
Other flight personnel -----	4.8	4.4	4.0	4.2	4.2	3.8
Communications personnel -----	3.2	3.2	3.7	3.4	3.7	4.2
Mechanics and maintenance personnel -----	40.7	39.4	34.5	34.9	34.1	34.2
Aircraft and traffic service personnel -----	56.3	51.9	49.1	46.7	44.6	43.3
Office employees -----	42.9	40.3	37.9	37.0	36.6	35.4
All other employees -----	24.7	23.0	22.4	20.7	20.9	21.1
Telephone industry -----	722.5	699.9	678.7	669.6	672.5	694.9
Professional and semiprofessional personnel -----	67.5	64.0	60.9	53.4	52.0	50.5
Business office and sales employees -----	54.3	52.7	51.4	52.0	51.6	49.8
Clerical employees -----	152.2	147.9	142.5	142.9	142.6	144.9
Telephone operators -----	199.1	193.1	189.2	188.5	196.8	216.3
Foremen, telephone craftsmen -----	28.9	27.2	26.1	25.9	25.5	26.0
Central office craftsmen -----	69.0	65.9	63.1	62.0	59.1	58.0
Installation and exchange repair craftsmen -----	79.6	77.7	75.1	73.2	72.0	71.2
Line, cable, and conduit craftsmen -----	39.2	38.3	37.0	38.1	38.8	43.0
Building, supplies, and motor vehicle employees -----	24.9	25.4	26.0	27.2	27.9	28.8
Laborers -----	.4	.4	.4	.5	.5	.5
Other employees, not elsewhere classified -----	2.7	2.3	2.4	1.4	1.5	1.7
Telegraph industry -----	30.9	31.6	32.8	34.9	36.5	37.6
Professional and semiprofessional personnel -----	1.4	1.2	1.2	1.4	1.4	1.4
Office superintendents -----	2.6	2.6	2.8	2.9	3.0	3.1
Sales employees -----	.5	.5	.5	.6	.6	.6
Clerical employees -----	7.2	7.3	7.7	8.1	8.5	8.7
Telegraph operators -----	6.1	6.3	7.0	7.4	8.0	8.7
Telephone operators -----	1.3	1.3	1.5	1.6	1.8	1.9
Construction, installation, and repair employees -----	6.9	6.9	6.5	7.1	6.9	6.6
Building service employees -----	.6	.6	.7	.8	.9	.9
Messengers -----	4.3	4.5	5.0	5.1	5.6	5.9

¹ Industry totals include data not shown separately.

SOURCE: See text, p. 12.

Chapter 6. Employment in Engineering, Scientific, and Technical Occupations in Private Industry

Beginning in the middle of the past decade, the Bureau of Labor Statistics conducted a series of employment surveys of scientists, engineers, and technicians in private industry. The National Science Foundation⁶ sponsored the early surveys and presented information on employment of scientists and engineers, the number in research and development, and the costs of research and development.⁷ Employment data were requested on persons working in each occupation regardless of their educational background.

Some of the results of the 1961 through 1966 surveys are presented in this report. Tables 10 through 14 include occupational employment of engineers, nine scientific occupations, and seven technician occupations by industry.⁸ The later occupational-industry series are not exactly comparable to their pre-1961 counterparts, as a number of revisions and improvements have been made. Data by size of establishment and information about the numbers employed in sales, research, and other employment functions were obtained also but not shown in this report.

Sampling Procedures

Prior to 1961 the sampling unit was a company. Companies not meeting the minimum employment specified—or "cut-off" point—which varied from industry to industry were excluded from the survey. Beginning in 1961, because of many technical problems the individual establishment, rather than the company, was chosen as the sampling unit.⁹ By 1962, the sample frame was increased to 350,000 establishments from which emerged a sample of 15,000.¹⁰

For 1965 and later surveys the sample frame was increased to about 530,000, the number of sampled establishments to 24,000, and minor modifications were made in cut-off points.

The influence of excluded establishments is very strong in certain industries which include large numbers of very small-size establishments. In the contract construction industry this exclusion biases downward the

estimates of engineering employment. Although the wholesale and retail trade and the finance, insurance, and real estate industries include large numbers of smaller establishments, employment of scientific and technical personnel is not important in these sectors. Some understatement of engineers and scientists who are self-employed also appears to exist in a few of the service industries.¹¹

Significant changes have been made in the industry and occupational detail presented. By 1964 the American economy had been subdivided into about 60 industry categories.

⁶ National Science Foundation reports: Science and Engineering in American Industry, Final Report on a 1953-54 Survey (October 1956), and 1956 Survey (November 1956); Scientific and Technical Personnel in Industry, 1960 (1961); Scientific and Technical Personnel in American Industry, Report on a 1959 Survey (1962); and U.S. Department of Labor's Employment of Scientific and Technical Personnel in Industry, 1962, BLS Bulletin 1418 (1964).

⁷ The Foundation's activities which gather information about expenditures for research and development have been expanded greatly and now constitute the subject of separate publications. For example, see Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1965, 1966, and 1967 vol. XV, July 1966. Since expenditure decisions are made for forthcoming fiscal years, this may serve as a helpful guide to employment forecasting.

The Foundation also has been compiling and publishing information upon the educational background, employment characteristics, present and expected supply and demand, and the general status of scientific and technical personnel in the national economic and social context. The latest in a series of publications containing a broad range of information is Scientific and Technical Manpower Resources, Summary Information on Employment, Characteristics, Supply, and Training, November 1964.

⁸ A publication containing the 1961-66 data is in preparation. It will contain slightly more detailed industry and occupational patterns than are included in tables 10 through 14. Results of the 1967 survey have been received and are being tabulated.

⁹ See table 15 for a presentation of these cutoff points by industry.

¹⁰ The basic list of establishments is comprised of those reporting to State employment security agencies and of interstate railroads and related companies. These number over 2 million and include about four-fifths of the Nation's employed. From this list, all establishments below a minimum size which varies from industry to industry are excluded. Also excluded are those industries which employ negligible numbers of scientists, e.g., farms; or which pose unusual sampling problems, e.g., nonprofit institutions; or which are the subject of separate exhaustive studies, e.g., education and hospitals. The remaining establishments—or sample frame—then are stratified by region, industry, and size of establishment. The surveyed establishments then are selected randomly from the sample frame.

¹¹ These surveys account for about 95 percent of the engineers, technicians, and scientists employment in private industry, where the latter is defined as the total excluding government, educational institutions, and nonprofit organizations.

Starting with the 1965 survey, more than 80 industry categories were tabulated. In all cases the Bureau of the Budget's standard industrial classification (SIC) system is used. Except for engineers, greater occupational detail is now available. Data for seven engineering occupations were obtained in the first survey, but now there exists only an "all engineers" occupational category. A survey in 1963 to explore the possibility of separate reporting by major branch of engineering revealed that many establishments would find it difficult to provide this information without a major increase in their work load. The number of scientific occupations was increased from 8 to 13, and the number of technician occupations from 1 "catch-all" to 8 groupings.

The magnitude of the sampling variability, or relative standard error, of these occupational estimates has not been ascertained in the 1961 and later surveys. However, estimates of the sampling variability in the January 1960 data have been calculated and are presented in tables 16 and 17.¹² Although these refer to company data, they are thought to be close approximations for most industries to corresponding standard errors which can be obtained from the data, commencing in 1961, based upon establishment information.

¹² See Scientific and Technical Personnel in Industry, 1960, 1961, National Science Foundation, Appendixes B and C for detailed presentation of the survey problems involved.

Table 10. Employment of Engineers, by Industry, as of January 1, 1961-66

(In thousands)							
SIC code	Industry	1966	1965	1964	1963	1962	1961
	All industries -----	775.9	749.1	720.3	711.7	671.2	643.2
07-09	Agriculture, forestry, and fisheries ----	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)
10-14	Mining -----	17.1	17.3	17.5	17.9	16.5	17.2
15-17	Contract construction -----	46.7	42.0	38.8	38.8	37.5	36.2
	Manufacturing -----	536.0	519.7	502.4	502.6	472.1	450.4
19	Ordnance and accessories -----	51.5	50.6	47.4	46.2	41.1	36.2
20	Food and kindred products -----	4.9	4.8	4.8	5.6	5.5	5.8
22	Textile mill products -----	3.1	2.9	3.3	2.9	2.7	2.6
23	Apparel and other finished products -----	.6	.5				
24	Lumber and wood products -----	.8	.7				
25	Furniture and fixtures -----	1.4	1.3				
26	Paper and allied products -----	9.7	9.6	9.3	9.5	9.5	9.0
27	Printing and publishing -----	1.1	1.1	.9	.9	.9	.8
28	Chemicals and allied products -----	40.6	38.6	39.3	34.6	33.2	32.2
29	Petroleum refining and related industries -----	9.9	10.1	10.5	10.3	10.1	10.0
30	Rubber and miscellaneous plastics products -----	7.8	7.2	6.6	6.1	5.8	5.8
31	Leather and leather products -----	.5	.5	.4	.4	.4	.4
32	Stone, clay, and glass products -----	8.9	8.4	8.3	8.5	8.4	8.1
33	Primary metal industries -----	20.5	20.0	19.4	20.3	21.1	20.5
34	Fabricated metal products -----	27.9	26.2	24.8	24.7	23.9	23.9
35	Machinery, except electrical -----	75.1	73.5	69.3	69.6	65.3	62.3
36	Electrical machinery, equipment, and supplies -----	135.6	132.2	129.5	133.9	122.7	117.7
37	Transportation equipment -----	103.4	100.5	96.7	97.3	90.5	85.9
38	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks -----	29.6	27.9	26.7	26.8	25.9	24.3
39	Other manufacturing industries ² -----	3.2	3.1	3.4	3.8	3.5	3.3
	Transportation, communications, and utilities -----	51.6	50.8	46.6	44.8	44.7	43.2
40	Railroad transportation -----	4.1	4.1	8.8	8.3	8.7	8.8
41-47	Other transportation services -----	4.3	4.4				
48	Communication -----	17.1	16.8	13.7	12.9	12.8	12.5
49	Electric, gas, and sanitary services -----	26.1	25.5	24.1	23.6	23.2	21.9
50-59	Wholesale and retail trade -----	23.0	21.6	20.6	19.2	18.4	17.7
60-67	Finance, insurance, and real estate ----	4.2	4.0	3.5	3.1	3.1	2.5
	Services -----	97.3	93.7	90.9	85.3	78.9	75.7
70-79	Hotel, personal, business, repair, amusement, recreation and legal -----	36.1	35.2	36.8	35.4	(³)	(³)
807	Medical and dental laboratories -----	(¹)	(¹)	.1	.1	(³)	(³)
891	Engineering and architectural services -----	61.2	58.5	54.0	49.8	(³)	(³)

¹ Less than 50.² Includes SIC 21 tobacco manufactures.³ Not available.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Preliminary data from sample surveys conducted by the U.S. Department of Labor, Bureau of Labor Statistics. Establishments below a minimum specified size, determined separately for each major industry group, were excluded from the survey. This exclusion does not significantly affect the above data. Governments, universities, and nonprofit organizations were not surveyed.

Table 11. Employment of Scientists, by Industry, as of January 1, 1961-66

		(In thousands)					
SIC code	Industry	1966	1965	1964	1963	1962	1961
	All industries -----	178.6	169.7	164.9	159.5	155.3	150.8
07-09	Agriculture, forestry, and fisheries ----	0.4	0.4	0.4	0.4	0.4	0.4
10-14	Mining -----	12.0	11.6	10.9	10.8	10.8	10.8
15-17	Contract construction -----	.4	.4	.3	.3	.2	.2
	Manufacturing -----	130.1	124.6	122.3	119.9	117.8	116.1
19	Ordnance and accessories -----	8.3	7.7	7.1	6.6	5.9	4.4
20	Food and kindred products -----	6.9	7.2	7.2	7.5	7.0	7.2
22	Textile mill products -----	2.1	2.0	1.7	1.3	1.3	1.3
23	Apparel and other finished products--	.3	.3				
24	Lumber and wood products -----	.2	.2				
25	Furniture and fixtures -----	(1)	(1)	.2	.2	.2	.2
26	Paper and allied products -----	4.1	3.8	4.0	3.8	3.8	3.6
27	Printing and publishing -----	.2	.2	.4	.3	.2	.2
28	Chemicals and allied products -----	57.1	53.3	51.8	49.9	49.9	50.2
29	Petroleum refining and related industries -----	4.0	4.0	4.3	4.3	4.2	4.2
30	Rubber and miscellaneous plastics products -----	3.3	3.0	3.0	3.0	2.6	2.6
31	Leather and leather products -----	.2	.1	.1	.2	.2	.2
32	Stone, clay, and glass products -----	1.7	1.6	1.6	1.6	1.6	1.5
33	Primary metal industries -----	7.3	7.2	7.8	8.5	9.2	9.8
34	Fabricated metal products -----	2.4	2.6	2.5	2.3	2.1	2.1
35	Machinery, except electrical -----	6.5	6.5	5.5	5.7	5.2	4.9
36	Electrical machinery, equipment and supplies -----	9.2	9.2	10.0	10.3	9.4	9.0
37	Transportation equipment -----	8.9	8.7	9.1	8.8	8.7	9.4
38	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks -----	6.0	5.4	4.8	4.6	4.5	4.2
39	Other manufacturing industries ² -----	1.3	1.3	1.2	1.0	1.0	1.1
	Transportation, communication, and utilities -----	1.8	1.8	2.0	1.7	1.6	1.6
40	Railroad transportation -----	.4	.4	.6	.5	.5	.5
41-47	Other transportation services -----	.1	.1				
48	Communication -----	.2	.1				
49	Electric, gas, and sanitary services -----	1.2	1.2	1.2	1.1	1.0	1.0
50-59	Wholesale and retail trade -----	8.6	7.9	6.8	6.7	6.1	5.6
60-67	Finance, insurance, and real estate -----	4.8	4.4	3.8	3.2	3.2	2.9
	Services -----	20.5	18.6	18.4	16.5	15.2	13.2
70-79	Hotel, personal, business, repair, amusement, recreation and legal -----	16.2	15.0	14.1	13.1	(3)	(3)
807	Medical and dental laboratories -----	1.4	1.3	1.2	1.1	(3)	(3)
891	Engineering and architectural services -----	2.9	2.2	3.1	2.3	(3)	(3)

¹ Less than 50.² Includes SIC 21 tobacco manufactures.³ Not available.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Preliminary data from sample surveys conducted by the U.S. Department of Labor, Bureau of Labor Statistics. Establishments below a minimum specified size, determined separately for each major industry group, were excluded from the survey. This exclusion does not significantly affect the above data. Governments, universities, and nonprofit organizations were not surveyed.

Table 12. Employment of Technicians, by Industry, as of January 1, 1961-66

		(In thousands)					
SIC code	Industry	1966	1965	1964	1963	1962	1961
	All industries -----	673.2	645.3	638.7	623.8	594.6	555.1
07-09	Agriculture, forestry, and fisheries----	1.0	1.0	1.5	2.0	2.1	1.8
10-14	Mining-----	10.2	10.2	11.3	11.2	11.2	11.1
15-17	Contract construction-----	30.2	25.7	28.8	27.8	26.2	26.0
	Manufacturing-----	380.2	366.9	369.4	370.1	355.4	329.2
19	Ordnance and accessories-----	19.0	19.1	19.2	19.3	18.2	16.9
20	Food and kindred products-----	4.2	4.1	4.7	4.0	3.9	3.2
22	Textile mill products-----	2.4	2.2	2.5	2.6	2.8	2.5
23	Apparel and other finished products--	.1	.1	.2	.2		
24	Lumber and wood products-----	.7	.6	.9	1.0	2.4	2.0
25	Furniture and fixtures-----	1.5	1.4	1.8	1.4		
26	Paper and allied products-----	6.0	6.0	6.3	6.3	6.2	5.6
27	Printing and publishing-----	.7	.6	1.0	.8	.8	.9
28	Chemical and allied products-----	38.3	36.7	37.9	36.9	35.5	35.6
29	Petroleum refining and related industries-----	5.8	5.7	4.6	4.7	5.8	5.4
30	Rubber and miscellaneous plastics products-----	4.9	5.0	4.7	4.9	5.4	5.4
31	Leather and leather products-----	.3	.3	.4	.3		
32	Stone, clay, and glass products-----	5.6	5.6	5.8	5.7	5.4	5.1
33	Primary metal industries-----	17.6	17.4	17.3	16.5	18.1	15.9
34	Fabricated metal products-----	24.7	24.7	25.4	25.3	25.8	23.3
35	Machinery, except electrical-----	67.4	65.5	64.9	61.7	57.9	53.8
36	Electrical machinery, equipment, and supplies-----	99.5	92.9	93.4	98.8	92.6	84.1
37	Transportation equipment-----	58.4	56.9	55.9	55.3	51.2	47.8
38	Professional, scientific, and controlling instruments; photographs and optical goods; watches and clocks-----	20.2	19.3	18.7	20.6	20.0	18.5
39	Other manufacturing industries ¹ -----	3.0	2.9	3.8	3.8	3.4	3.2
	Transportation, communication, and utilities-----	58.4	56.9	57.9	55.6	54.3	52.3
40	Railroad transportation-----	4.7	4.5	6.5	6.0	6.0	6.2
41-47	Other transportation services-----	2.1	2.1				
48	Communication-----	31.7	30.6	31.3	30.7	30.4	29.8
49	Electric, gas, and sanitary services-----	19.8	19.6	20.1	18.9	17.9	16.3
50-59	Wholesale and retail trade-----	31.2	28.9	25.8	23.2	21.6	22.9
60-67	Finance, insurance, and real estate----	5.8	5.2	4.6	4.6	4.4	4.2
	Services-----	156.2	150.5	139.7	129.2	119.4	107.6
70-79, 81	Hotel, personal, business, repair, amusement, recreation, and legal-----	39.9	39.6	40.3	39.7	(²)	(²)
807	Medical and dental laboratories-----	18.5	18.6	18.7	16.2	(²)	(²)
891	Engineering and architectural services-----	97.8	92.3	80.6	73.2	(²)	(²)

¹ Includes SIC 21 tobacco manufactures.² Not available.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Preliminary data from sample surveys conducted by the U.S. Department of Labor, Bureau of Labor Statistics. Establishments below a minimum specified size, determined separately for each major industry group, were excluded from the survey. This exclusion does not significantly affect the above data. Governments, universities, and nonprofit organizations were not surveyed.

Table 13. Employment of Scientists, by Occupation and Industry, as of January 1, 1966

SIC code	Industry	(In thousands)									
		Total	Agri- cult- ural	Biolo- gists	Chem- ical	Geolo- gists	Mathe- matic- al	Medi- cal	Metal- lurgi- cal	Physi- cal	Other
	All industries -----	178.7	4.9	9.1	84.5	13.8	27.3	4.3	10.9	15.1	8.8
07-09	Agriculture, forestry, and fisheries -----	0.4	0.4	(1)	(2)	(2)	(1)	(2)	(2)	(2)	(1)
10-14	Mining -----	12.0	.1	(1)	0.8	10.5	0.2	(2)	0.3	(1)	0.1
15-17	Contract construction -----	.4	(1)	(2)	(1)	.1	.3	(2)	(1)	(1)	(2)
	Manufacturing -----	130.1	3.0	7.4	73.1	.8	15.3	2.9	9.9	10.9	6.7
19	Ordnance and accessories -----	8.4	(1)	.2	1.5	.2	3.1	(1)	.5	2.4	.4
20	Food and kindred products -----	6.9	1.2	.7	4.3	(1)	.1	(1)	(1)	(1)	.6
21	Textile mill products -----	2.1	(2)	(1)	1.7	(1)	.3	(1)	(2)	(1)	.1
23	Apparel and other finished products -----	.3	(2)	(2)	.3	(2)	(1)	(2)	(2)	(2)	(1)
24	Lumber and wood products -----	.2	.1	(1)	.1	(1)	(1)	(2)	(2)	(2)	.1
25	Furniture and fixtures -----	(1)	(2)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(2)
26	Paper and allied products -----	4.1	.6	(1)	2.6	(1)	.3	(1)	(1)	.1	.4
27	Printing and publishing -----	.2	(1)	(2)	.2	(1)	.1	(1)	(1)	(1)	(1)
28	Chemicals and allied products ---	57.1	1.0	6.2	40.2	.1	1.3	2.6	.7	2.0	2.8
29	Petroleum refining and related industries -----	4.0	(1)	(1)	3.3	.1	.2	(2)	(1)	.2	.1
30	Rubber and miscellaneous plastics products -----	3.3	(1)	(1)	2.9	(1)	(1)	(1)	(1)	.1	.3
31	Leather and leather products ----	.2	(2)	(2)	.1	(2)	(1)	(2)	(1)	(2)	(2)
32	Stone, clay, and glass products ---	1.7	(1)	(1)	1.2	.1	.1	(2)	.1	.1	.1
33	Primary metal industries -----	7.3	(1)	(1)	2.2	.1	.3	(1)	4.5	(1)	.1
34	Fabricated metal products -----	2.4	(1)	(1)	.8	(1)	.5	(1)	.6	.2	.2
35	Machinery, except electrical ----	6.5	.1	.1	1.7	(1)	2.7	(1)	1.1	.7	.1
36	Electrical machinery, equipment, and supplies -----	9.2	(1)	.1	2.6	(1)	2.5	(1)	.6	2.5	.8
37	Transportation equipment -----	8.9	(1)	.1	2.2	(1)	3.3	(1)	1.6	1.4	.3
38	Professional, scientific, and controlling instruments; photo- graphic and optical goods; watches and clocks -----	6.0	(2)	.1	4.1	(1)	.2	.1	.1	1.0	.3
39	Other manufacturing industries ³ ---	1.3	(1)	(1)	1.1	(2)	.1	(1)	(1)	.1	(1)
	Transportation, communication, and utilities -----	1.8	.2	(1)	.6	.4	.5	(1)	(1)	(1)	.1
40	Railroad transportation -----	.4	(1)	(1)	.1	(1)	.1	(1)	(1)	(1)	(1)
41-47	Other transportation services ----	.1	(2)	(2)	(1)	(1)	(1)	(1)	(2)	(1)	(2)
48	Communication -----	.2	(2)	(2)	(1)	(2)	.1	(2)	(1)	(1)	(1)
49	Electric, gas, and sanitary services -----	1.2	.1	(1)	.5	.3	.2	(1)	(1)	(1)	(1)
50-59	Wholesale and retail trade -----	8.6	.6	.3	4.0	.2	1.8	.1	.1	.2	1.2
60-67	Finance, insurance, and real estate -----	4.8	.1	(1)	(1)	(1)	4.6	.1	(2)	(2)	(1)
	Services -----	20.5	.6	1.3	6.0	2.0	4.5	1.1	.5	4.0	.6
70-79, 81	Hotel, personal, business, amusement, recreation, and legal -----	16.2	.6	.3	5.2	1.3	3.7	1.0	.4	3.3	.3
807	Medical and dental laboratories ---	1.4	(2)	.9	.3	(2)	(1)	.1	(2)	(2)	(1)
891	Engineering and architectural services -----	2.9	(1)	.1	.4	.6	.8	(1)	.1	.6	.3

¹ Less than 50.² Not available.³ Includes SIC 21 tobacco manufactures.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Preliminary data from sample surveys conducted by the U.S. Department of Labor, Bureau of Labor Statistics. Establishments below a minimum specified size determined separately for each major industry group, were excluded from the survey. This exclusion does not significantly affect the above data. Governments, universities, and nonprofit organizations were not surveyed.

Table 14. Employment of Technicians, by Occupation and Industry, as of January 1, 1966

(In thousands)									
SIC code	Industry	Total	Drafts-men	Survey-ors	Elec-trical and elec-tronic	Other engineering and physical science	Biolog-ical and agricul-tural	Medical and dental	Other life science
	All industries -----	673.2	244.6	26.6	150.3	149.5	6.3	22.1	73.7
07-09	Agriculture, forestry, and fisheries -----	1.0	(¹)	(²)	(¹)	(²)	0.6	(¹)	.4
10-14	Mining -----	10.2	3.7	1.6	1.0	2.0	(¹)	(¹)	1.8
15-17	Contract construction -----	30.2	18.3	3.1	4.6	1.0	(²)	(¹)	3.2
	Manufacturing -----	380.2	128.5	1.6	88.7	112.4	4.7	1.1	43.3
19	Ordnance and accessories -----	19.0	4.2	(¹)	8.7	4.9	.2	(¹)	1.0
20	Food and kindred products -----	4.2	.6	(¹)	.3	1.2	.7	(¹)	1.4
22	Textile mill products -----	2.4	.3	(²)	.3	.8	(¹)	(²)	1.0
23	Apparel and other finished products -----	.1	(¹)	(¹)	(¹)	(¹)	(²)	(²)	.1
24	Lumber and wood products -----	.7	.4	.1	(¹)	.1	(¹)	(²)	(¹)
25	Furniture and fixtures -----	1.5	1.3	(²)	(¹)	.1	(²)	(²)	.1
26	Paper and allied products -----	6.0	1.2	.1	.4	3.2	.1	(¹)	1.0
27	Printing and publishing -----	.7	.3	(¹)	.1	.1	(¹)	(¹)	.2
28	Chemicals and allied products -----	38.3	3.7	(¹)	1.3	23.1	3.2	.4	6.5
29	Petroleum refining and related industries -----	5.8	.7	(¹)	.3	3.2	(¹)	(¹)	1.6
30	Rubber and miscellaneous plastics products -----	4.9	1.3	(²)	.2	2.5	(¹)	(¹)	.9
31	Leather and leather products -----	.3	.1	(²)	(²)	.2	(¹)	(²)	(¹)
32	Stone, clay, and glass products -----	5.6	2.4	(¹)	.4	1.7	(¹)	(¹)	1.0
33	Primary metal industries -----	17.6	4.7	.3	1.8	7.2	(¹)	.1	3.6
34	Fabricated metal products -----	24.7	16.6	.1	.9	5.4	(¹)	(¹)	1.5
35	Machinery, except electrical -----	67.4	35.6	.2	11.6	13.1	.1	(¹)	6.8
36	Electrical machinery, equipment, and supplies -----	99.5	27.6	.6	46.6	16.1	.1	.1	8.4
37	Transportation equipment -----	58.4	20.5	.1	9.7	23.9	(¹)	.1	4.2
38	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks -----	20.2	6.0	(¹)	5.6	4.4	.1	.2	3.8
39	Other manufacturing industries ³ -----	3.0	1.0	(²)	.4	1.2	.1	(²)	.3
	Transportation, communication, and utilities -----	58.4	9.7	2.7	26.5	13.3	(¹)	(¹)	6.0
40	Railroad transportation -----	4.7	1.8	.8	.7	.8	(²)	(¹)	.6
41-47	Other transportation services -----	2.1	.3	.4	.9	.1	(²)	(¹)	.4
48	Communication -----	31.7	1.1	.2	19.1	8.5	(²)	(²)	2.9
49	Electric, gas, and sanitary services -----	19.8	6.4	1.4	5.9	3.9	(¹)	(¹)	2.2
50-59	Wholesale and retail trade -----	31.2	5.0	(¹)	15.2	3.1	(¹)	4.2	3.6
60-67	Finance, insurance, and real estate -----	5.8	.4	(²)	.2	.9	(²)	.1	4.2
	Services -----	156.2	78.9	17.6	14.2	16.8	1.0	16.7	11.2
70-79, 81	Hotel, personal, business, amusement, recreation, and legal -----	39.9	10.7	.8	10.2	12.2	.8	(¹)	5.2
807	Medical and dental laboratories -----	18.5	(¹)	(²)	(¹)	(¹)	.1	16.7	1.7
891	Engineering and architectural services -----	97.8	68.1	16.8	4.0	4.5	.1	(¹)	4.3

¹ Less than 50.² Not available.³ Includes SIC 21 tobacco manufactures.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Preliminary data from sample surveys conducted by the U.S. Department of Labor, Bureau of Labor Statistics. Establishments below a minimum specified size, determined separately for each major industry group, were excluded from the survey. This exclusion does not significantly affect the above data. Governments, universities, and nonprofit organizations were not surveyed.

Table 15. Minimum Employment¹ Size of Establishments, by Industry, Covered by the 1961-66 Surveys

SIC code	Industry	1961-64	1965-66
07-09	Agriculture, forestry, and fisheries -----	50	10
10-14	Mining:		
10	Metal -----	10	10
11-12	Anthracite, bituminous, and lignite -----	10	10
13	Crude petroleum and natural gas -----	1	4
14	Nonmetallic minerals, except fuels -----	10	10
15-17	Contract construction -----	10	4
	Manufacturing:		
19	Ordnance and accessories -----	1	4
20	Food and kindred products -----	10	10
21	Tobacco manufactures -----	10	50
22	Textile mill products -----	50	50
23	Apparel and other finished products -----	10	100
24	Lumber and wood products -----	50	50
25	Furniture and fixtures -----	50	50
26	Paper and allied products -----	10	10
27	Printing and publishing -----	10	100
28	Chemicals and allied products -----	1	4
29	Petroleum refining and related industries -----	1	10
30	Rubber and miscellaneous plastics products -----	10	10
31	Leather and leather products -----	10	50
32	Stone, clay, and glass products -----	10	4
33	Primary metal industries -----	1	4
34	Fabricated metal products -----	1	4
35	Machinery, except electrical -----	1	1
36	Electrical machinery, equipment, and supplies -----	1	4
37	Transportation equipment -----	1	4
38	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks -----	1	4
39	Miscellaneous manufacturing industries -----	10	10
	Transportation, communication, and utilities:		
40	Railroad transportation -----	100	50
41-47	Other transportation services -----	1	50
48	Communication -----	1	4
49	Electric, gas, and sanitary services -----	1	4
50-59	Wholesale and retail trade -----	50	10
60-67	Finance, insurance, and real estate -----	50	50
	Services:		
739	Commercial laboratories; business and management consulting services -----	1	1
807	Medical and dental laboratories -----	1	1
891	Engineering and architectural services -----	1	1
70-79 (excl. 739), 81	Other services -----	50	100

¹ Slightly different minimum employment sizes may apply to some sectors within major industry groups.

SOURCE: 1961-64 Employment of Scientific and Technical Personnel in Industry, 1962, BLS Bulletin 1418, p. 73.

1965-66 Bureau of Labor Statistics, unpublished data.

Table 16. Relative Standard Errors for Scientists and Engineers, and for Technicians, by Industry, January 1960

(In percent)		
Industry	Scientists and engineers	Technicians
All industries -----	2	3
Construction -----	12	26
Food and kindred products -----	8	14
Textile mill products and apparel -----	17	22
Paper and allied products -----	7	15
Chemicals and allied products -----	2	4
Petroleum products and extraction -----	5	8
Stone, clay, and glass products -----	8	11
Primary metal industries -----	3	3
Fabricated metal products and/or ordnance -----	13	16
Machinery, except electrical -----	3	4
Electrical equipment -----	5	5
Motor vehicles and equipment -----	1	1
Aircraft and parts -----	1	1
Professional and scientific instruments -----	8	13
Other manufacturing industries -----	7	21
Transportation and other public utilities -----	5	18
Other nonmanufacturing industries -----	6	10

SOURCE: Scientific and Technical Personnel in Industry 1960, 1961, National Science Foundation, p. 45.

Table 17. Relative Standard Errors for Engineers, Scientists, and Technicians, All Industries, January 1960

Occupation	Percent
Engineers -----	2
Scientists:	
Chemists -----	3
Physicists -----	4
Metallurgists -----	6
Geologists and geophysicists -----	7
Mathematicians -----	5
Medical scientists -----	8
Agricultural scientists -----	9
Biological scientists -----	7
Other scientists -----	9
Technicians -----	3
Draftsmen -----	3
Engineering and physical science -----	3
Medical, agricultural, and biological -----	8
All other -----	6

SOURCE: Scientific and Technical Personnel in Industry, 1960, 1961, National Science Foundation, p. 46.

Chapter 7. Employment of Engineers, Scientists, and Technicians by Universities and Colleges, and by Scientific and Research Nonprofit Organizations

The National Science Foundation has conducted two surveys in which employment information for scientific and technical personnel was requested from almost 2,000 institutions of higher education. These included universities, colleges, agricultural experiment stations, medical schools, and Federally Funded Research and Development Centers. These centers are research and development organizations administered on a contractual basis by educational institutions but financed exclusively or substantially by the Federal Government. Estimates were made for nonrespondents who generally had small science and engineering programs so that these surveys represent, substantially, the national total. Some of the results appear in tables 18 through 20 which present employment by universities and colleges of engineers and scientists in 1961 and 1965 and of technicians in 1965.

In a recent publication,¹³ the Foundation has evaluated the supply and demand factors which influence the number of scientists and engineers engaged in teaching and research in institutions of higher education and has estimated their annual staffing requirements through 1975.

A survey of scientists, engineers, and technicians in independent nonprofit institutions also has been made by the National Science Foundation.¹⁴

This survey included organizations financing or performing research and development or disseminating scientific and technical information. These groups are characterized by a large number of small units and pose special sampling problems. Employment of engineers, scientists, and technicians by these institutions in 1965 is presented in table 21. Excluded from the survey were voluntary nonprofit hospitals and health agencies.

¹³ Science and Engineering Staff in Universities and Colleges, 1965-75, May 1967, National Science Foundation.

¹⁴ Scientific Activities of Nonprofit Institutions—1964 Expenditures and January 1965 Manpower, 1967. National Science Foundation.

Table 18. Employment of Engineers and Scientists, by Universities and Colleges, March 1961

Field of employment	(In thousands)					
	Full-time			Part-time		
	Total	Faculty ¹	Other ²	Total ³	Faculty ¹	Other ³
Engineers -----	18.6	12.6	6.0	8.7	3.0	5.7
Aeronautical and astronautical -----	.9	.4	.4	.4	.1	.3
Agricultural -----	.7	.6	.1	.1	(⁴)	.1
Chemical -----	1.3	.9	.4	1.1	.1	1.0
Civil -----	2.6	2.2	.3	1.3	.4	.9
Electrical -----	5.3	2.8	2.5	2.1	.9	1.3
Mechanical -----	4.3	2.7	1.6	1.7	.7	1.0
Metallurgical -----	.6	.4	.2	.4	.1	.4
Other engineers -----	3.0	2.5	.5	1.6	.7	.9
Physical scientists -----	30.0	22.1	7.9	19.1	4.6	14.5
Chemists -----	9.3	6.7	2.6	6.5	.9	5.6
Earth scientists -----	2.3	1.8	.5	1.6	.2	1.4
Physicists and astronomers -----	8.3	5.1	3.2	5.4	1.1	4.3
Mathematicians -----	9.5	8.2	1.4	5.3	2.3	3.0
Other physical scientists -----	.6	.4	.2	.3	.1	.2
Life scientists -----	42.6	30.0	12.6	20.6	8.1	12.5
Agricultural scientists ⁵ -----	6.5	5.3	1.2	2.3	.2	2.1
Biological scientists ⁶ -----	21.3	16.3	5.0	9.8	2.2	7.6
Medical scientists ⁷ -----	14.8	8.4	6.4	8.6	5.8	2.8
Psychologists -----	5.3	4.8	.4	3.9	1.6	2.3
Social scientists -----	18.5	17.7	.8	8.4	3.6	4.8
Economists -----	5.5	5.2	.3	2.7	1.1	1.6
Sociologists -----	3.1	2.9	.1	1.5	.8	.7
Political scientists -----	2.6	2.5	.1	1.2	.5	.7
Other social scientists ⁸ -----	7.3	7.0	.3	3.1	1.3	1.8

¹ Primarily in teaching.² Primarily in research and development, administrative, and other nonteaching functions. Includes all full-time graduate students. They are not separated by function.³ Includes all part-time graduate students. They are not separated by function.⁴ Less than 50.⁵ Includes commodity related agricultural scientists.⁶ Includes anatomists, biochemists, microbiologists, pathologists, pharmacologists, physiologists, biologists, botanists, entomologists, zoologists, and other life scientists.⁷ Includes clinical medical scientists and other clinical scientists.⁸ Includes geographers, historians, and other social scientists.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Scientists and Engineers in Colleges and Universities, 1961, December 1961, National Science Foundation.

Table 19. Employment of Engineers and Scientists, by Universities and Colleges, January 1965¹

Field of employment	(In thousands)			Part-time ²		
	Total	Teaching	Other ³	Total	Teaching	Other ⁴
Engineers -----	22.9	13.2	9.7	14.5	7.1	7.4
Aeronautical -----	1.1	.6	.6	.9	.4	.6
Chemical -----	1.6	1.0	.6	1.6	.7	1.0
Civil -----	2.8	2.2	.6	2.0	.9	1.0
Electrical -----	6.7	3.2	3.5	3.7	2.1	1.6
Mechanical -----	4.7	2.9	1.8	2.4	1.5	.9
Industrial -----	1.0	.8	.3	.6	.4	.1
Other engineers -----	4.9	2.6	2.3	3.3	1.2	2.1
Physical scientists -----	38.7	26.6	12.1	29.4	18.2	11.2
Chemists -----	11.0	7.3	3.7	9.9	5.8	4.2
Earth scientists -----	3.7	2.7	1.0	2.8	1.6	1.1
Physicists -----	10.4	6.0	4.4	8.1	4.1	4.0
Mathematicians -----	11.9	10.0	1.9	7.7	6.4	1.3
Other physical scientists -----	1.8	.7	1.1	1.0	.3	.7
Life scientists -----	63.4	29.3	34.1	38.0	20.2	17.8
Agricultural scientists -----	13.4	2.9	10.5	5.0	1.0	4.0
Biological scientists -----	21.0	12.7	8.3	12.4	6.7	5.7
Medical Scientists -----	29.0	13.7	15.3	20.6	12.5	8.1
Psychologists -----	7.1	5.7	1.3	5.7	3.7	2.1
Social scientists -----	26.6	22.9	3.6	14.3	10.8	3.4
Economists -----	6.4	5.1	1.3	3.7	2.6	1.1
Sociologists -----	4.9	4.3	.5	3.0	2.2	.8
Political scientists -----	4.9	4.5	.4	2.3	1.9	.4
Other social scientists -----	10.4	9.0	1.4	5.3	4.2	1.1
Other scientists—not specified -----	.9	.5	.4	.2	.1	.1

¹ Includes employment in Federally Funded Research and Development Centers administered by universities and colleges. These centers accounted for almost 5 percent of employment and were almost exclusively involved in research and development.

² Graduate students accounted for slightly more than one-half of all part-time employees and were concentrated in the physical sciences occupations. Other part-time employees were concentrated in the life sciences occupations.

³ Includes administrative and other functions. Over 70 percent were involved with research and development functions. Less than 20 percent were employed in the Federally Funded Research and Development Centers.

⁴ Includes administrative and other functions. Almost all were employed by the universities and colleges, and over 85 percent were involved with research and development functions.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Unpublished survey data compiled by the National Science Foundation.

Table 20. Employment of Technicians, by Universities and Colleges, January 1965¹

(In thousands)			
Field of employment	Total	Research and development	Other activities
Total -----	47.0	36.2	10.8
Engineering and physical science -----	16.0	14.1	1.9
Life science -----	26.1	19.0	7.1
Social science -----	1.2	1.0	.2
Other -----	3.7	2.1	1.6

¹ Includes employment in Federally Funded Research and Development Centers managed exclusively or primarily by universities and colleges. These Centers accounted for less than 20 percent of employment and were engaged almost exclusively in research and development.

SOURCE: Unpublished survey data compiled by the National Science Foundation.

Table 21. Employment of Engineers, Scientists, and Technicians by Independent Nonprofit Institutions, January 1965¹

(In thousands)	
Field of employment	Employment ²
Engineers -----	4.8
Physical scientists -----	4.0
Mathematicians -----	1.6
Life scientists -----	5.0
Psychologists -----	.8
Social scientists -----	1.8
Technicians ³ -----	6.9

¹ Includes independent research institutes and operating foundations, Federally Funded Research and Development Centers administered by nonprofit institutions, private philanthropic foundations, professional and technical societies, academies of science, science museums, botanical gardens, zoological parks, and other nonprofit organizations.

² Full-time plus part-time workers. Almost 90 percent were involved in research and development.

³ Includes engineering and physical science, life science, psychology, social science, and other science technicians.

SOURCE: Scientific Activities of Nonprofit Institutions—1964 Expenditures and January 1965 Manpower, 1967 National Science Foundation.

Chapter 8. Occupational Employment in Federal, State, and Local Governments

Federal Government

Relatively current Federal Government occupational employment data are presented in the Civil Service Commission's publication Current Federal Work Force Data.¹⁵ This semiannual publication contains total governments employment excluding the Post Office,¹⁶ the Central Intelligence Agency, and the National Security Agency, as of June 30, and of December 31. However, no detailed information is reported on occupational and other employment characteristics by agency. The end-of-year figures are population data and represent an actual count of all Federal employees. The midyear data are estimates obtained from a 10-percent sample of each occupation series' employment. Table 22 shows data for 157 occupational series, each employing at least 1,000 persons during December 31, 1964, through June 30, 1966. Based on current and expected trends in Federal agency programs, 4-year projections of employment in these 157 occupations are presented in the Commission's annual publication Federal Work Force Outlook.¹⁷

Comprehensive occupational data, by Federal agency, are collected and tabulated annually. In the Commission's latest publication containing information on professional, technical, clerical, and related workers. Occupations of Federal White-Collar Workers, October 31, 1961, statistics are presented for over 500 occupational series for each of 21 agencies (including one catch-all category).¹⁸ Unpublished white-collar worker data are available for 1962, 1964, and 1966. Information is presented for almost 900 categories of craftsmen, operatives, laborers, and related workers for each of 19 agencies (including one catch-all category) in the Commission's publication Occupations of Federal Blue-Collar Workers, October 31, 1960.¹⁹ Unpublished blue-collar worker data for 1961, 1962, 1965, and 1966 are available.

State and Local Governments

Employment of scientific, professional, and technical personnel by State governments in January 1964 and by local governments in October 1963 was obtained from sample surveys conducted by the Bureau of Labor Statistics and is shown in table 19. State data are for the 50 States and exclude State educational institutions. Similar surveys of State governments employment were made for 1959 and 1962.²⁰ Local governments data exclude all governmental administration units of less than 25,000 population (except certain special districts) and all educational institutions.

The Bureau of Labor Statistics presently is conducting a survey of State governments occupational employment in 1967 and is considering a future study of local governments occupational employment.

¹⁵ Current Federal Work Force Data as of June, 1966, March 1967, U. S. Civil Service Commission. Data for December 1964 and June 1965 appear in the September 1966 publication. Data for June 1964 are in the August 1965 publication.

¹⁶ Employment in selected postal occupations during 1960-66 is presented in table 23.

¹⁷ The third report in this series, covering the fiscal years 1967-70, was published in May 1967.

¹⁸ Earlier data are contained in similarly titled publications dated Aug. 31, 1954; Feb. 28, 1957; Oct. 31, 1958; Oct. 31, 1959; and Oct. 31, 1960. Data for 1947 and 1951 are in the BLS Bulletin 1117, which was published in cooperation with the Civil Service Commission.

¹⁹ Earlier data are contained in similarly titled publications dated Feb. 28, 1957; Oct. 31, 1958; Oct. 31, 1960; and Oct. 31, 1961.

²⁰ Employment of Scientific and Technical Personnel in State Government Agencies, Report on a 1959 Survey, 1961, National Science Foundation. This survey was sponsored by the National Science Foundation and conducted by the U. S. Department of Labor, Bureau of Labor Statistics.

Employment of Scientific and Technical Personnel in State Government Agencies, 1962, Bulletin 1412, U. S. Department of Labor, Bureau of Labor Statistics.

Table 22. Federal Employment in White-Collar Occupations, 1964-66

Series code	Series	June 30, 1966 ¹	December 31, 1965 ²	December 31, 1964 ²
	All white-collar occupations-----	1,190,250	1,143,055	1,074,697
	Professional occupations-----	226,185	224,937	214,237
	Social science-----	9,533	8,693	7,633
0110	Economics-----	5,443	4,533	3,641
0180	Psychology-----	1,863	1,817	1,843
0185	Social work-----	2,227	2,343	2,149
	Agricultural science-----	17,307	16,734	16,263
0401	Biology-----	1,243	1,059	1,027
0457	Soil conservation-----	4,856	4,742	4,780
0460	Forestry-----	6,094	6,184	5,974
0470	Soil science-----	1,893	1,873	1,903
0475	Farm management loan-----	3,221	2,876	2,579
	Accounting-----	31,219	31,540	31,038
0510	Accounting-----	18,236	18,677	18,265
0512	Internal revenue agent-----	12,983	12,863	12,773
	Medical-----	38,033	37,738	35,344
0602	Medical officer-----	12,511	12,886	11,613
0610	Nurse-----	24,462	23,807	22,570
0630	Dietitian-----	1,060	1,045	1,161
0701	Veterinary-----	2,352	2,447	2,285
	Engineering-----	72,136	71,195	67,976
0801	General engineering-----	11,741	11,215	10,359
0808	Architecture-----	1,491	1,455	1,383
0810	Civil engineering-----	³ 18,516	13,901	8,461
0811	Construction engineering-----	-	1,835	3,451
0812	Structural engineering-----	-	590	1,286
0813	Hydraulic engineering-----	-	936	2,178
0820	Highway engineering-----	-	1,268	1,938
0830	Mechanical engineering-----	8,709	8,660	8,376
0850	Electrical engineering-----	4,181	4,314	4,370
0855	Electronic engineering-----	14,566	14,465	13,776
0861	Aerospace engineering-----	8,599	8,090	7,970
0871	Naval architecture-----	1,046	1,055	1,100
0893	Chemical engineering-----	1,280	1,342	1,290
0896	Industrial engineering-----	2,007	2,069	2,038
0905	Attorney-----	9,378	9,264	9,057
1224	Patent examining-----	1,116	1,066	1,106
	Physical science-----	27,007	26,460	26,018
1301	General physical science-----	6,309	6,388	6,466
1310	Physics-----	5,339	5,127	5,026
1320	Chemistry-----	8,150	7,831	7,716
1340	Meteorology-----	2,261	2,220	2,190
1350	Geology-----	1,933	1,949	1,965
1370	Cartography-----	3,015	2,945	2,655
	Mathematics-----	3,924	3,721	3,512
1520	Mathematics-----	3,432	3,308	3,089
1529	Mathematical statistics-----	492	413	423
1710	Education-----	14,180	16,079	14,005
	Administrative-technical (general) occupations-----	316,392	297,758	282,266
	Safety, security-----	3,882	3,772	3,533
0016	Safety management-----	1,579	1,579	1,420
0080	Security-----	2,303	2,193	2,113
0132	Intelligence-----	3,015	2,952	2,776
0188	Recreation-----	1,944	1,829	1,811

See footnotes at end of table.

Table 22. Federal Employment in White-Collar Occupations, 1964-66—Continued

Series code	Series	June 30, 1966 ¹	December 31, 1965 ²	December 31, 1964 ²
	Personnel-----	16,337	15,419	14,987
0201	Personnel administration-----	8,268	8,036	7,959
0212	Staffing-----	3,781	3,263	2,949
0221	Classification-----	2,452	2,385	2,433
0235	Employee development-----	1,836	1,735	1,646
	Computer and management services-----	42,819	40,645	38,486
0330	Systems administration-----	1,336	1,349	1,107
0331	Digital computer programmer-----	4,624	6,251	5,438
0332	Systems operation-----	5,011	4,459	3,728
0334	Systems analysis-----	6,845	3,882	3,354
0341	Administrative officer-----	9,445	9,445	9,500
0342	Office services-----	2,029	1,876	2,008
0343	Management analysis-----	8,731	8,592	8,313
0344	Management technician-----	3,792	3,539	3,529
0362	EAM project planning-----	1,006	1,252	1,509
	Agricultural support-----	8,675	7,276	6,329
0403	Microbiology-----	1,485	1,408	1,215
0404	Biology laboratory technician-----	4,094	2,716	2,237
0458	Soil conservation aid-----	3,096	3,152	2,877
	Accounting, finance support-----	26,555	26,594	26,805
0501	General accounting, budget-----	10,524	10,638	11,073
0525	Accounting technician-----	12,799	12,947	12,990
0570	Financial institution examiner-----	3,232	3,009	2,742
	Medical-----	4,687	4,274	4,114
0645	Medical technician-----	3,052	2,735	2,639
0647	Radiology technician-----	1,635	1,539	1,475
	Engineering support-----	57,765	53,205	49,883
0802	Engineering technician-----	26,706	23,673	21,785
0809	Construction inspection-----	2,956	2,985	2,772
0817	Surveying technician-----	5,500	4,992	4,597
0818	Engineering drafting-----	3,994	3,974	3,893
0856	Electronic technician-----	18,609	17,581	16,836
	Fine arts-----	9,129	8,532	8,319
1020	Illustrating-----	2,475	2,405	2,369
1060	Photography-----	2,897	2,479	2,500
1081	Public information-----	1,890	1,827	1,731
1082	Writing and editing-----	1,867	1,821	1,719
	Business and industry-----	39,348	37,257	36,068
1101	General business and industry-----	2,845	2,294	1,942
1102	Contract procurement-----	16,674	15,440	14,971
1104	Property disposal-----	1,315	1,368	1,336
1150	Industrial specialist-----	4,486	4,011	3,802
1152	Production control-----	6,168	6,345	6,531
1165	Loan specialist-----	2,255	2,303	2,179
1170	Realty-----	2,991	2,882	2,751
1171	Appraising, assessing-----	2,614	2,614	2,556
	Physical science support-----	9,828	9,085	8,039
1311	Physical science technician-----	3,566	3,207	2,898
1341	Meteorological technician-----	2,678	2,597	2,607
1371	Cartographic aides-----	3,584	3,281	2,534
1410	Librarian-----	3,751	3,569	3,387
1530	Statistician-----	2,736	2,688	2,337
	Equipment and construction-----	15,794	14,455	13,704
1640	Construction maintenance-----	2,783	2,701	2,568
1670	Equipment specialist-----	13,011	11,754	11,136
1712	Instruction-----	9,252	8,283	6,622
	Investigation-----	4,661	4,614	4,373
1810	General investigation-----	2,739	2,749	2,821
1825	Aviation safety officer-----	1,922	1,865	1,552

See footnotes at end of table.

Table 22. Federal Employment in White-Collar Occupations, 1964-66—Continued

Series code	Series	June 30, 1966 ¹	December 31, 1965 ²	December 31, 1964 ²
1901	Inspection and quality control -----	13,368	12,121	9,543
	General commodity quality control and inspection -----	2,515	2,370	2,123
1903	Quality control and inspection management -----	2,366	2,048	1,550
1936	Electronic equipment -----	3,059	2,690	2,368
1940	Mechanical equipment -----	2,100	1,670	1,404
1942	Aircraft quality control and inspection -----	2,238	2,090	1,008
1950	Missile quality control and inspection -----	1,090	1,253	1,090
	Supply -----	31,587	30,565	31,299
2001	General supply -----	10,141	10,477	11,785
2010	Supply requirements -----	14,970	13,704	13,033
2030	Storage management -----	1,127	1,081	1,172
2050	Cataloging -----	3,865	3,865	3,917
2090	Publication -----	1,484	1,438	1,392
	Transportation -----	11,259	10,623	9,851
2101	General transportation -----	1,629	1,675	1,794
2130	Traffic management -----	1,734	1,528	1,486
2131	Freight rate -----	2,202	2,255	2,263
2132	Travel -----	1,426	1,307	1,401
2134	Shipment -----	2,414	2,348	1,894
2181	Aircraft operation -----	1,854	1,510	1,013
	Administrative-technical -----			
	(Government) occupations -----	94,808	91,294	87,459
0007	Correctional institution administration -----	2,934	2,915	2,905
0105	Social insurance administration -----	10,218	9,703	8,503
	Accounting -----	17,827	16,191	15,145
0526	Tax technician -----	2,808	2,798	2,798
0560	Budget -----	6,112	6,035	5,958
0592	Tax accounting -----	8,907	7,358	6,389
0685	Public health program specialist -----	1,898	1,845	1,646
	Claims examining -----	11,247	10,564	9,885
0962	Contract representative -----	1,201	1,110	1,168
0963	Legal institution examining -----	1,941	1,894	1,894
0993	Social security claims -----	5,702	5,683	5,071
0996	Veterans claims examining -----	2,403	1,877	1,752
1169	Collection officer -----	6,200	6,241	6,422
	Investigation -----	24,653	23,488	22,428
1811	Criminal investigation -----	12,941	12,249	11,258
1813	Wage and hour law enforcement -----	1,255	1,139	1,162
1816	Immigration inspection -----	1,247	1,229	1,159
1854	Alcohol, tobacco tax -----	1,178	1,090	1,149
1863	Food inspection -----	3,952	3,845	3,723
1890	Customs inspection -----	2,826	2,711	2,667
1896	Immigration patrol -----	1,254	1,225	1,310
1980	Agricultural grading -----	2,600	2,940	2,923
2152	Air traffic control -----	17,231	17,407	17,602
	Aid-assistant occupations -----	44,937	42,595	41,496
	Medical support -----	42,990	40,809	39,903
0621	Nursing assistant -----	38,378	36,617	35,955
0636	Physical therapy assistant -----	1,011	1,029	1,047
0681	Dental assistant -----	1,647	1,395	1,308
0699	Medical aid -----	1,954	1,768	1,593
1411	Library assistant -----	1,947	1,786	1,593
	Clerical (specialized) occupations -----	107,033	101,049	90,382
	Personnel clerical -----	14,692	12,734	12,050
0203	Personnel clerical -----	7,165	6,699	6,081
0204	Military personnel clerical -----	7,527	6,035	5,969

See footnotes at end of table.

Table 22. Federal Employment in White-Collar Occupations, 1964-66—Continued

Series code	Series	June 30, 1966 ¹	December 31, 1965 ²	December 31, 1964 ²
0309	Correspondence clerk-----	1,742	1,716	1,729
	Accounting clerical-----	29,051	27,941	27,080
0520	Accounts maintenance-----	12,475	12,019	11,626
0540	Voucher examining-----	5,553	5,495	5,447
0544	Time, leave, and payroll-----	4,576	4,439	4,355
0545	Military pay-----	4,307	3,947	3,598
0590	Time, leave-----	2,140	2,041	2,054
0998	Claims clerical-----	10,025	9,412	2,873
1531	Statistical clerical-----	6,888	6,898	7,019
	Supply clerical-----	44,635	42,348	39,631
2020	Purchasing-----	8,837	8,491	8,186
2040	Stock control-----	32,896	31,137	28,994
2091	Sales store-----	2,902	2,720	2,451
	Clerical (general) occupations-----	277,400	259,117	241,616
	Office occupations-----	274,178	255,791	238,300
0302	Messenger-----	1,620	1,578	1,702
0305	File, mail-----	27,224	25,379	23,967
0312	Clerk-stenographer-----	52,771	51,726	51,859
0316	Clerk-dictating machine-----	6,620	6,522	6,493
0318	Secretary-----	58,544	56,028	54,935
0322	Clerk-typist-----	95,426	84,695	70,647
0350	Office machine operations-----	1,561	1,478	1,487
0356	Card punch-----	16,139	14,229	12,276
0359	EAM operations-----	5,132	5,113	5,836
0382	Telephone operation-----	7,071	7,041	6,756
0385	Teletypist-----	2,070	2,002	2,342
0530	Cash clerical-----	3,222	3,326	3,316
	Other occupations-----	123,495	126,305	117,241
	Miscellaneous-----	28,531	27,569	27,085
0081	Fire-----	11,814	11,277	11,406
0083	Police-----	2,774	2,840	2,554
0085	Guard-----	13,943	13,452	13,125
0301	General clerical and administrative-----	94,964	98,736	90,156

¹ Based upon a 10 percent sample.² Total population.³ Coverage of 0810 expanded to include series 0811, 0812, 0813 and 0820 which were discontinued in 1966.SOURCE: Data for 1964 and 1965 are from Current Federal Workforce Data, September 1966, U.S. Civil Service Commission. Data for 1966, *ibid.*, March 1967.

Table 23. Employment in Selected Post Office Occupations, 1960-66

(In thousands)

Occupation	1966	1965	1964	1963	1962	1961	1960
All occupations-----	692	610	593	590	585	580	568
Postmasters ¹ -----	33	33	34	34	35	35	35
Supervisors-----	33	32	32	32	31	31	30
Postal clerks-----	300	250	240	239	239	239	234
Mail carriers ² -----	225	207	202	200	198	195	190
Special delivery carriers-----	5	4	4	4	4	4	5
Mail handlers-----	44	32	32	31	31	30	29

¹ Does not include assistant postmasters.² Includes part-time carriers on a full-time equivalent basis.

NOTE: Data are as of October.

SOURCE: Post Office Department. Bureau of Finance and Administration Paid Employees Report, Form 1988.

Table 24. Employment of Scientific, Professional, and Technical Personnel
by State and Local Governments

(In thousands)		
Occupation	State government January 1964	Local government ¹ October 1963
All occupations -----	156.8	² 134.4
Engineers -----	34.5	22.3
Civil engineers -----	31.0	17.1
Electrical engineers -----	(³)	2.3
Mechanical engineers -----	(³)	1.3
Traffic engineers -----	(³)	.7
Sanitary engineers -----	1.2	(³)
Other engineers -----	2.3	.8
Scientists -----	16.7	5.9
Chemists -----	1.4	1.2
Geologists and geophysicists -----	1.0	(⁴)
Other physical scientists -----	.1	.1
Agricultural scientists -----	3.3	.9
Biomedical scientists -----	2.0	1.8
Other life scientists -----	2.9	.3
Mathematicians -----	.3	.1
Statisticians -----	1.6	.4
Economists -----	.7	.2
Sociologists and anthropologists -----	.2	(⁵)
Other social scientists -----	.5	.4
Clinical psychologists -----	2.0	(⁶)
Social psychologists -----	1	(⁶)
Other psychologists -----	.4	.7
Social workers -----	9.2	(⁷)
Selected health professions ⁸ -----	36.2	73.9
Public health officers (M. D.) -----	.8	1.9
Psychiatrists (M. D.) -----	3.8	.8
All other physicians (M. D. and D. O.) -----	4.4	10.8
Dentists (D. D. S. or D. D. M.) -----	1.0	1.0
Professional nurses (R. N.) -----	21.6	51.6
Veterinarians (D. V. M.) -----	1.1	.4
Sanitarians -----	3.4	7.3
Technicians -----	60.2	32.3
Draftsmen -----	7.9	7.9
Surveyors -----	12.0	5.5
Engineering technicians -----	30.5	7.2
Physical science technicians -----	1.5	1.1
Agricultural technicians -----	2.0	.5
Biological technicians -----	1.8	(⁹)
Medical and dental technicians -----	3.7	9.2
Other technicians -----	.8	.9

¹ Data are only for city, county, and township governments which have a population for the governmental unit of 25,000 or more, and for certain districts which were sampled with certainty probability.

² Excludes social workers. See footnote 7.

³ Included with civil engineers.

⁴ Included with other physical scientists.

⁵ Included with other social scientists.

⁶ Included with other psychologists.

⁷ Data not collected.

⁸ The relevant occupations do not include physicians and dentists dealing with patients.

⁹ Included with agricultural technicians.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: Local data—Department of Labor, Bureau of Labor Statistics, unpublished sample survey preliminary data. State data—Employment of Scientific, Professional, and Technical Personnel in State Governments, January 1964. BLS Bulletin 1557, (1967).

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