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**EMPLOYMENT OF SCIENTIFIC
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TECHNICAL PERSONNEL
IN INDUSTRY
1962**

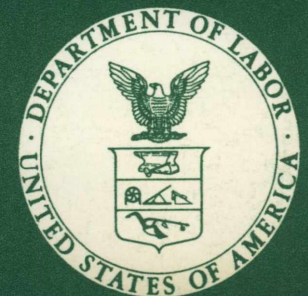
Bulletin No. 1418

UNITED STATES DEPARTMENT OF LABOR

W. Willard Wirtz, Secretary

BUREAU OF LABOR STATISTICS

Ewan Clague, Commissioner



Employment of Scientific and Technical Personnel in Industry, 1962

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June 1964



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Data for this report were collected through questionnaires mailed to a sample of establishments carefully selected to be representative of the Nation's industry. The response to the survey was excellent; nearly

90 percent of the approximately 14,200 establishments in the sample provided usable information. Excluded were self-employed scientists and engineers and those employed in certain small companies outside the scope of the survey. For further information on coverage see appendix B of this report.

The Bureau of Labor Statistics wishes to express its appreciation to the many organizations and individuals whose cooperation made this survey possible, especially to the companies that supplied data on their scientific and technical personnel.

This bulletin was prepared by Michael D. Wertheimer, with the assistance of Allan Katz and Sylvia K. Lawrence, under the supervision of William L. Copeland. The study was conducted under the general direction of Cora E. Taylor, Chief of the Bureau's Division of Occupational Employment Statistics, and Harold Goldstein, Assistant Commissioner for Manpower and Employment Statistics.

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HIGHLIGHTS

SCIENTISTS AND ENGINEERS

Industry employed approximately 852,000 scientists and engineers in January 1962. Engineers, numbering 684,000, represented 80 percent of this employment. Of the 168,000 scientists, chemists represented almost 50 percent; other physical scientists, 23 percent; life scientists, 16 percent; mathematicians, 9 percent; and the unclassified scientists, 3 percent.

Four manufacturing industry groups--electrical equipment, transportation equipment, chemicals, and machinery--accounted for almost half of all scientific and engineering employment.

Scientists and engineers were concentrated in large manufacturing establishments--64 percent of all such workers in manufacturing industries were in establishments with 1,000 employees or more.

More than 2 out of 3 scientists and engineers were in functions concerned with production and operations or research and development combined. R&D was the primary activity of 1 out of every 2 scientists, but of only 1 out of every 3 engineers.

In five industry groups--transportation equipment, electrical equipment, textile mill products, ordnance, and instruments--at least half of the scientists and engineers were in research and development activities.

TECHNICIANS

Of the 585,000 technicians employed in industry in January 1962, 44 percent were classified as engineering and physical science technicians, 36 percent as draftsmen, 3 percent as medical, agricultural, and biological technicians, and the remainder were unclassified.

Approximately half of all technicians were employed in four major industry groups--services, electrical equipment, machinery, and transportation equipment.

The ratio of technicians to scientists and engineers was, on the average, 62 per 100 in manufacturing industries and 86 per 100 in nonmanufacturing industries.

Approximately 1 out of every 4 technicians was engaged in research and development.

YEAR-TO-YEAR CHANGE

Employment of scientists and engineers in industry was 4 percent greater in 1962 than in 1961. This was a slower rate of growth than for 1960-61 (6.1 percent) or for 1959-60 (6.4 percent).

Technician employment rose about 3 percent between 1961 and 1962. This increase was less than for the previous year (4.6 percent), and much below the 1959-60 growth rate (6.1 percent).

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POINTS TO KEEP IN MIND

- **THE SURVEY RESULTS ARE ESTIMATES BASED ON A SAMPLE OF ESTABLISHMENTS. SINCE SUCH ESTIMATES ARE APPROXIMATIONS, ROUNDED FIGURES ARE SHOWN THROUGHOUT THE REPORT. TOTALS AND PERCENTAGES WERE CALCULATED, HOWEVER, ON UNROUNDED FIGURES, AND HENCE THE DETAILED DATA PRESENTED IN TABLES AND CHARTS MAY NOT ALWAYS ADD TO THE TOTALS SHOWN.**
- **ALL OCCUPATIONAL EMPLOYMENT FIGURES USED IN THIS REPORT REFER TO THE NUMBER OF PERSONS ACTUALLY WORKING AS SCIENTISTS, ENGINEERS, OR TECHNICIANS IN JANUARY 1962--REGARDLESS OF THE FIELD IN WHICH THEY MAY HAVE RECEIVED THEIR EDUCATION OR TRAINING. THE FULL DEFINITIONS ARE REPRODUCED IN APPENDIX D.**
- **ALL INDUSTRY CATEGORIES ARE BASED ON THE STANDARD INDUSTRIAL CLASSIFICATION MANUAL OF 1957 AND ITS 1958 SUPPLEMENT, (EXECUTIVE OFFICE OF THE PRESIDENT, BUREAU OF THE BUDGET). CERTAIN TWO-DIGIT AND THREE-DIGIT INDUSTRIES ARE COMBINED FOR TECHNICAL REASONS.**
- **THIS REPORT SUMMARIZES THE MAJOR FINDINGS OF THE SURVEY WITH RESPECT TO OCCUPATIONAL EMPLOYMENT WITHIN BROAD INDUSTRY GROUPINGS. THE DETAILED FINDINGS ARE PRESENTED IN THE TABLES IN APPENDIX A.**

SCIENTISTS AND ENGINEERS — — By Occupation

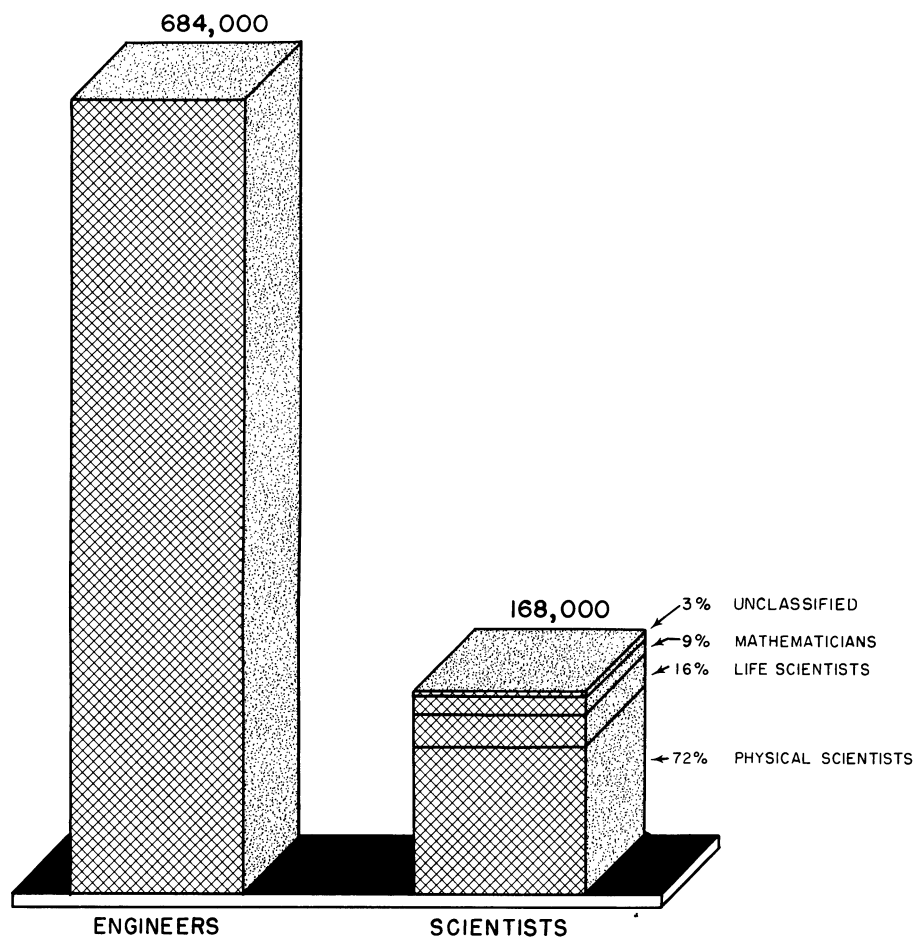
● ENGINEERS OUTNUMBER SCIENTISTS IN INDUSTRY BY 4 TO 1

● AS OF JANUARY 1962 INDUSTRY EMPLOYED 852,000 ENGINEERS AND SCIENTISTS

▶ 684,000 Engineers

▶ 168,000 Scientists

NUMBER OF ENGINEERS AND SCIENTISTS



SCIENTISTS

121,000 Physical Scientists

27,000 Life Scientists

15,000 Mathematicians

5,000 Unclassified

PHYSICAL SCIENTISTS

82,000 Chemists

14,000 Physicists

13,000 Geologists and
Geophysicists

12,000 Metallurgists

LIFE SCIENTISTS

10,000 Biologists

9,000 Agricultural

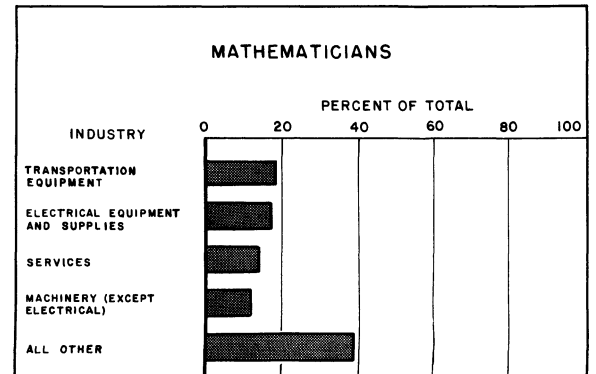
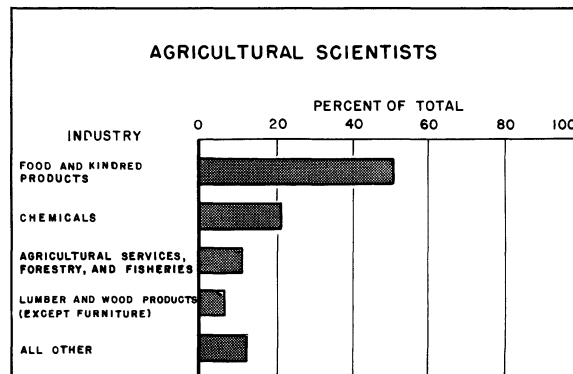
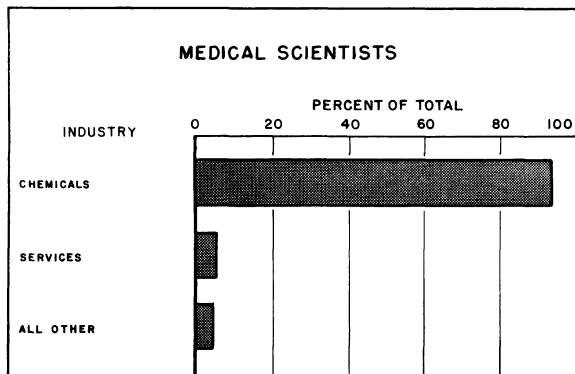
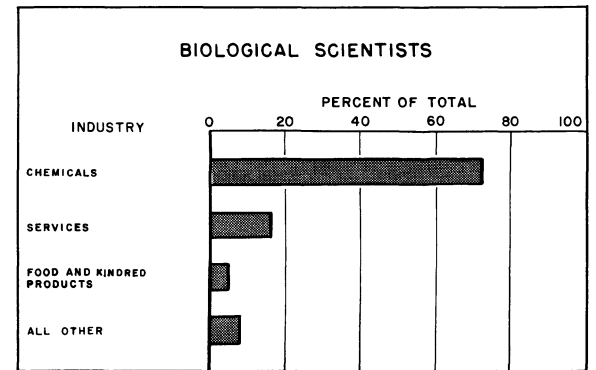
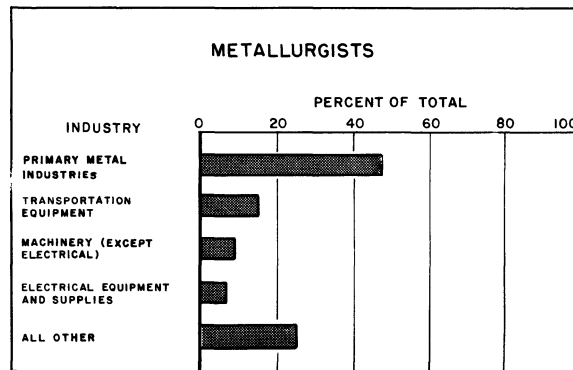
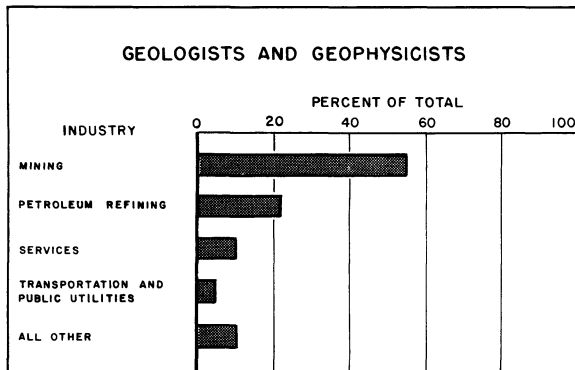
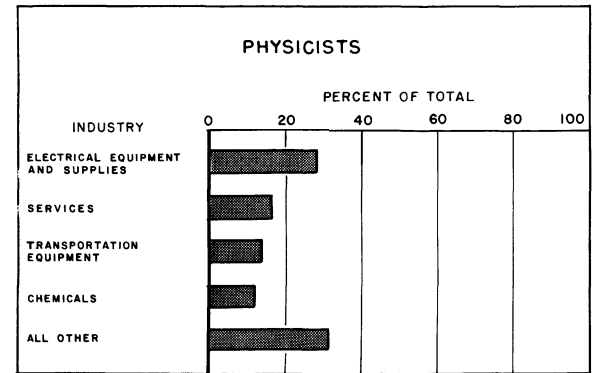
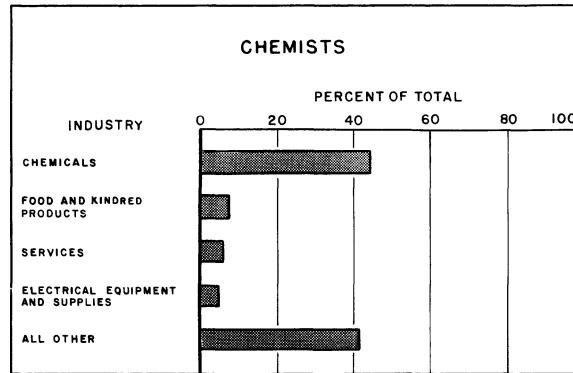
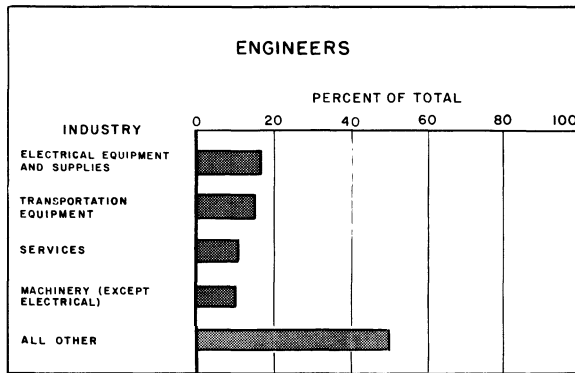
Scientists

8,000 Medical

Scientists

SCIENTISTS AND ENGINEERS — — By Occupation

● **SCIENTISTS--TO A GREATER EXTENT THAN ENGINEERS--TEND TO BE CONCENTRATED IN ONE OR A FEW INDUSTRIES.**

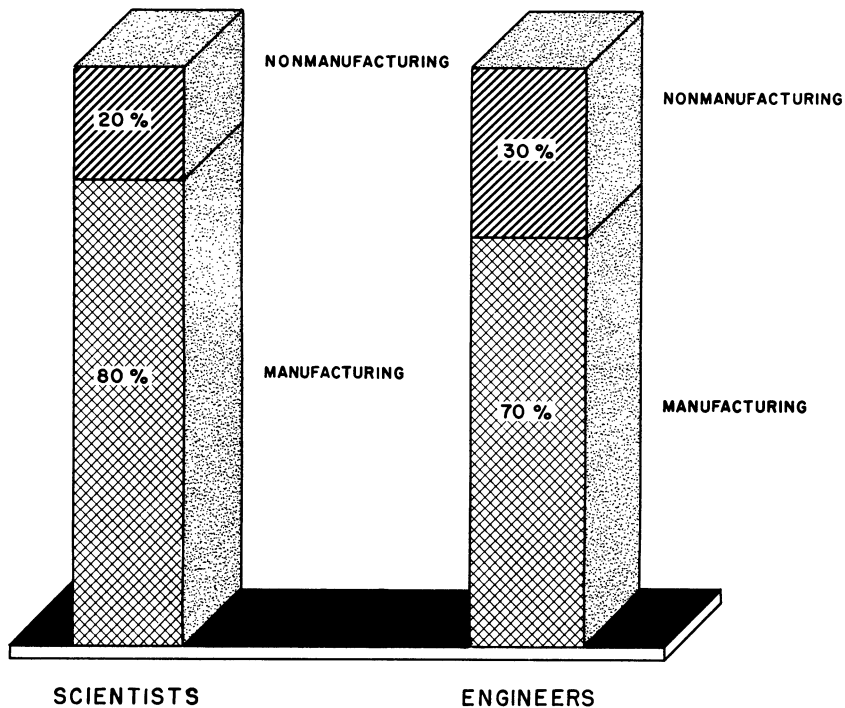


SCIENTISTS AND ENGINEERS — — By Industry

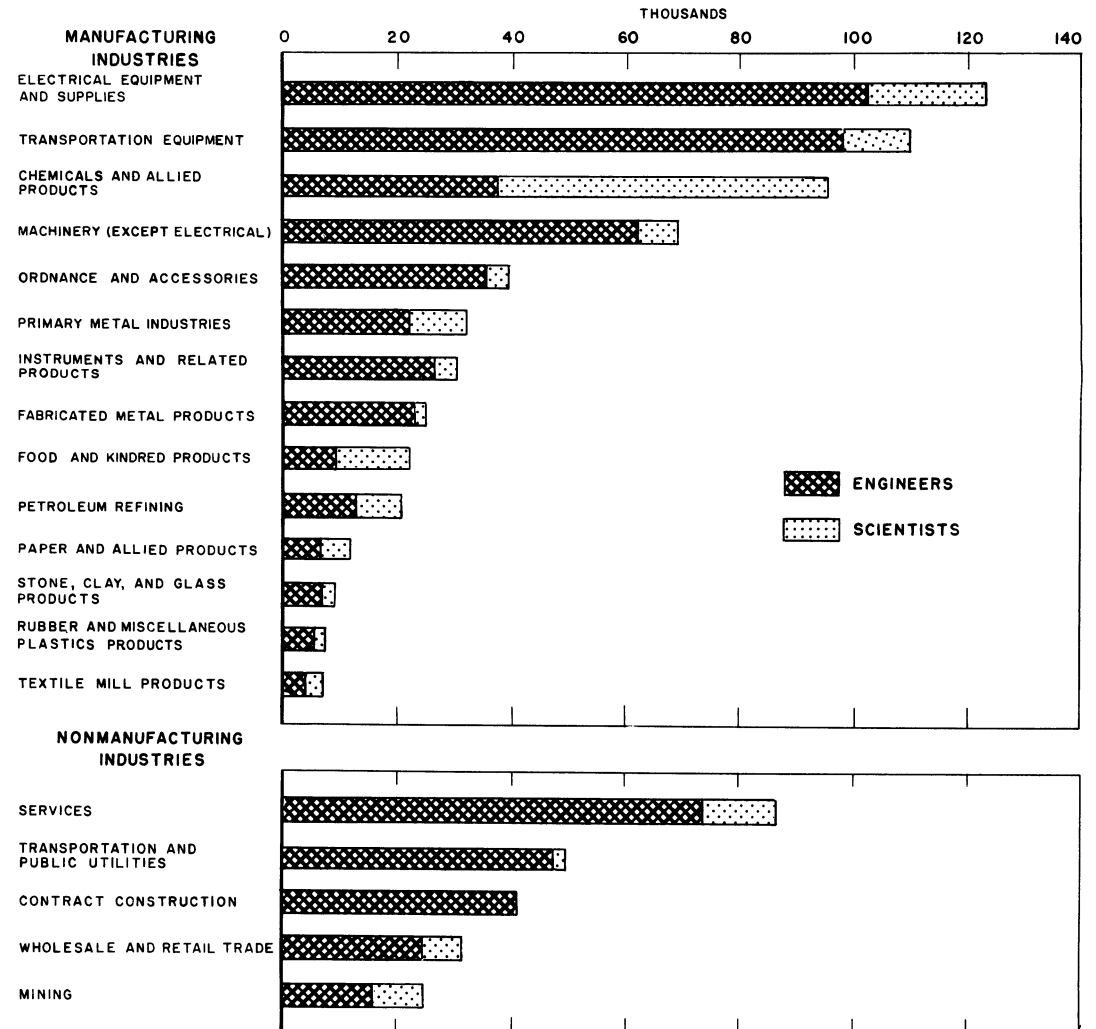
WHO EMPLOYS SCIENTISTS AND ENGINEERS ?

- ▶ More than 7 out of 10 are in manufacturing industries.
- ▶ Four manufacturing industry groups account for almost half of all scientists and engineers.

Manufacturing and Nonmanufacturing Industries Differ with Respect to the Proportions of Scientists and Engineers Employed



Employment of Scientists and Engineers in Selected Industries,
January 1962



SCIENTISTS AND ENGINEERS — — By Size of Establishment

● **SCIENTISTS AND ENGINEERS ARE CONCENTRATED IN LARGE MANUFACTURING ESTABLISHMENTS-- THOSE WITH 1,000 EMPLOYEES OR MORE.**

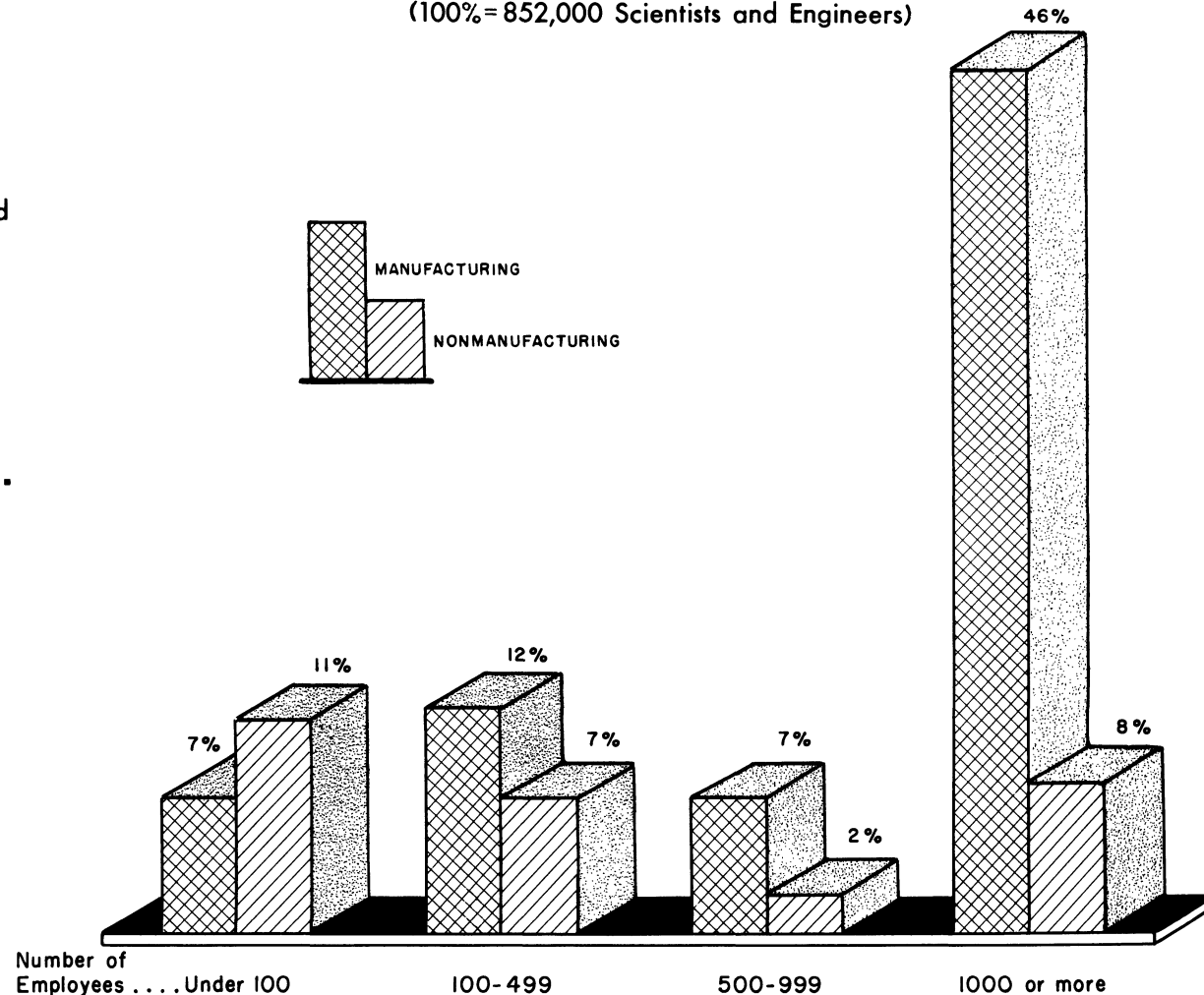
▶ Of the 614,000 scientists and engineers employed in manufacturing, 64 percent are in the largest plants.

● **NONMANUFACTURING ESTABLISHMENTS SHOW A DIFFERENT PATTERN.**

▶ Of the 238,000 scientists and engineers in nonmanufacturing, only 27 percent are in the largest plants.

DISTRIBUTION OF SCIENTISTS AND ENGINEERS
By Size of Establishment, January 1962

(100%= 852,000 Scientists and Engineers)



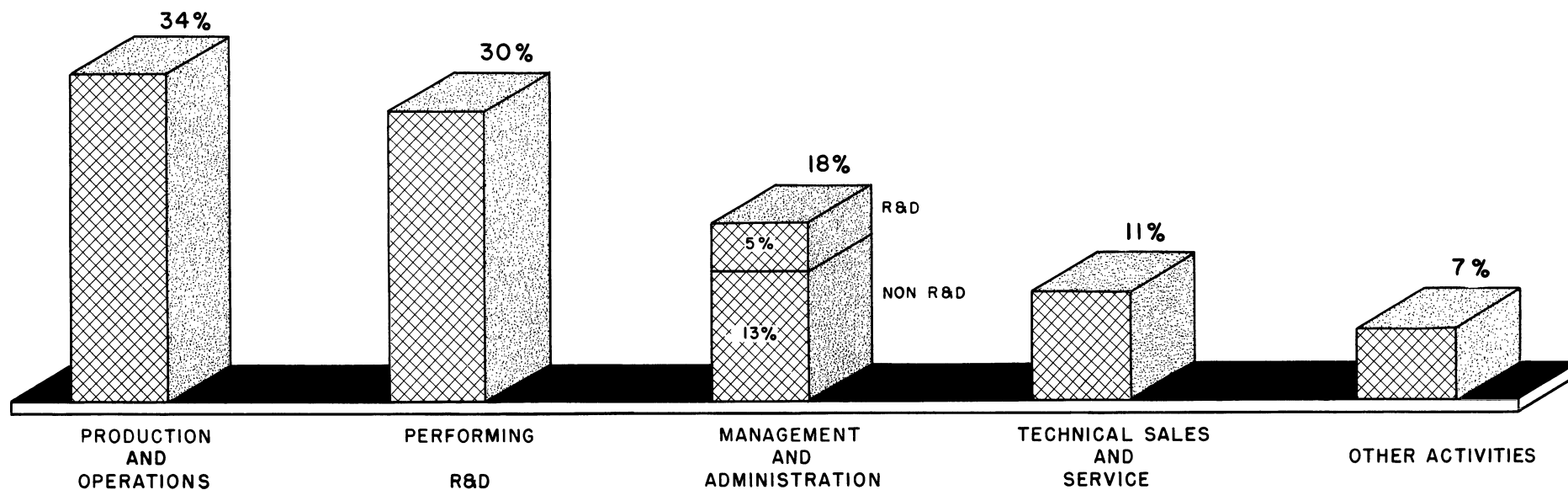
SCIENTISTS AND ENGINEERS — — By Function

● WHAT DO SCIENTISTS AND ENGINEERS DO?

- ▶ About 2 out of 3 are engaged either in production and operations or in performing research and development (R & D).
- ▶ Fewer than a third of those in management and administration are concerned with R & D.

PERCENT DISTRIBUTION OF SCIENTISTS AND ENGINEERS, BY FUNCTION, JANUARY 1962

(100 Percent = 852,000 Scientists and Engineers)



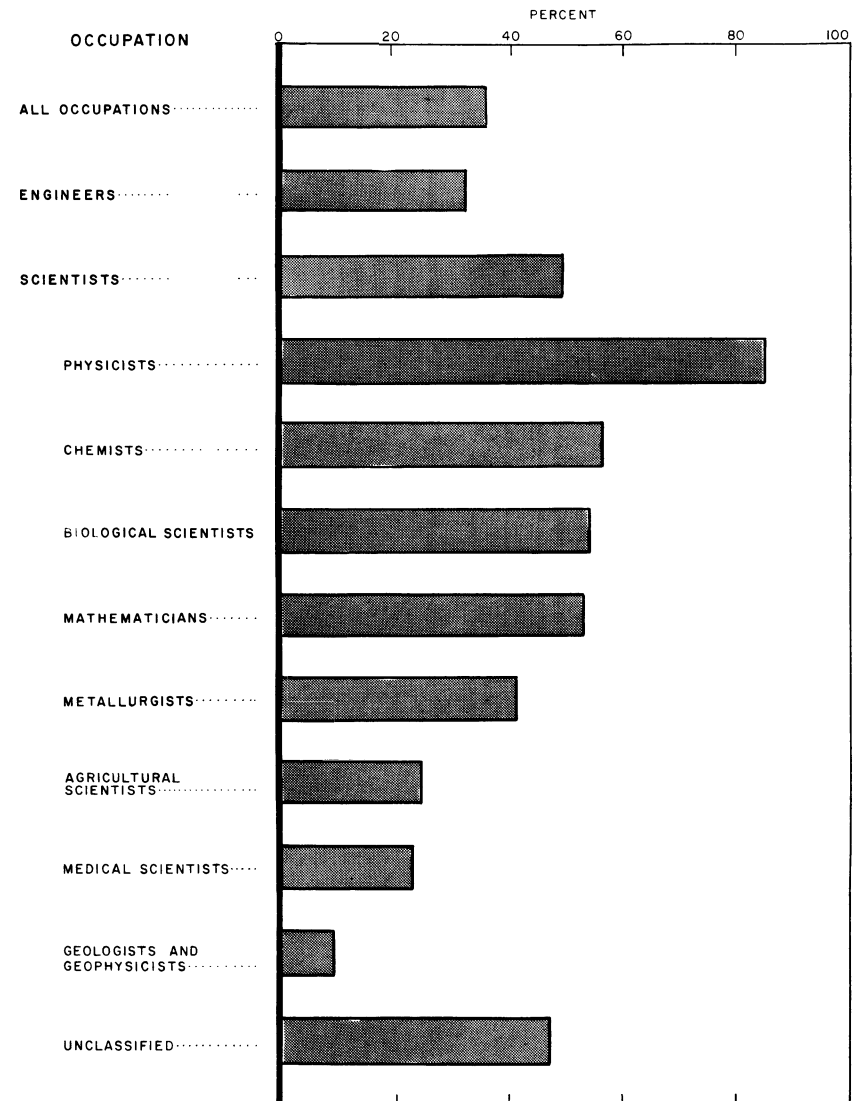
R&D SCIENTISTS AND ENGINEERS — — By Occupation

● **OUT OF 852,000 SCIENTISTS AND ENGINEERS--
221,000 ENGINEERS AND 83,000 SCIENTISTS
ARE ENGAGED IN THE PERFORMANCE
OR ADMINISTRATION OF RESEARCH
AND DEVELOPMENT (R&D).**

● **ONE OUT OF EVERY 2 SCIENTISTS
IS ENGAGED IN R&D;
THE RATIO FOR ENGINEERS IS ONLY
1 OUT OF 3.**

● **MORE THAN HALF OF THE PHYSICISTS,
CHEMISTS, BIOLOGICAL SCIENTISTS, AND
MATHEMATICIANS ARE ENGAGED IN R&D.**

Percent of Scientists and Engineers Engaged in Performance
or Administration of R & D, January 1962



R&D SCIENTISTS AND ENGINEERS — — By Industry

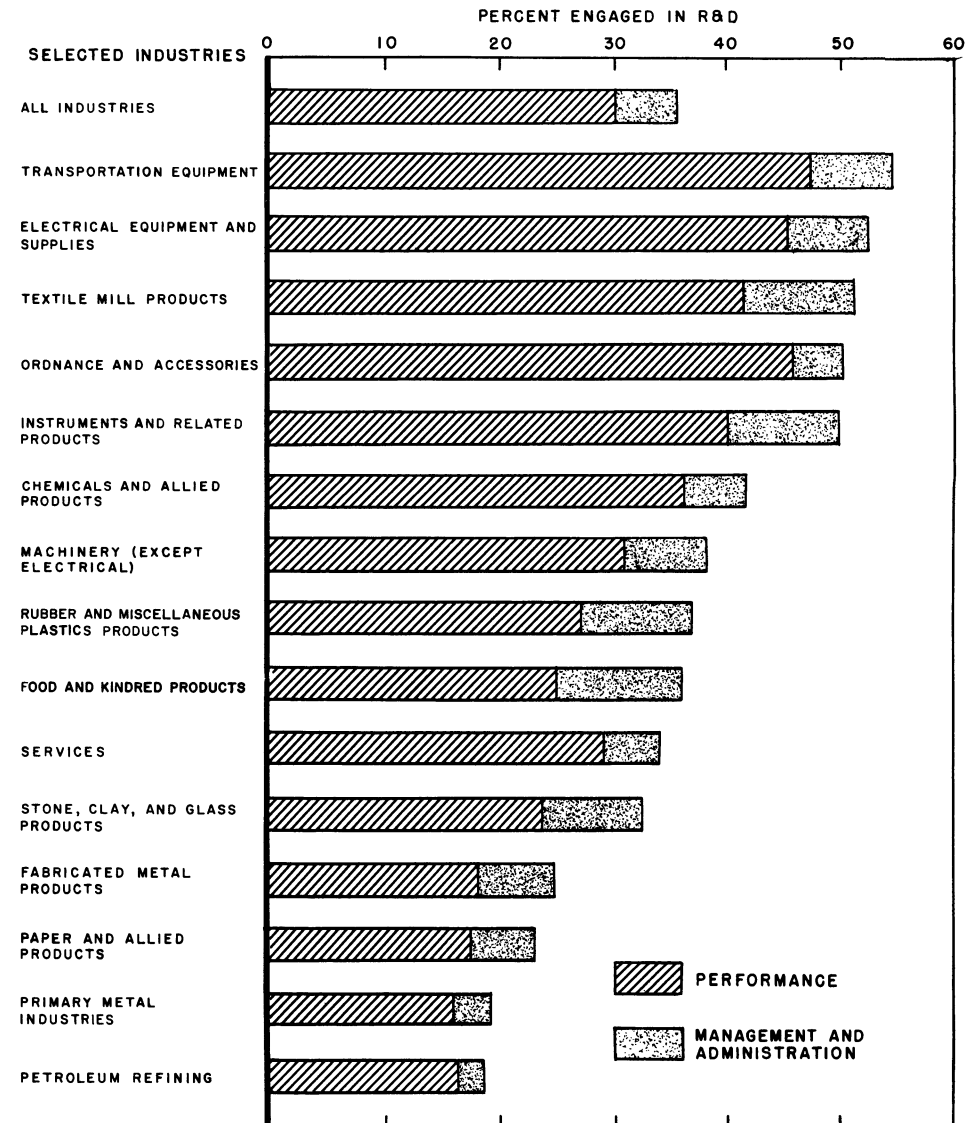
● INDUSTRIES VARY WIDELY WITH RESPECT TO THEIR USE OF SCIENTISTS AND ENGINEERS IN R&D--

▶ Five industries employ at least half of their scientists and engineers in R & D.

▶ Four of these industries are heavily involved in aero-space activities. They account for 53% of all scientists and engineers employed in R & D.

● MOST INDUSTRIES UTILIZE BETWEEN 5 AND 10 PERCENT OF THEIR R&D SCIENTISTS AND ENGINEERS IN MANAGEMENT OR ADMINISTRATIVE WORK.

SCIENTISTS AND ENGINEERS IN R & D ACTIVITIES --
As percent of total scientists and engineers, January 1962



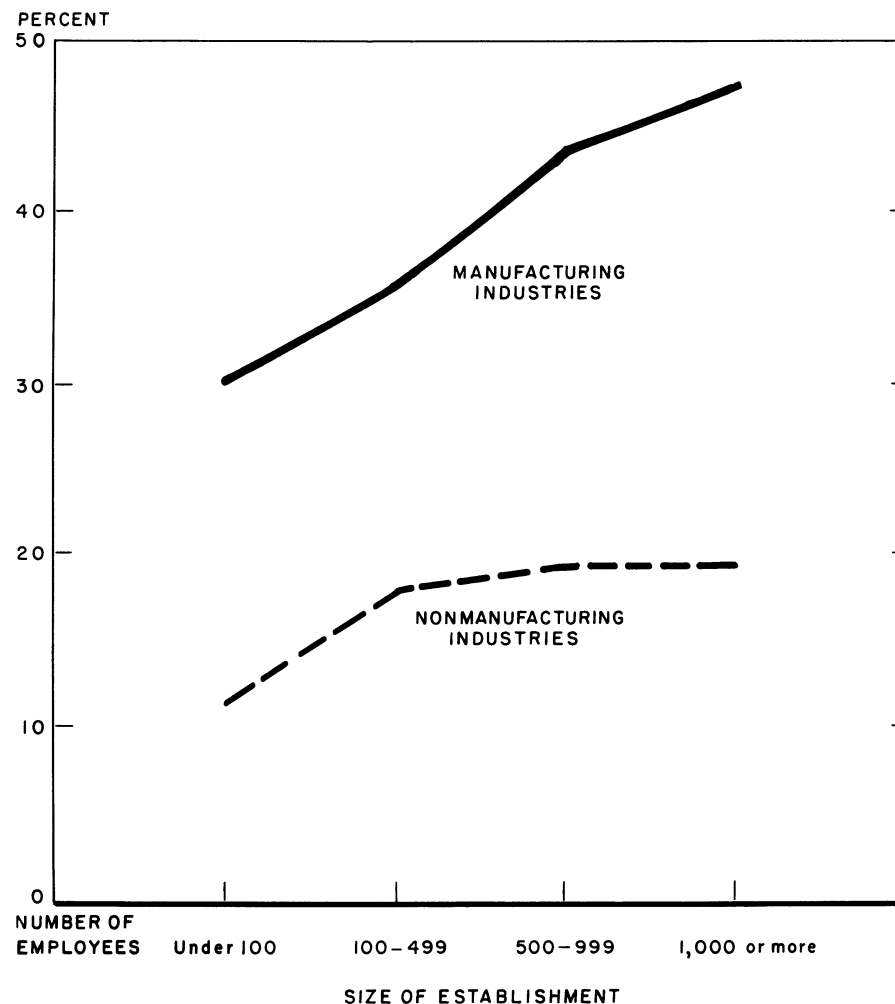
R&D SCIENTISTS AND ENGINEERS Related to Size of Establishment

● **IN MANUFACTURING INDUSTRIES, THE NUMBER OF SCIENTISTS AND ENGINEERS ENGAGED IN R & D ACTIVITIES VARIES DIRECTLY WITH THE SIZE OF THE ESTABLISHMENT.**

IN NONMANUFACTURING INDUSTRIES, THE RELATIONSHIP DOES NOT HOLD.

● **MANUFACTURING INDUSTRIES EMPLOY A MUCH HIGHER PROPORTION OF SCIENTISTS AND ENGINEERS IN R&D THAN NONMANUFACTURING INDUSTRIES.**

PERCENT OF R & D SCIENTISTS AND ENGINEERS EMPLOYED IN
MANUFACTURING AND NONMANUFACTURING INDUSTRIES
By size of establishment, January 1962



NON - R&D SCIENTISTS AND ENGINEERS — —

- THE MAJORITY OF ENGINEERS AND PHYSICAL SCIENTISTS ARE ENGAGED IN PRODUCTION AND OPERATIONS.
- MEDICAL SCIENTISTS ARE CONCENTRATED IN TECHNICAL SALES AND SERVICE.
- APPROXIMATELY 20 PERCENT OF ALL NON-R & D SCIENTISTS AND ENGINEERS PERFORM MANAGEMENT OR ADMINISTRATIVE FUNCTIONS.

DISTRIBUTION OF NON-R & D SCIENTISTS AND ENGINEERS
By Function and Occupation, January 1962

Occupation	Total		Distribution by function			
	Number (thousands)	Percent ¹	Production and operations	Technical sales and service	Other non- management	Management and administration
Total scientists and engineers	548	100.0	53.3	16.9	10.2	19.6
All engineers	464	100.0	54.5	16.2	9.3	20.0
All scientists	84	100.0	46.4	21.1	15.0	17.5
Physical scientists	57	100.0	53.3	16.3	13.0	17.4
Chemists	36	100.0	55.5	21.5	6.9	16.1
Geologists and geophysicists	12	100.0	42.0	3.1	36.9	18.0
Metallurgists	7	100.0	62.6	10.5	3.9	23.0
Physicists	2	100.0	46.0	19.9	15.9	18.2
Life scientists	17	100.0	29.4	37.4	16.3	16.9
Agricultural scientists	6	100.0	35.9	17.5	20.3	26.3
Medical scientists	6	100.0	10.1	57.3	20.9	11.7
Biological scientists	5	100.0	44.9	40.1	4.8	10.2
Mathematicians	7	100.0	40.3	21.8	19.1	18.8
Unclassified scientists	3	100.0	22.8	17.5	39.6	20.1

¹ Percents are based on unrounded data.

TECHNICIANS By Occupation

AS OF JANUARY 1962-- THERE WERE 585,000 TECHNICIANS:

255,000 Engineering and physical
science technicians

213,000 Draftsmen

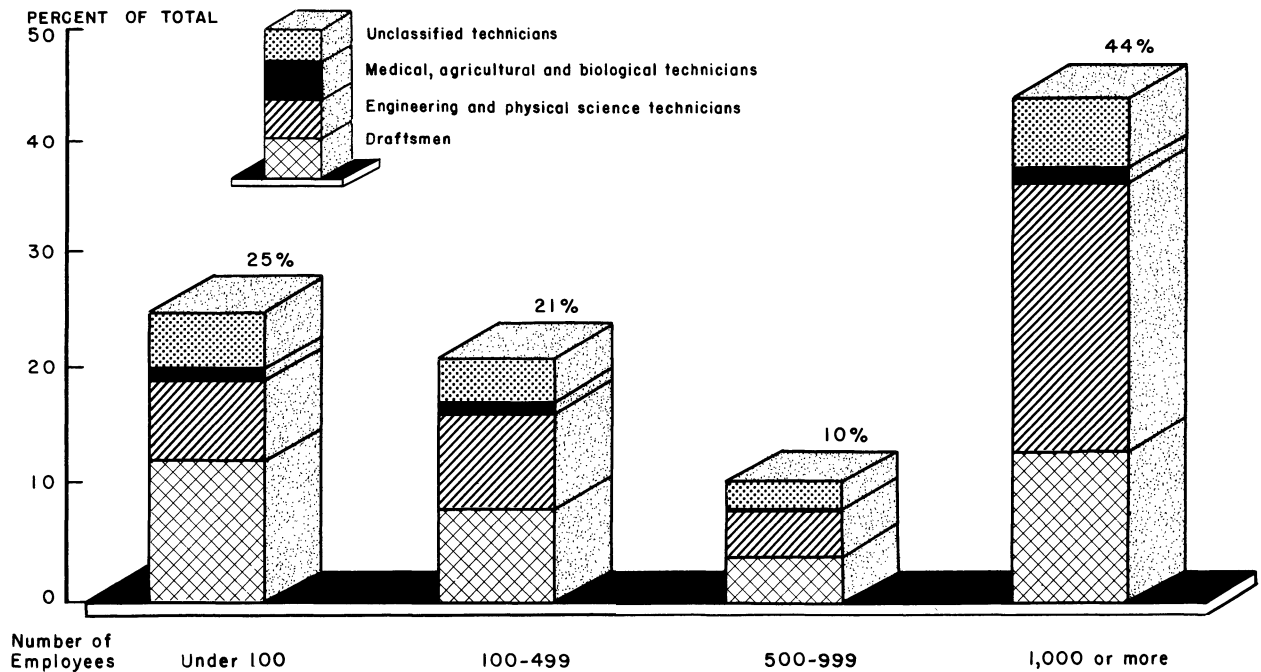
17,000 Medical, agricultural,
and biological technicians

101,000 Unclassified technicians

2 OUT OF 5 TECHNICIANS ARE EMPLOYED IN THE LARGEST ESTABLISHMENTS
(1,000 employees or more)

100 Percent = 585,000 Technicians

Occupation	Percent in manufacturing industries
All technicians	65.0
Engineering and physical science technicians	73.0
Draftsmen	59.0
Medical, agricultural, and biological technicians	67.0
Unclassified technicians	56.0



TECHNICIANS By Industry

FOUR MAJOR INDUSTRIES EMPLOY

54 PERCENT OF ALL TECHNICIANS :

- ▶ SERVICES 18%
- ▶ ELECTRICAL EQUIPMENT 15%
- ▶ MACHINERY (EXCEPT ELECTRICAL) 11%
- ▶ TRANSPORTATION EQUIPMENT 10%

THREE INDUSTRIES EMPLOY MORE TECHNICIANS THAN SCIENTISTS AND

ENGINEERS :

- ▶ AGRICULTURAL SERVICES,
FORESTRY, AND FISHERIES
- ▶ SERVICES
- ▶ LUMBER AND WOOD PRODUCTS

TECHNICIANS ARE CONCENTRATED DIFFERENTLY BY OCCUPATION ACCORDING TO INDUSTRY

OCCUPATIONAL DISTRIBUTION OF TECHNICIANS
By Industry, January 1962

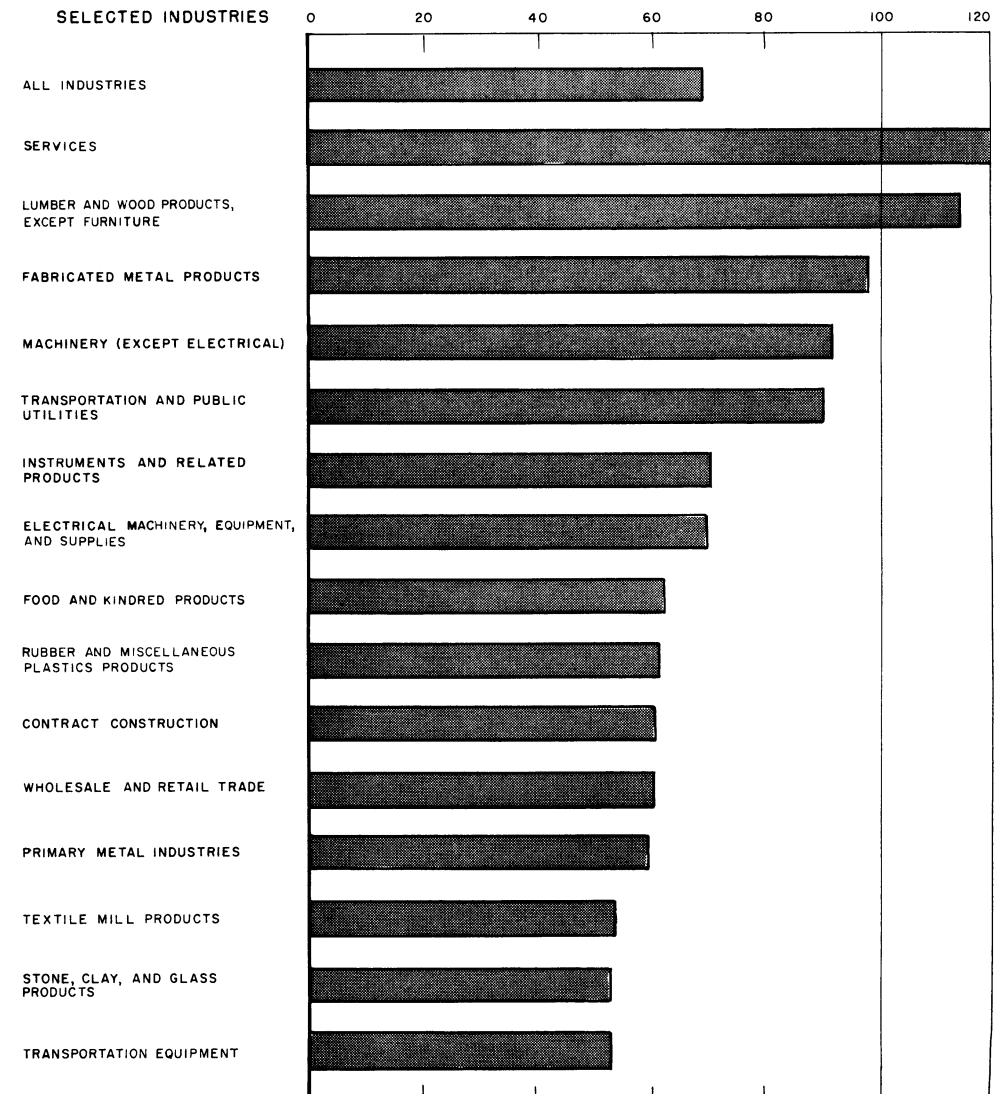
Industry	All technicians	Draftsmen	Engineers and physical science technicians	Medical, agricultural, biological technicians	Unclassified technicians
All industries:					
Number	585,000	213,000	255,000	17,000	101,000
Percent	100.0	100.0	100.0	100.0	100.0
Ordnance and accessories	2.4	2.1	3.2	0.6	1.2
Food and food products	2.4	.5	1.5	26.9	4.2
Chemicals and allied products	7.4	1.6	10.2	30.8	8.7
Primary metals industries	3.2	2.2	4.2	1.2	3.3
Fabricated metal products	4.2	7.1	2.6	.3	2.9
Machinery, except electrical	10.8	15.4	9.1	.9	7.1
Electrical equipment and supplies	14.5	12.3	18.3	1.1	11.8
Transportation equipment	9.9	9.7	11.8	2.4	6.8
Instruments and related products	3.6	3.2	4.2	1.7	3.6
Contract construction	4.2	7.1	1.5	.1	5.6
Transportation and public utilities	7.6	4.3	8.8	.8	12.6
Wholesale and retail trade	3.2	2.1	2.0	.2	9.3
Services	17.7	25.8	12.1	23.2	14.0
All other	8.9	6.6	10.5	9.8	8.9

TECHNICIANS — — Ratio to Scientists and Engineers

● **THE RATIO OF TECHNICIANS TO SCIENTISTS AND ENGINEERS IS 3 TO 5 IN MANUFACTURING INDUSTRIES COMPARED WITH 4 TO 5 IN NONMANUFACTURING INDUSTRIES.**

● **FEW INDUSTRIES EMPLOY MORE TECHNICIANS THAN SCIENTISTS AND ENGINEERS.**

AVERAGE NUMBER OF TECHNICIANS PER 100 SCIENTISTS AND ENGINEERS,
January 1962

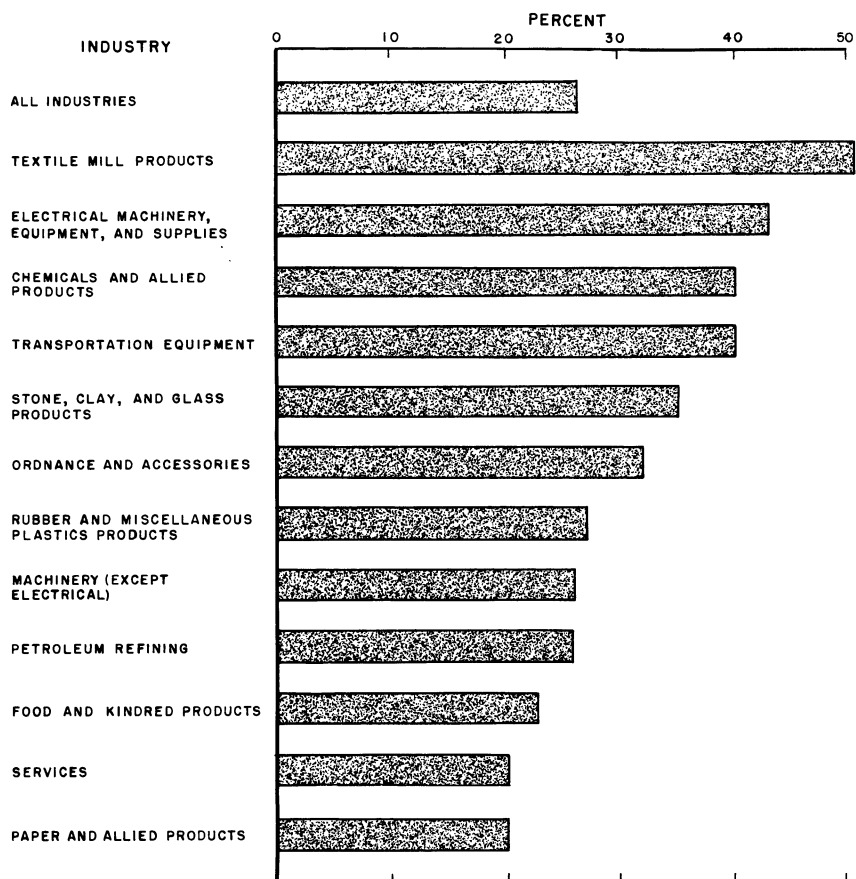


R&D TECHNICIANS

APPROXIMATELY 1 OUT OF EVERY 4 TECHNICIANS IS ENGAGED IN R&D

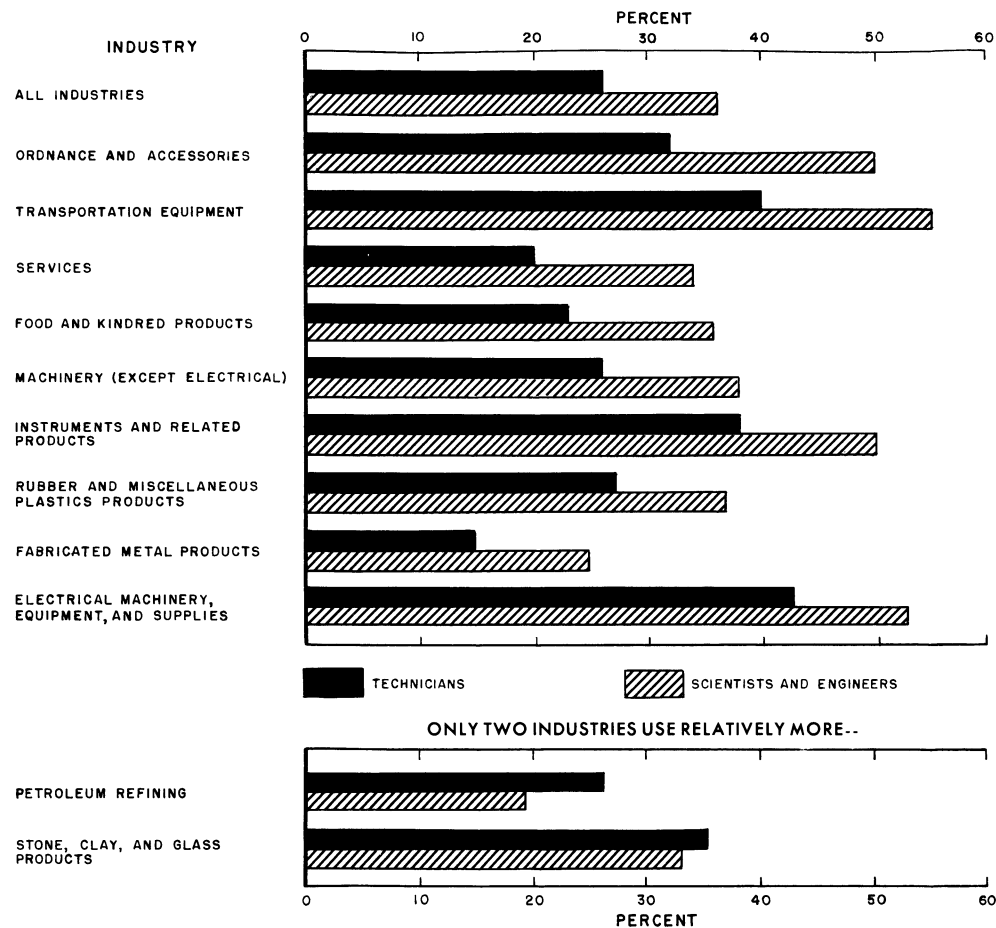
TECHNICIANS IN R&D AS PERCENT OF TOTAL TECHNICIANS

Selected Industries, January 1962



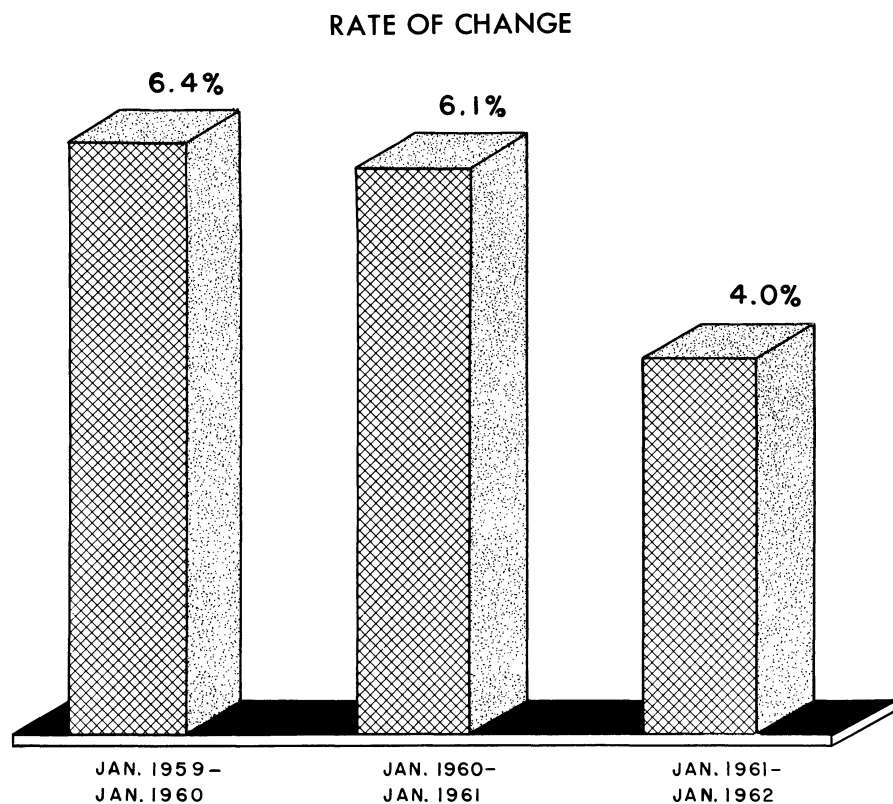
MOST INDUSTRIES USE RELATIVELY FEWER TECHNICIANS THAN SCIENTISTS AND ENGINEERS IN R&D

PERCENT OF TOTAL TECHNICIANS, AND OF TOTAL SCIENTISTS AND ENGINEERS, IN R&D
Selected Industries, January 1962



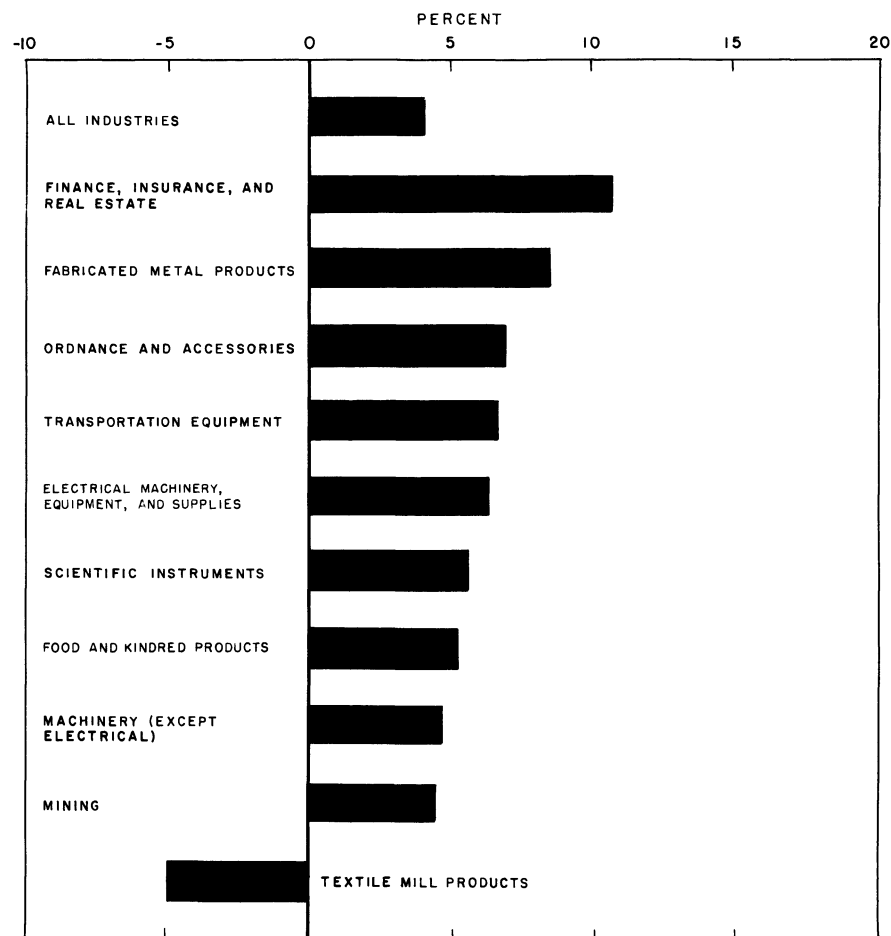
CHANGES IN SCIENTIFIC AND ENGINEERING EMPLOYMENT

● RATE OF GROWTH IN EMPLOYMENT OF SCIENTISTS AND ENGINEERS IN INDUSTRY SLOWED IN 1961-62 PERIOD.



● MOST INDUSTRIES EMPLOYED MORE SCIENTISTS AND ENGINEERS IN 1962 THAN IN 1961--

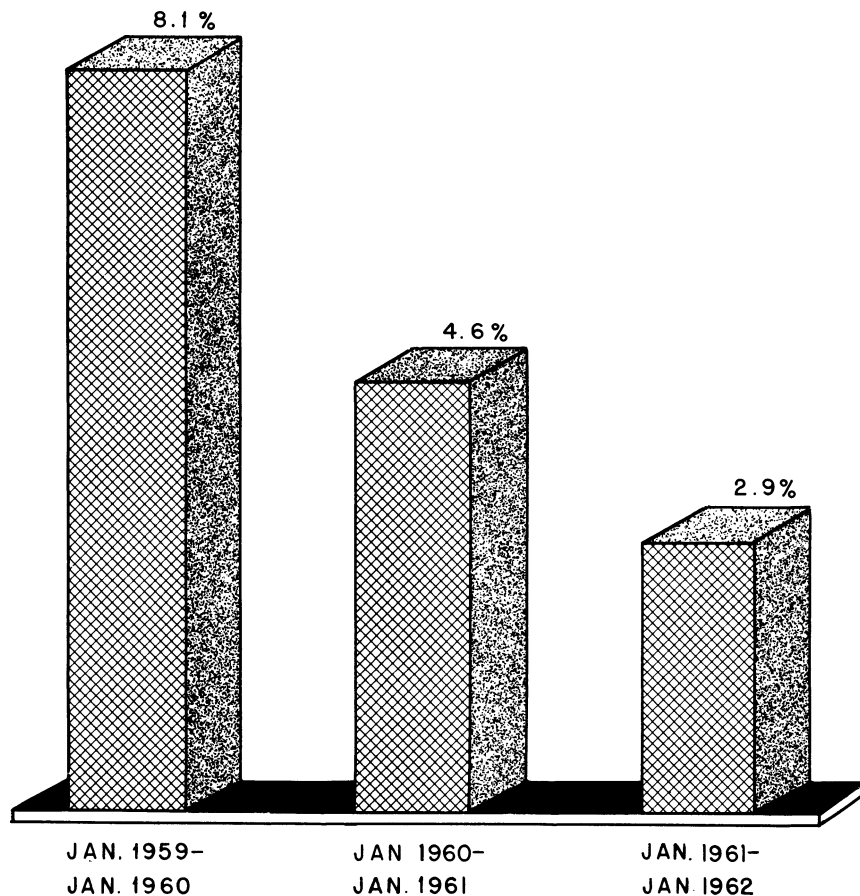
SCIENTISTS AND ENGINEERS IN SELECTED INDUSTRIES
Percent change, January 1961 to January 1962



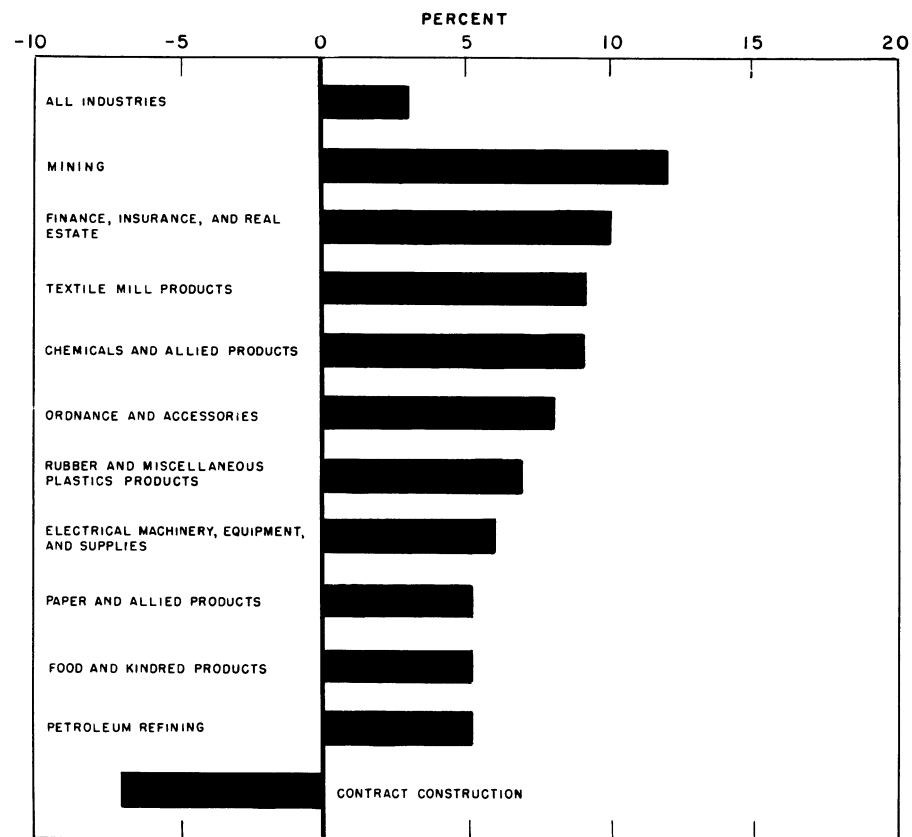
CHANGES IN TECHNICIAN EMPLOYMENT

● RATE OF GROWTH IN EMPLOYMENT OF TECHNICIANS IN INDUSTRY HAS DECLINED.

RATE OF CHANGE



TECHNICIANS IN SELECTED INDUSTRIES
Percent Change, January 1961 - January 1962



The following tables present separate estimates for different industries or industry groups, and for different sizes of establishments, wherever possible. The numbers of industries and other categories for which separate figures can be given are limited by a need to maintain the confidentiality of data supplied by individual establishments, the design of the sample, and other technical factors. On the tables presenting data distributed by industry and size of establishment, two industries or more within certain major industry groups have been combined into residual groups. For example, the "other chemical products" group includes agricultural chemicals and all other chemical products not shown separately; and the "other manufacturing industries" group includes tobacco manufactures, apparel and finished products, furniture and fixtures, printing and publishing, paving and roofing materials, miscellaneous products of petroleum and coal, leather products, and miscellaneous manufacturing. Among

the nonmanufacturing industry groups, "communications" includes telephone and telegraph communications, the radio and television broadcasting industry, and all other communication services; the "other services" group combines medical and dental laboratories, engineering and architectural services, and all other services (except nonprofit, educational, private households, and accounting services).

All the absolute figures presented in these tables are rounded because they represent estimates based on sample data. All totals and percentages, however, have been calculated on the basis of unrounded figures. Therefore, some of the rounded figures shown in the tables do not always correspond exactly with the sums of other rounded figures or percentages computed from rounded data.

Percentages are shown to one decimal place to distinguish them from absolute figures and thus facilitate reading of the tables. The percentages, like the aggregate figures, are estimates subject to sampling errors.

Table A-1. Scientists and engineers, by occupational group and industry, January 1962

Industry	Scientists and engineers	Engineers	Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
	Number										
All industries.....	851,600	684,600	81,600	13,900	12,400	12,900	14,700	7,700	8,600	10,200	5,000
Manufacturing.....	613,600	480,300	69,200	11,500	11,100	4,100	9,700	7,300	7,500	8,400	4,700
Ordnance and accessories.....	39,500	36,900	600	1,000	300	(1)	600	(1)	(1)	100	(1)
Food and kindred products.....	22,200	10,400	5,300	(1)	(1)	(1)	200	(1)	4,400	500	1,500
Textile mill products.....	7,000	4,100	2,800	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Lumber and wood products, except furniture	1,600	900	200	(1)	(1)	(1)	(1)	(1)	500	(1)	(1)
Paper and allied products.....	11,700	7,900	3,200	100	(1)	(1)	100	(1)	500	100	(1)
Chemicals and allied products.....	95,500	39,200	35,800	1,600	600	300	800	7,100	1,800	7,300	1,100
Industrial chemicals.....	45,900	26,200	15,600	1,400	400	200	500	100	400	700	300
Plastics and synthetics, except glass...	8,200	4,400	3,500	100	(1)	(1)	100	(1)	(1)	100	100
Drugs.....	21,600	1,600	6,100	(1)	(1)	(1)	100	6,900	700	5,800	300
Agricultural chemicals.....	2,200	500	1,100	(1)	(1)	(1)	(1)	(1)	500	100	(1)
Other chemical products.....	17,600	6,400	9,500	100	100	100	100	100	100	700	400
Petroleum refining.....	20,900	14,100	3,500	200	(1)	2,800	200	(1)	100	(1)	(1)
Rubber and miscellaneous plastics products	7,700	5,800	1,800	100	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products.....	9,100	7,500	1,300	200	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Primary metal industries.....	32,000	22,700	2,800	100	5,900	100	200	(1)	100	(1)	(1)
Blast furnace and basic steel products..	20,200	14,400	1,700	100	3,700	100	200	(1)	100	(1)	(1)
Other primary metal industries.....	11,800	8,300	1,100	(1)	2,200	(1)	2,200	(1)	100	(1)	(1)
Fabricated metal products.....	25,100	22,700	1,500	100	500	(1)	200	(1)	(1)	(1)	(1)
Machinery, except electrical.....	69,200	64,000	1,300	800	1,000	100	1,700	(1)	(1)	100	200
Engines and turbines.....	3,900	3,600	100	(1)	100	(1)	100	(1)	(1)	(1)	(1)
Office, computing, and accounting											
machines.....	14,400	11,800	400	500	100	(1)	1,400	(1)	(1)	(1)	100
Farm machinery and equipment.....	7,400	7,100	100	(1)	200	(1)	(1)	(1)	(1)	(1)	(1)
Other machinery.....	43,600	41,500	800	300	600	100	200	(1)	(1)	100	(1)
Electrical equipment and supplies.....	123,200	112,000	3,200	3,900	700	(1)	2,600	(1)	(1)	(1)	700
Electric distribution equipment and											
industrial apparatus.....	25,300	23,800	600	400	200	(1)	200	(1)	(1)	(1)	100
Household appliances.....	3,700	3,500	100	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Communication equipment.....	55,400	50,500	600	1,900	200	(1)	1,600	(1)	(1)	(1)	600
Electric lighting and wiring equipment..	4,200	3,900	100	100	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Electronic components and accessories...	18,700	16,000	1,100	900	200	(1)	500	(1)	(1)	(1)	(1)
Radio and television receiving sets.....	10,800	9,900	200	500	(1)	(1)	200	(1)	(1)	(1)	(1)
Miscellaneous electrical equipment and											
supplies.....	5,100	4,500	400	100	100	(1)	(1)	(1)	(1)	(1)	(1)

See footnote at end of table.

Table A-1. Scientists and engineers, by occupational group and industry, January 1962 -- Continued

Industry	Scien- tists and engineers	Engi- neers	Chemists	Physi- cists	Metal- lurgists	Geolo- gists and geophys- icists	Mathe- ma- ticians	Medical scien- tists	Agricul- tural scien- tists	Biolog- ical scien- tists	Unclas- sified scien- tists
	Number										
Transportation equipment.....	110,400	100,100	2,500	1,900	1,800	200	2,700	(1)	(1)	200	1,000
Motor vehicles and equipment.....	22,200	20,800	500	200	400	(1)	200	(1)	(1)	(1)	(1)
Aircraft and parts.....	83,000	74,400	1,900	1,700	1,300	200	2,400	(1)	(1)	(1)	(1)
Other transportation equipment.....	5,100	4,900	100	(1)	(1)	(1)	100	(1)	(1)	(1)	(1)
Instruments and related products.....	30,200	25,500	2,000	1,400	100	400	400	100	100	100	200
Engineering and scientific instruments...	11,500	10,200	300	300	100	400	200	(1)	(1)	(1)	(1)
Other instruments and related products...	18,800	15,300	1,700	1,200	100	(1)	200	100	(1)	100	200
Other manufacturing industries.....	8,300	6,600	1,500	100	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nonmanufacturing.....	238,000	204,300	12,400	2,500	1,300	8,800	5,000	400	1,100	1,800	300
Mining.....	24,600	15,900	900	(1)	400	7,000	100	(1)	(1)	200	(1)
Crude petroleum and natural gas.....	16,400	9,500	100	(1)	(1)	6,500	100	(1)	(1)	(1)	(1)
Metal mining.....	3,400	2,200	400	(1)	400	400	(1)	(1)	(1)	(1)	(1)
Coal mining.....	3,100	2,800	300	(1)	(1)	100	(1)	(1)	(1)	(1)	(1)
Quarrying and nonmetallic mining.....	1,800	1,500	200	(1)	(1)	100	(1)	(1)	(1)	(1)	(1)
Contract construction.....	41,000	40,700	(1)	(1)	(1)	(1)	200	(1)	(1)	(1)	(1)
Transportation and public utilities.....	49,200	47,600	500	(1)	(1)	600	300	(1)	200	(1)	(1)
Railroad transportation.....	5,300	5,000	200	(1)	(1)	(1)	(1)	(1)	100	(1)	(1)
Other transportation.....	4,200	4,100	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Communication.....	13,700	13,700	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Electric, gas, and sanitary services.....	26,000	24,800	300	(1)	(1)	500	300	(1)	100	(1)	(1)
Wholesale and retail trade.....	31,200	23,500	6,400	200	300	(1)	800	(1)	(1)	(1)	100
Finance, insurance, and real estate.....	4,500	2,700	(1)	(1)	(1)	(1)	1,600	100	(1)	(1)	100
Services.....	86,500	73,900	4,500	2,200	600	1,200	1,900	300	(1)	1,600	100
Commercial laboratories; business and management consulting services.....	34,100	25,800	3,800	1,600	300	400	1,500	300	(1)	300	100
Medical and dental laboratories.....	700	(1)	200	(1)	(1)	(1)	(1)	100	(1)	400	(1)
Engineering and architectural services...	49,800	47,100	400	600	200	800	400	(1)	(1)	100	(1)
Other services.....	1,800	1,000	100	(1)	(1)	(1)	(1)	(1)	(1)	700	(1)
Agricultural services, forestry, and fisheries.....	1,000	(1)	(1)	(1)	(1)	(1)	(1)	(1)	900	(1)	(1)

1/ Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-2. Percent distribution of scientists and engineers, by occupational group and industry, January 1962

Industry	Scientists and engineers	Engineers	Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
	Percent distribution										
All industries.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing.....	72.1	70.2	84.8	82.3	89.3	31.5	65.9	94.3	86.7	82.3	94.0
Ordnance and accessories.....	4.6	5.4	.7	6.8	2.7	(1)	4.0	(1)	(1)	.5	(1)
Food and kindred products.....	2.6	1.5	6.4	(1)	(1)	(1)	7.1	(1)	50.8	5.1	28.9
Textile mill products.....	.8	.6	3.5	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Lumber and wood products, except furniture	.2	.1	.2	(1)	(1)	(1)	(1)	(1)	6.0	(1)	(1)
Paper and allied products.....	1.4	1.1	3.9	.4	(1)	(1)	.5	(1)	5.7	.5	(1)
Chemicals and allied products.....	11.2	5.7	43.9	11.3	4.5	2.4	5.4	91.8	20.7	71.6	22.5
Industrial chemicals.....	5.4	3.8	19.2	10.0	3.2	1.5	3.5	1.6	4.8	6.8	6.7
Plastics and synthetics, except glass...	1.0	.6	4.2	.5	(1)	(1)	.5	(1)	(1)	.6	1.9
Drugs.....	2.5	.2	7.4	(1)	(1)	(1)	.7	89.1	8.5	56.7	6.9
Agricultural chemicals.....	.3	.1	1.4	(1)	(1)	(1)	(1)	(1)	6.4	.5	(1)
Other chemical products.....	2.1	.9	11.6	.6	1.1	.8	.8	1.1	.7	6.9	7.1
Petroleum refining.....	2.5	2.1	4.3	1.3	(1)	21.6	1.5	(1)	1.2	(1)	(1)
Rubber and miscellaneous plastics products	.9	.8	2.2	.5	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products.....	1.1	1.1	1.6	1.2	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Primary metal industries.....	3.8	3.3	3.5	1.1	47.3	1.0	1.6	(1)	1.0	(1)	(1)
Blast furnace and basic steel products..	2.4	2.1	2.1	.7	29.7	.7	1.0	(1)	.8	(1)	(1)
Other primary metal industries.....	1.4	1.2	1.4	(1)	17.6	(1)	.5	(1)	(1)	(1)	(1)
Fabricated metal products.....	2.9	3.3	1.8	.8	4.3	(1)	1.1	(1)	(1)	(1)	(1)
Machinery, except electrical.....	8.1	9.3	1.6	5.9	8.0	1.0	11.7	(1)	(1)	.5	3.6
Engines and turbines.....	.5	.5	.1	(1)	.7	(1)	.7	(1)	(1)	(1)	(1)
Office, computing, and accounting machines.....	1.7	1.7	.5	3.7	1.1	(1)	9.5	(1)	(1)	(1)	2.4
Farm machinery and equipment.....	.9	1.0	.1	(1)	1.3	(1)	(1)	(1)	(1)	(1)	(1)
Other machinery.....	5.1	6.1	.9	2.0	4.8	1.0	1.3	(1)	(1)	.5	(1)
Electrical equipment and supplies.....	14.5	16.4	3.9	28.2	5.8	(1)	17.4	(1)	(1)	(1)	13.7
Electric distribution equipment and industrial apparatus.....	3.0	3.5	.8	3.0	1.6	(1)	1.7	(1)	(1)	(1)	1.1
Household appliances.....	.4	.5	.2	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Communication equipment.....	6.5	7.4	.8	13.6	1.3	(1)	11.1	(1)	(1)	(1)	11.5
Electric lighting and wiring equipment..	.5	.6	.2	.5	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Electronic components and accessories...	2.2	2.3	1.3	6.5	1.5	(1)	3.2	(1)	(1)	(1)	(1)
Radio and television receiving sets....	1.3	1.4	.3	3.9	(1)	(1)	1.1	(1)	(1)	(1)	(1)
Miscellaneous electrical equipment and supplies.....	.6	.7	.5	.6	.6	(1)	(1)	(1)	(1)	(1)	(1)

See footnote at end of table.

Table A-2. Percent distribution of scientists and engineers, by occupational group and industry, January 1962 -- Continued

Industry	Scien- tists and engineers	Engi- neers	Chemists	Physi- cists	Metal- lurgists	Geolo- gists and geophys- icists	Mathe- ma- ticians	Medical scien- tists	Agricul- tural scien- tists	Biolog- ical scien- tists	Unclassi- fied scien- tists
	Percent distribution										
Transportation equipment.....	13.0	14.6	3.0	13.9	14.8	1.5	18.5	(1)	(1)	1.8	19.2
Motor vehicles and equipment.....	2.6	3.0	.6	1.2	3.6	(1)	1.7	(1)	(1)	(1)	(1)
Aircraft and parts.....	9.8	10.9	2.3	12.3	10.9	1.5	16.4	(1)	(1)	1.8	18.3
Other transportation equipment.....	.6	.7	.1	(1)	(1)	(1)	.4	(1)	(1)	(1)	(1)
Instruments and related products.....	3.6	3.7	2.5	10.3	1.1	3.1	2.4	.7	.6	.9	3.3
Engineering and scientific instruments..	1.3	1.5	.4	2.0	.7	3.0	1.3	(1)	(1)	(1)	(1)
Other instruments and related products..	2.2	2.2	2.1	8.3	.4	(1)	1.2	.7	(1)	.9	3.3
Other manufacturing industries.....	1.0	1.0	1.8	.4	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nonmanufacturing.....	27.9	29.8	15.2	17.7	10.7	68.5	34.1	5.7	13.3	17.7	6.0
Mining.....	2.9	2.3	1.1	(1)	3.6	54.4	.7	(1)	(1)	1.9	(1)
Crude petroleum and natural gas.....	1.9	1.4	.2	(1)	(1)	50.0	.6	(1)	(1)	1.8	(1)
Metal mining.....	.4	.3	.5	(1)	3.3	3.1	(1)	(1)	(1)	(1)	(1)
Coal mining.....	.4	.4	.3	(1)	(1)	.7	(1)	(1)	(1)	(1)	(1)
Quarrying and nonmetallic mining.....	.2	.2	.2	(1)	(1)	.6	(1)	(1)	(1)	(1)	(1)
Contract construction.....	4.8	5.9	(1)	(1)	(1)	(1)	1.3	(1)	(1)	(1)	(1)
Transportation and public utilities.....	5.8	6.9	.7	(1)	(1)	4.3	2.1	(1)	2.0	(1)	(1)
Railroad transportation.....	.6	.7	.2	(1)	(1)	(1)	(1)	(1)	.6	(1)	(1)
Other transportation.....	.5	.6	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Communication.....	1.6	2.0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Electric, gas, and sanitary services	3.1	3.6	.4	(1)	(1)	3.8	1.9	(1)	1.4	(1)	(1)
Wholesale and retail trade.....	3.7	3.4	7.8	1.2	2.2	(1)	5.6	(1)	(1)	(1)	1.9
Finance, insurance, and real estate.....	.5	.4	(1)	(1)	(1)	(1)	11.1	1.2	(1)	(1)	1.1
Services.....	10.2	10.8	5.6	16.0	4.6	9.4	13.2	4.4	(1)	15.7	2.8
Commercial laboratories; business and management consulting services.....	4.0	3.8	4.7	11.4	2.7	2.9	10.1	3.6	(1)	3.2	1.8
Medical and dental laboratories.....	.1	(1)	.3	(1)	(1)	(1)	(1)	.6	(1)	4.2	(1)
Engineering and architectural services..	5.9	6.9	.5	4.6	1.9	6.4	3.0	(1)	(1)	1.3	(1)
Other services.....	.2	.2	.1	(1)	(1)	(1)	(1)	(1)	(1)	7.0	(1)
Agricultural services, forestry, and fisheries.....	.1	(1)	(1)	(1)	(1)	(1)	(1)	(1)	10.6	(1)	(1)

1/ Less than 50 cases; percentage not computed.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-3. Scientists and engineers, by size of establishment and industry, January 1962

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
	Number				
All industries.....	851,600	152,700	160,500	81,900	456,500
Manufacturing.....	613,600	57,400	103,700	60,900	391,600
Ordnance and accessories.....	39,500	100	300	2,100	37,000
Food and kindred products.....	22,200	4,900	8,600	4,000	4,700
Textile mill products.....	7,000	200	5,200	400	1,300
Lumber and wood products, except furniture.....	1,600	200	1,000	300	100
Paper and allied products.....	11,700	2,700	3,300	1,800	3,900
Chemicals and allied products.....	95,500	8,900	21,900	7,800	56,800
Industrial chemicals.....	45,900	1,400	5,400	2,700	36,400
Plastics and synthetics, except glass.....	8,200	1,000	2,300	1,500	3,400
Drugs.....	21,600	2,000	6,100	1,700	11,800
Other chemical products <u>1</u> /.....	19,800	4,500	8,200	2,000	5,100
Petroleum refining.....	20,900	500	2,900	1,900	15,600
Rubber and miscellaneous plastics products.....	7,700	500	1,500	1,800	3,900
Stone, clay, and glass products.....	9,100	1,500	3,100	1,300	3,100
Primary metal industries.....	32,000	2,400	5,900	3,000	20,700
Blast furnace and basic steel products.....	20,200	1,000	2,800	1,300	15,200
Other primary metal industries.....	11,800	1,500	3,100	1,700	5,500
Fabricated metal products.....	25,100	6,400	7,600	4,200	6,900
Machinery, except electrical.....	69,200	13,300	14,900	10,100	31,000
Engines and turbines.....	3,900	200	100	500	3,100
Office, computing, and accounting machines.....	14,400	200	1,100	1,800	11,200
Farm machinery and equipment.....	7,400	2,700	1,100	500	3,100
Other machinery.....	43,600	10,200	12,600	7,300	13,500
Electrical equipment and supplies.....	123,200	9,500	14,000	12,600	87,100
Electric distribution equipment and industrial apparatus.....	25,300	3,900	3,900	5,000	12,500
Household appliances.....	3,700	200	200	300	3,000
Communication equipment.....	55,400	1,200	3,500	3,200	47,500
Electric lighting and wiring equipment.....	4,200	600	1,000	1,100	1,400
Electronic components and accessories.....	18,700	3,100	2,800	2,200	10,600
Radio and television receiving sets.....	10,800	300	1,500	400	8,600
Miscellaneous electrical equipment and supplies.....	5,100	300	1,000	300	3,500

See footnotes at end of table.

Table A-3. Scientists and engineers, by size of establishment and industry, January 1962 -- Continued

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
Transportation equipment.....	110,400	1,900	5,300	5,900	97,300
Motor vehicles and equipment.....	22,200	300	1,000	1,100	19,700
Aircraft and parts.....	83,000	1,300	3,800	4,500	73,500
Other transportation equipment.....	5,100	300	400	300	4,100
Instruments and related products.....	30,200	2,700	5,600	2,600	19,400
Engineering and scientific instruments.....	11,500	600	1,500	400	9,000
Other instruments and related products.....	18,800	2,100	4,100	2,200	10,400
Other manufacturing industries.....	8,300	1,800	2,500	1,200	2,800
Nonmanufacturing.....	238,000	95,300	56,800	21,000	64,900
Mining.....	24,600	9,300	7,500	2,600	5,300
Crude petroleum and natural gas.....	16,400	7,100	5,200	1,600	2,500
Metal mining.....	3,400	700	900	200	1,500
Coal mining.....	3,100	1,200	500	200	1,200
Quarrying and nonmetallic mining.....	1,800	300	800	600	(2)
Contract construction.....	41,000	24,200	9,000	3,100	4,700
Transportation and public utilities.....	49,200	5,300	6,500	4,400	33,000
Railroad transportation.....	5,300	(3)	100	100	5,000
Other transportation.....	4,200	300	1,900	800	1,200
Communication.....	13,700	3,200	1,900	700	7,900
Electric, gas, and sanitary services.....	26,000	1,800	2,600	2,900	18,800
Wholesale and retail trade.....	31,200	8,900	12,100	5,200	5,100
Finance, insurance, and real estate.....	4,500	200	1,000	1,000	2,300
Services.....	86,500	47,000	20,300	4,600	14,500
Commercial laboratories; business and management consulting services	34,100	13,200	8,600	3,200	9,100
Other services ^{1/}	52,400	33,800	11,700	1,400	5,400
Agricultural services, forestry, and fisheries.....	1,000	400	500	(2)	(2)

^{1/} Included in designated industry group are industries combined as follows:
Other chemical products--agricultural chemicals.
Other services--medical and dental laboratories, engineering and architectural services.

^{2/} Less than 50 cases.

^{3/} Size group not sampled.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-4. Percent distribution of scientists and engineers, by size of establishment and industry, January 1962

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Percent distribution			
All industries.....	100.0	17.9	18.8	9.6	53.6
Manufacturing.....	100.0	9.4	16.9	9.9	63.8
Ordnance and accessories.....	100.0	.2	.9	5.3	93.6
Food and kindred products.....	100.0	22.2	38.6	18.0	21.2
Textile mill products.....	100.0	2.2	74.1	5.1	18.6
Lumber and wood products, except furniture.....	100.0	12.6	60.0	18.5	8.9
Paper and allied products.....	100.0	22.6	28.1	15.8	33.5
Chemicals and allied products.....	100.0	9.4	23.0	8.2	59.5
Industrial chemicals.....	100.0	3.1	11.7	5.8	79.3
Plastics and synthetics, except glass.....	100.0	12.6	28.1	17.7	41.7
Drugs.....	100.0	9.2	28.1	7.9	54.9
Other chemical products ^{1/}	100.0	22.7	41.4	10.1	25.8
Petroleum refining.....	100.0	2.2	14.0	9.1	74.7
Rubber and miscellaneous plastics products.....	100.0	7.1	19.1	23.2	50.6
Stone, clay, and glass products.....	100.0	16.7	34.3	14.6	34.4
Primary metal industries.....	100.0	7.6	18.5	9.3	64.6
Blast furnace and basic steel products.....	100.0	4.7	13.8	6.4	75.0
Other primary metal industries.....	100.0	12.6	26.4	14.2	46.8
Fabricated metal products.....	100.0	25.4	30.4	16.9	27.3
Machinery, except electrical.....	100.0	19.2	21.6	14.5	44.7
Engines and turbines.....	100.0	4.4	3.0	12.3	80.3
Office, computing, and accounting machines.....	100.0	1.7	7.8	12.6	77.9
Farm machinery and equipment.....	100.0	36.8	14.3	7.0	41.9
Other machinery.....	100.0	23.4	29.0	16.7	31.0
Electrical equipment and supplies.....	100.0	7.7	11.4	10.2	70.7
Electric distribution equipment and industrial apparatus.....	100.0	15.5	15.6	19.7	49.3
Household appliances.....	100.0	4.7	5.4	7.2	82.8
Communication equipment.....	100.0	2.1	6.4	5.8	85.7
Electric lighting and wiring equipment.....	100.0	14.8	23.5	27.3	34.3
Electronic components and accessories.....	100.0	16.4	15.0	11.9	56.7
Radio and television receiving sets.....	100.0	2.7	14.2	4.1	78.9
Miscellaneous electrical equipment and supplies.....	100.0	5.2	19.7	5.6	69.5

See footnotes at end of table.

Table A-4. Percent distribution of scientists and engineers, by size of establishment and industry, January 1962 -- Continued

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Percent distribution			
Transportation equipment.....	100.0	1.7	4.8	5.4	88.1
Motor vehicles and equipment.....	100.0	1.5	4.7	4.9	88.9
Aircraft and parts.....	100.0	1.5	4.6	5.4	88.5
Other transportation equipment.....	100.0	5.1	8.2	6.4	80.4
Instruments and related products.....	100.0	9.0	18.4	8.5	64.1
Engineering and scientific instruments.....	100.0	5.0	12.8	3.6	78.5
Other instruments and related products.....	100.0	11.5	21.8	11.5	55.2
Other manufacturing industries.....	100.0	21.3	30.7	14.3	33.8
Nonmanufacturing.....	100.0	40.0	23.9	8.8	27.3
Mining.....	100.0	37.9	30.4	10.4	21.3
Crude petroleum and natural gas.....	100.0	43.4	31.9	9.5	15.2
Metal mining.....	100.0	21.3	27.2	7.0	44.5
Coal mining.....	100.0	38.1	17.0	5.4	39.5
Quarrying and nonmetallic mining.....	100.0	17.6	45.5	34.5	(2)
Contract construction.....	100.0	59.0	22.0	7.7	11.4
Transportation and public utilities.....	100.0	10.7	13.2	9.0	67.1
Railroad transportation.....	100.0	(3)	2.7	1.5	95.8
Other transportation.....	100.0	7.3	45.6	18.7	28.5
Communication.....	100.0	23.2	13.8	5.1	57.8
Electric, gas, and sanitary services.....	100.0	6.8	9.8	11.0	72.4
Wholesale and retail trade.....	100.0	28.5	38.6	16.6	16.3
Finance, insurance, and real estate.....	100.0	4.7	21.7	22.6	51.0
Services.....	100.0	54.3	23.5	5.4	16.8
Commercial laboratories; business and management consulting services..	100.0	38.7	25.1	9.5	26.7
Other services ^{1/}	100.0	64.5	22.4	2.7	10.4
Agricultural services, forestry, and fisheries.....	100.0	47.0	53.0	(2)	(2)

^{1/} Included in designated industry group are industries combined as follows:

Other chemical products--agricultural chemicals.
Other services--medical and dental laboratories, engineering and architectural services.

^{2/} Less than 50 cases; percentage not computed.

^{3/} Size group not sampled.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-5. Scientists and engineers as percent of total employment, by size of establishment and industry, January 1962

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
All industries.....	3.0	2.0	1.9	2.8	4.7
Manufacturing.....	3.8	1.6	2.2	3.3	6.4
Ordnance and accessories.....	18.3	3.3	3.6	10.2	20.2
Food and kindred products.....	1.3	.9	1.2	2.3	1.6
Textile mill products.....	.8	.2	1.7	.2	.4
Lumber and wood products, except furniture..	.5	.2	.6	.9	.6
Paper and allied products.....	2.0	2.6	1.4	1.9	2.7
Chemicals and allied products.....	10.2	5.7	10.2	8.4	12.1
Industrial chemicals.....	11.3	5.7	9.3	7.3	12.7
Plastics and synthetics, except glass.....	7.8	7.8	13.0	7.5	6.3
Drugs.....	16.9	10.6	16.9	12.0	20.2
Other chemical products ^{1/}	6.7	4.5	7.9	8.7	7.4
Petroleum refining.....	9.7	8.2	10.2	8.8	9.8
Rubber and miscellaneous plastics products..	2.0	.8	1.6	2.9	2.5
Stone, clay and glass products.....	1.9	1.0	1.8	2.2	3.0
Primary metal industries.....	2.6	2.0	2.4	2.3	2.7
Blast furnace and basic steel products....	2.2	1.5	1.9	1.9	2.4
Other primary metal industries.....	3.6	2.5	3.4	2.9	4.6
Fabricated metal products.....	2.2	1.5	2.2	2.9	3.1
Machinery, except electrical.....	4.6	3.3	4.2	5.1	5.7
Engines and turbines.....	4.8	8.2	2.3	5.2	4.9
Office, computing, and accounting machines	9.5	4.4	6.4	15.4	9.6
Farm machinery and equipment.....	2.9	2.2	2.7	3.4	3.8
Other machinery.....	4.3	3.8	4.3	4.5	4.8
Electrical equipment and supplies.....	7.8	5.6	4.7	6.6	9.4
Electric distribution equipment and industrial apparatus.....	7.4	10.1	5.1	6.9	8.1
Household appliances.....	2.6	2.4	.8	1.3	3.4
Communication equipment.....	12.3	6.6	8.2	14.1	13.0
Electric lighting and wiring equipment....	3.1	2.0	2.2	4.3	4.4
Electronic components and accessories.....	7.0	6.9	4.5	7.1	8.4
Radio and television receiving sets.....	7.8	2.6	7.6	3.9	8.9
Miscellaneous electrical equipment and supplies.....	4.6	1.4	4.2	4.2	5.8

See footnotes at end of table.

Table A-5. Scientists and engineers as percent of total employment, by size of establishment and industry, January 1962 -- Continued

Industry	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of-			
		Under 100	100-499	500-999	1,000, or more
Transportation equipment.....	6.8	1.8	3.0	5.7	7.9
Motor vehicles and equipment.....	3.0	1.1	1.5	2.2	3.4
Aircraft and parts.....	12.4	3.9	7.5	12.2	13.4
Other transportation equipment.....	2.4	.7	.8	1.8	4.1
Instruments and related products.....	8.6	4.0	6.9	6.2	11.8
Engineering and scientific instruments.....	17.7	6.7	12.2	6.9	23.6
Other instruments and related products.....	6.5	3.7	6.0	6.1	8.3
Other manufacturing industries.....	.3	.2	.2	.2	.6
Nonmanufacturing.....	1.9	2.3	1.5	2.0	1.8
Mining.....	1.9	2.3	1.5	2.0	1.8
Crude petroleum and natural gas.....	5.3	4.2	6.6	8.6	5.9
Metal mining.....	4.5	9.2	5.9	2.9	3.5
Coal mining.....	2.0	2.7	1.3	.8	2.4
Quarrying and nonmetallic mining.....	1.7	.6	2.2	4.6	(2)
Contract construction.....	2.5	1.9	2.7	9.2	11.5
Transportation and public utilities.....	1.4	.6	1.1	1.9	1.8
Railroad transportation.....	.7	(3)	.6	.4	.7
Other transportation.....	.3	.1	.5	.7	.5
Communication.....	1.7	2.5	2.1	1.6	1.5
Electric, gas, and sanitary services.....	4.2	1.9	2.8	5.7	4.9
Wholesale and retail trade.....	.8	.9	.8	1.3	.6
Finance, insurance, and real estate.....	.3	.1	.2	.6	.5
Services.....	6.4	7.6	4.5	3.1	11.0
Commercial laboratories; business and management consulting services.....	5.6	9.0	3.2	1.1	7.1
Agricultural services, forestry, and fisheries	5.6	6.2	5.2	(2)	(2)

1/ Included in designated industry group are industries combined as follows:

Other chemical products--agricultural chemicals.
Other services--medical and dental laboratories, engineering and architectural services.

2/ Less than 50 cases; percentage not computed.

3/ Size group not sampled.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-6. Scientists and engineers, by size of establishment and occupational group, January 1962

Occupational group	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
All groups.....	851,600	152,700	160,500	81,900	456,500
Engineers.....	684,600	127,600	116,700	65,000	375,300
Physical scientists.....	120,900	18,500	32,400	11,600	58,400
Chemists.....	81,600	10,900	26,000	8,300	36,400
Physicists.....	13,900	1,300	1,400	1,100	10,100
Metallurgists.....	12,400	1,800	1,800	1,100	7,700
Geologists and geophysicists.....	12,900	4,500	3,200	1,100	4,200
Life scientists.....	26,500	5,200	9,600	1,300	10,400
Medical scientists.....	7,700	1,000	2,200	200	4,300
Agricultural scientists.....	8,600	2,600	4,000	400	1,600
Biological scientists.....	10,200	1,600	3,400	700	4,500
Mathematicians.....	14,700	1,300	1,300	2,100	9,900
Unclassified scientists.....	5,000	100	500	1,900	2,500

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-7. Percent distribution of scientists and engineers, by size of establishment and occupational group, January 1962

Occupational group	Scientists and engineers in all establishments	Scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Percent distribution			
All groups.....	100.0	17.9	18.8	9.6	53.6
Engineers.....	100.0	18.6	17.1	9.5	54.8
Physical scientists.....	100.0	15.3	26.8	9.6	48.3
Chemists.....	100.0	13.4	31.9	10.1	44.6
Physicists.....	100.0	9.4	9.9	8.1	72.6
Metallurgists.....	100.0	14.7	14.8	8.6	61.8
Geologists and geophysicists.....	100.0	34.5	24.5	8.8	32.2
Life scientists.....	100.0	19.7	36.4	4.8	39.1
Medical scientists.....	100.0	13.0	28.7	3.0	55.3
Agricultural scientists.....	100.0	30.3	46.6	4.4	18.7
Biological scientists.....	100.0	15.9	33.5	6.5	44.1
Mathematicians.....	100.0	9.0	8.8	14.4	67.8
Unclassified scientists.....	100.0	1.6	9.3	38.5	50.5

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-8. Scientists and engineers, by function and occupational group, January 1962

Occupational group	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
		Number					
All groups.....	851,600	256,600	47,200	107,500	92,700	291,900	55,700
Engineers.....	684,600	186,200	34,800	92,800	74,900	252,900	43,100
Physical scientists.....	120,900	53,800	9,700	10,000	9,300	30,600	7,500
Chemists.....	81,600	38,700	6,800	5,800	7,800	20,100	2,500
Physicists.....	13,900	10,000	1,800	400	400	1,000	300
Metallurgists.....	12,400	4,200	800	1,700	800	4,600	300
Geologists and geophysicists.....	12,900	900	300	2,100	400	4,900	4,300
Life scientists.....	26,500	7,900	1,400	2,900	6,400	5,100	2,800
Medical scientists.....	7,700	1,400	400	700	3,400	600	1,200
Agricultural scientists.....	8,600	1,600	500	1,700	1,100	2,300	1,300
Biological scientists.....	10,200	4,900	600	500	1,900	2,100	200
Mathematicians.....	14,700	7,100	700	1,300	1,500	2,800	1,300
Unclassified scientists.....	5,000	1,700	700	500	500	600	1,100

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-9. Percent distribution of scientists and engineers, by function and occupational group, January 1962

Occupational group	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Percent distribution							
All groups.....	100.0	30.1	5.5	12.6	10.9	34.3	6.5
Engineers.....	100.0	27.2	5.1	13.6	10.9	36.9	6.3
Physical scientists.....	100.0	44.5	8.0	8.3	7.7	25.3	6.2
Chemists.....	100.0	47.4	8.3	7.1	9.5	24.6	3.0
Physicists.....	100.0	72.1	12.6	2.8	3.0	7.0	2.4
Metallurgists.....	100.0	33.7	6.8	13.7	6.3	37.3	2.3
Geologists and geophysicists.....	100.0	6.8	2.3	16.3	2.8	38.1	33.6
Life scientists.....	100.0	29.7	5.4	10.9	24.3	19.1	10.5
Medical scientists.....	100.0	17.8	5.0	9.0	44.2	7.8	16.1
Agricultural scientists.....	100.0	18.7	5.3	20.0	13.3	27.3	15.4
Biological scientists.....	100.0	48.0	5.9	4.7	18.5	20.7	2.2
Mathematicians.....	100.0	48.4	4.6	8.8	10.3	19.0	9.0
Unclassified scientists.....	100.0	33.4	13.6	10.6	9.3	12.1	21.0

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-10. Scientists and engineers, by function and industry, January 1962

Industry	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
		Number					
All industries.....	851,600	256,600	47,200	107,500	92,700	291,900	55,700
Manufacturing.....	613,600	224,800	41,100	66,800	59,500	189,600	31,800
Ordnance and accessories.....	39,500	18,000	1,700	1,200	1,400	16,400	700
Food and kindred products.....	22,200	5,500	2,500	4,100	400	8,000	1,700
Textile mill products.....	7,000	2,900	700	800	200	2,400	100
Lumber and wood products, except furniture.....	1,600	100	100	400	(1)	900	100
Paper and allied products.....	11,700	2,100	700	2,000	700	5,800	500
Chemicals and allied products.....	95,500	34,600	5,100	7,900	10,900	29,200	7,900
Industrial chemicals.....	45,900	15,700	1,600	3,000	2,800	18,100	4,700
Plastics and synthetics, except glass.....	8,200	3,000	600	1,000	900	2,400	300
Drugs.....	21,600	7,300	1,200	1,800	5,600	3,700	1,900
Agricultural chemicals.....	2,200	700	100	500	100	800	100
Other chemical products.....	17,600	7,900	1,500	1,700	1,400	4,200	800
Petroleum refining.....	20,900	3,500	500	3,000	1,300	8,700	3,900
Rubber and miscellaneous plastics products.....	7,700	2,100	700	1,100	700	2,700	400
Stone, clay, and glass products.....	9,100	2,200	800	1,500	1,100	3,200	300
Primary metal industries.....	32,000	5,200	1,000	6,100	2,700	15,600	1,500
Blast furnace and basic steel products	20,200	3,200	600	3,800	1,600	9,700	1,200
Other primary metal industries.....	11,800	2,000	400	2,200	1,100	5,800	300
Fabricated metal products.....	25,100	4,500	1,700	4,600	4,300	8,800	1,100
Machinery, except electrical.....	69,200	21,300	5,200	9,300	11,100	18,900	3,400
Engines and turbines.....	3,900	1,300	300	500	500	1,200	100
Office, computing, and accounting machines.....	14,400	7,800	1,400	700	900	2,900	700
Farm machinery and equipment.....	7,400	2,400	600	1,200	700	2,100	400
Other machinery.....	43,600	9,900	3,000	6,800	9,000	12,700	2,300
Electrical equipment and supplies.....	123,200	56,100	8,700	11,300	15,400	26,200	5,500
Electric distribution equipment and industrial apparatus.....	25,300	8,900	1,800	2,900	4,800	6,000	900
Household appliances.....	3,700	1,400	400	400	100	1,300	100
Communication equipment.....	55,400	29,200	3,900	4,500	3,800	10,400	3,500
Electric lighting and wiring equipment	4,200	1,300	300	600	600	1,200	200
Electronic components and accessories	18,700	6,700	1,100	1,900	3,700	5,000	300
Radio and television receiving sets...	10,800	6,900	900	400	1,300	1,000	300
Miscellaneous electrical equipment and supplies.....	5,100	1,700	300	600	1,000	1,300	200

See footnote at end of table.

Table A-10. Scientists and engineers, by function and industry, January 1962 -- Continued

Industry	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Number							
Transportation equipment.....	110,400	52,200	8,100	10,000	5,500	31,600	3,000
Motor vehicles and equipment.....	22,200	7,500	1,400	3,500	1,300	8,000	500
Aircraft and parts.....	83,000	43,600	6,400	5,600	3,900	21,500	2,100
Other transportation equipment.....	5,100	1,100	300	900	300	2,100	400
Instruments and related products.....	30,200	12,100	3,000	2,500	3,400	8,000	1,300
Engineering and scientific instruments.	11,500	5,200	1,400	1,000	700	2,800	400
Other instruments and related products.	18,800	6,900	1,600	1,400	2,700	5,200	900
Other manufacturing industries.....	8,300	2,300	700	1,200	400	3,200	500
Nonmanufacturing.....	238,000	31,800	6,100	40,700	33,200	102,300	23,800
Mining.....	24,600	1,600	600	5,600	1,200	12,900	2,600
Crude petroleum and natural gas.....	16,400	1,000	500	3,900	700	8,100	2,200
Metal mining.....	3,400	200	100	1,000	100	1,700	200
Coal mining.....	3,100	200	(1)	300	200	2,300	100
Quarrying and nonmetallic mining.....	1,800	300	100	400	200	800	100
Contract construction.....	41,000	300	300	8,800	3,000	21,700	6,900
Transportation and public utilities.....	49,200	1,900	500	10,900	2,600	29,100	4,300
Railroad transportation.....	5,300	100	(1)	900	100	2,900	1,100
Other transportation.....	4,200	300	100	1,100	(1)	2,600	100
Communication.....	13,700	300	100	3,000	300	10,000	100
Electric, gas, and sanitary services...	26,000	1,200	300	5,900	2,100	13,600	2,900
Wholesale and retail trade.....	31,200	2,400	300	4,900	18,000	4,800	800
Finance, insurance, and real estate.....	4,500	200	200	1,100	500	1,400	1,100
Services.....	86,500	25,400	4,200	9,000	7,600	32,200	8,200
Commercial laboratories; business and management consulting services.....	34,100	17,600	2,600	3,300	2,400	6,300	2,000
Medical and dental laboratories.....	700	100	(1)	100	100	400	(1)
Engineering and architectural services.	49,800	7,600	1,600	5,600	4,500	24,500	6,000
Other services.....	1,800	(1)	(1)	(1)	600	1,000	200
Agricultural services, forestry, and fisheries.....	1,000	(1)	(1)	500	300	200	(1)

¹/ Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-11. Percent distribution of scientists and engineers, by function and industry, January 1962

Industry	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Percent distribution							
All industries.....	100.0	30.1	5.5	12.6	10.9	34.3	6.5
Manufacturing.....	100.0	36.6	6.7	10.9	9.7	30.9	5.2
Ordnance and accessories.....	100.0	45.7	4.4	3.0	3.6	41.6	1.7
Food and kindred products.....	100.0	24.9	11.1	18.6	2.0	36.0	7.5
Textile mill products.....	100.0	41.5	9.8	10.8	3.0	34.0	1.0
Lumber and wood products, except furniture.....	100.0	8.9	7.1	22.4	(1)	57.5	3.6
Paper and allied products.....	100.0	17.6	5.6	17.3	6.2	49.4	4.0
Chemicals and allied products.....	100.0	36.2	5.3	8.3	11.4	30.5	8.3
Industrial chemicals.....	100.0	34.2	3.6	6.5	6.0	39.4	10.3
Plastics and synthetics, except glass.....	100.0	36.8	7.7	12.1	11.3	28.5	3.7
Drugs.....	100.0	33.9	5.8	8.2	26.1	17.1	8.9
Agricultural chemicals.....	100.0	29.6	2.4	22.6	5.1	36.9	3.4
Other chemical products.....	100.0	44.9	8.5	9.6	8.1	24.1	4.8
Petroleum refining.....	100.0	16.5	2.2	14.2	6.4	41.8	18.8
Rubber and miscellaneous plastics products.....	100.0	27.3	9.6	14.0	9.7	34.6	4.9
Stone, clay, and glass products.....	100.0	23.9	8.7	16.5	11.7	35.5	3.7
Primary metal industries.....	100.0	16.2	3.3	18.9	8.3	48.6	4.6
Blast furnace and basic steel products.....	100.0	16.0	3.1	19.0	7.9	48.1	5.9
Other primary metal industries.....	100.0	16.7	3.6	18.8	9.0	49.5	2.4
Fabricated metal products.....	100.0	18.1	6.7	18.5	17.0	35.2	4.5
Machinery, except electrical.....	100.0	30.8	7.5	13.4	16.0	27.3	4.9
Engines and turbines.....	100.0	32.9	6.8	14.1	13.6	30.0	2.6
Office, computing, and accounting machines.....	100.0	54.2	9.5	5.1	6.3	19.9	4.9
Farm machinery and equipment.....	100.0	32.5	7.7	16.9	9.6	28.3	4.9
Other machinery.....	100.0	22.6	6.9	15.5	20.6	29.3	5.2
Electrical equipment and supplies.....	100.0	45.5	7.1	9.2	12.5	21.3	4.5
Electric distribution equipment and industrial apparatus.....	100.0	35.3	7.2	11.4	19.1	23.6	3.4
Household appliances.....	100.0	38.8	9.8	11.5	1.8	35.0	3.1
Communication equipment.....	100.0	52.7	7.0	8.1	6.9	18.9	6.4
Electric lighting and wiring equipment.....	100.0	30.8	7.8	14.5	13.8	28.9	4.1
Electronic components and accessories.....	100.0	35.7	6.1	10.2	19.8	26.6	1.6
Radio and television receiving sets.....	100.0	63.4	8.3	3.9	12.2	9.3	2.8
Miscellaneous electrical equipment and supplies.....	100.0	33.6	5.4	11.2	20.1	25.5	4.3

See footnote at end of table.

Table A-11. Percent distribution of scientists and engineers, by function and industry, January 1962 -- Continued

Industry	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Percent distribution							
Transportation equipment.....	100.0	47.3	7.3	9.1	5.0	28.6	2.7
Motor vehicles and equipment.....	100.0	33.6	6.5	15.9	5.7	36.0	2.3
Aircraft and parts.....	100.0	52.5	7.7	6.7	4.7	25.9	2.5
Other transportation equipment.....	100.0	21.3	5.7	17.2	6.3	41.3	8.2
Instruments and related products.....	100.0	40.0	9.8	8.1	11.2	26.6	4.4
Engineering and scientific instruments	100.0	45.1	12.1	8.9	6.4	24.3	3.3
Other instruments and related products	100.0	36.8	8.4	7.6	14.1	28.0	5.0
Other manufacturing industries.....	100.0	28.2	8.2	13.9	5.1	38.5	6.1
Nonmanufacturing.....	100.0	13.4	2.6	17.1	13.9	43.0	10.0
Mining.....	100.0	6.6	2.6	22.9	4.8	52.5	10.6
Crude petroleum and natural gas.....	100.0	6.0	2.8	24.0	4.4	49.6	13.2
Metal mining.....	100.0	6.9	2.6	28.9	2.6	52.1	6.9
Coal mining.....	100.0	5.3	(1)	10.7	5.7	73.4	4.1
Quarrying and nonmetallic mining.....	100.0	14.0	4.5	22.6	10.5	43.8	4.6
Contract construction.....	100.0	.8	.7	21.4	7.4	53.0	16.7
Transportation and public utilities.....	100.0	3.8	1.0	22.1	5.2	59.1	8.7
Railroad transportation.....	100.0	1.9	(1)	17.9	2.1	55.6	21.6
Other transportation.....	100.0	7.1	1.2	25.4	(1)	62.4	3.5
Communication.....	100.0	2.2	.7	21.5	2.4	72.5	.7
Electric, gas, and sanitary services..	100.0	4.5	1.2	22.8	8.1	52.2	11.3
Wholesale and retail trade.....	100.0	7.8	1.0	15.6	57.7	15.4	2.5
Finance, insurance, and real estate.....	100.0	3.7	5.0	24.4	11.8	31.1	23.9
Services.....	100.0	29.3	4.8	10.3	8.8	37.2	9.5
Commercial laboratories; business and management consulting services.....	100.0	51.7	7.5	9.6	7.1	18.3	5.8
Medical and dental laboratories.....	100.0	12.2	(1)	8.5	17.4	59.8	(1)
Engineering and architectural services	100.0	15.3	3.2	11.2	8.9	49.2	12.1
Other services.....	100.0	(1)	(1)	(1)	34.5	53.5	9.6
Agricultural services, forestry, and fisheries.....	100.0	(1)	(1)	50.2	26.4	18.8	(1)

1/ Less than 50 cases; percentage not computed.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-12. Scientists and engineers. by function and size of establishment, January 1962

Size of establishment	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Number							
Total.....	851,600	256,600	47,200	107,500	92,700	291,900	55,700
Under 100 employees.....	152,700	21,300	7,700	30,500	22,000	58,800	12,400
100-499 employees.....	160,500	38,400	8,500	21,600	25,200	58,100	8,600
500-999 employees.....	81,900	24,500	5,800	10,000	11,200	24,800	5,600
1,000 employees or more.....	456,500	172,400	25,300	45,300	34,300	150,200	29,100

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-13. Percent distribution of scientists and engineers, by function and size of establishment, January 1962

Size of establishment	Scientists and engineers, all activities	Scientists and engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Percent distribution							
Total.....	100.0	30.1	5.5	12.6	10.9	34.3	6.5
Under 100 employees.....	100.0	13.9	5.1	20.0	14.4	38.5	8.1
100-499 employees.....	100.0	23.9	5.3	13.5	15.7	36.2	5.4
500-999 employees.....	100.0	29.9	7.1	12.2	13.6	30.3	6.8
1,000 employees or more.....	100.0	37.8	5.5	9.9	7.5	32.9	6.4

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-14. Scientists and engineers primarily engaged in research and development, ^{1/} by occupational group and industry, January 1962

Industry	R&D scientists and engineers	R&D Engineers	R&D scientists								
			Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
All industries.....	303,800	220,900	45,500	11,800	5,000	1,200	7,800	1,800	2,100	5,500	2,400
Manufacturing.....	265,900	193,800	40,500	9,700	4,500	400	6,100	1,100	1,600	2,000	2,300
Ordnance and accessories.....	19,800	17,600	500	900	300	(2)	500	(2)	(2)	100	(2)
Food and kindred products.....	8,000	2,000	3,100	(2)	(2)	(2)	100	(2)	1,000	300	1,500
Textile mill products.....	3,600	1,600	2,000	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Lumber and wood products, except furniture.....	300	200	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Paper and allied products.....	2,700	1,000	1,600	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Chemicals and allied products.....	39,700	10,100	20,900	1,100	400	(2)	400	1,500	800	4,200	200
Industrial chemicals.....	17,400	6,700	8,600	1,000	300	(2)	200	(2)	100	400	100
Plastics and synthetics, except glass.....	3,700	1,400	2,100	100	(2)	(2)	(2)	(2)	(2)	(2)	100
Drugs.....	8,600	300	3,300	(2)	(2)	(2)	100	1,500	300	3,100	(2)
Agricultural chemicals.....	700	(2)	200	(2)	(2)	(2)	(2)	(2)	400	100	(2)
Other chemical products.....	9,400	1,800	6,600	100	100	(2)	100	(2)	(2)	700	100
Petroleum refining.....	3,900	1,900	1,600	100	(2)	200	100	(2)	(2)	(2)	(2)
Rubber and miscellaneous plastics products.....	2,800	1,700	1,100	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Stone, clay, and glass products.....	3,000	2,000	700	200	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Primary metal industries.....	6,200	3,200	1,200	200	1,500	(2)	100	(2)	(2)	(2)	(2)
Blast furnace and basic steel products.....	3,900	1,800	700	100	1,100	(2)	(2)	(2)	(2)	(2)	(2)
Other primary metal industries.....	2,400	1,400	500	(2)	400	(2)	(2)	(2)	(2)	(2)	(2)
Fabricated metal products.....	6,200	5,400	400	100	200	(2)	100	(2)	(2)	(2)	(2)
Machinery, except electrical.....	26,600	23,300	900	600	400	(2)	1,200	(2)	(2)	(2)	100
Engines and turbines.....	1,500	1,400	100	(2)	100	(2)	(2)	(2)	(2)	(2)	(2)
Office, computing, and accounting machines.....	9,200	7,300	300	400	100	(2)	1,000	(2)	(2)	(2)	(2)
Farm machinery and equipment.....	3,000	2,800	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other machinery.....	12,800	11,800	500	200	200	(2)	100	(2)	(2)	(2)	(2)
Electrical equipment and supplies....	64,800	56,700	2,300	3,500	500	(2)	1,400	(2)	(2)	(2)	300
Electric distribution equipment and industrial apparatus.....	10,800	9,600	500	400	200	(2)	100	(2)	(2)	(2)	(2)
Household appliances.....	1,800	1,700	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Communication equipment.....	33,100	29,600	400	1,800	100	(2)	900	(2)	(2)	(2)	200
Electric lighting and wiring equipment.....	1,600	1,400	100	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Electronic components and accessories.....	7,800	5,800	800	700	100	(2)	300	(2)	(2)	(2)	(2)
Radio and television receiving sets.....	7,800	6,900	200	500	(2)	(2)	100	(2)	(2)	(2)	(2)
Miscellaneous electrical equipment and supplies.....	2,000	1,700	200	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)

See footnotes at end of table.

Table A-14. Scientists and engineers primarily engaged in research and development, ^{1/} by occupational group and industry, January 1962 -- Continued

Industry	R&D scientists and engineers	R&D engineers	R&D scientists								
			Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
Transportation equipment.....	60,300	53,300	1,800	1,700	1,100	(2)	2,000	(2)	(2)	200	200
Motor vehicles and equipment.....	8,900	8,000	400	200	200	(2)	200	(2)	(2)	(2)	(2)
Aircraft and parts.....	50,000	44,100	1,400	1,500	900	(2)	1,800	(2)	(2)	200	200
Other transportation equipment...	1,400	1,200	100	(2)	(2)	(2)	100	(2)	(2)	(2)	(2)
Instruments and related products....	15,100	11,900	1,400	1,200	100	(2)	300	(2)	(2)	100	(2)
Engineering and scientific instruments	6,600	5,800	300	200	100	(2)	200	(2)	(2)	(2)	(2)
Other instruments and related products	8,500	6,200	1,200	1,000	(2)	(2)	100	(2)	(2)	100	(2)
Other manufacturing industries.....	3,000	1,900	900	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Nonmanufacturing.....	38,000	27,100	5,000	2,100	500	800	1,700	100	100	500	100
Mining.....	2,300	1,300	200	(2)	100	500	(2)	(2)	(2)	200	(2)
Crude petroleum and natural gas....	1,400	800	(2)	(2)	(2)	400	(2)	(2)	(2)	200	(2)
Metal mining.....	300	200	(2)	(2)	100	(2)	(2)	(2)	(2)	(2)	(2)
Coal mining.....	200	100	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Quarrying and nonmetallic mining...	300	200	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Contract construction.....	600	600	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Transportation and public utilities..	2,400	2,100	100	(2)	(2)	(2)	100	(2)	(2)	(2)	(2)
Railroad transportation.....	100	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other transportation.....	400	300	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Communication.....	400	400	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Electric, gas, and sanitary services	1,500	1,300	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Wholesale and retail trade.....	2,800	1,500	1,300	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Finance, insurance, and real estate...	400	200	(2)	(2)	(2)	(2)	200	(2)	(2)	(2)	(2)
Services.....	29,500	21,500	3,400	2,100	400	300	1,400	100	(2)	300	100
Commercial laboratories; business and management consulting services.	20,200	13,700	3,000	1,400	300	200	1,100	100	(2)	200	100
Medical and dental laboratories....	100	(2)	100	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Engineering and architectural services.....	9,200	7,700	300	600	100	100	300	(2)	(2)	100	(2)
Other services.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Agricultural services, forestry, and fisheries.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

^{1/} Conducting or administering research and development.

^{2/} Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-15. Scientists and engineers primarily engaged in research and development, $\frac{1}{2}$ as percent of scientists and engineers in all activities, by occupational group and industry, January 1962

Industry	Scientists and engineers	Engineers	Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
All industries.....	35.7	32.3	55.7	84.7	40.5	9.1	52.9	22.8	24.0	53.9	47.0
Manufacturing.....	43.3	40.4	58.5	84.6	40.7	9.8	63.2	22.5	26.5	59.4	47.9
Ordnance and accessories.....	50.1	47.8	85.9	94.4	93.7	(2)	82.7	(2)	(2)	100.0	(2)
Food and kindred products.....	36.0	19.0	58.1	(2)	(2)	(2)	76.8	(2)	23.9	61.3	99.7
Textile mill products.....	51.3	37.7	71.1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Lumber and wood products, except furniture.....	16.0	24.6	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Paper and allied products.....	23.2	12.4	51.7	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Chemicals and allied products.....	41.5	25.8	58.4	71.5	67.9	(2)	45.2	21.7	43.5	58.4	16.5
Industrial chemicals.....	37.8	25.4	55.1	70.5	76.3	(2)	43.6	(2)	23.3	52.5	14.8
Plastics and synthetics, except glass	44.5	30.7	61.6	86.3	(2)	(2)	(2)	(2)	(2)	(2)	58.5
Drugs.....	39.7	17.2	54.3	(2)	(2)	(2)	49.5	21.5	37.1	54.6	(2)
Agricultural chemicals.....	32.0	(2)	21.0	(2)	(2)	(2)	(2)	(2)	68.1	100.0	(2)
Other chemical products.....	53.4	27.4	69.9	66.2	43.5	(2)	48.7	(2)	(2)	96.6	21.6
Petroleum refining.....	18.7	13.5	45.9	75.0	(2)	7.0	38.3	(2)	(2)	(2)	(2)
Rubber and miscellaneous plastics products.....	36.9	28.9	60.1	97.1	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Stone, clay, and glass products.....	32.6	26.8	56.2	96.5	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Primary metal industries.....	19.5	14.1	43.5	88.5	25.9	(2)	32.0	(2)	(2)	(2)	(2)
Blast furnace and basic steel products	19.1	12.8	43.4	85.6	29.4	(2)	(2)	(2)	(2)	(2)	(2)
Other primary metal industries.....	20.3	16.5	43.5	(2)	20.1	(2)	(2)	(2)	(2)	(2)	(2)
Fabricated metal products.....	24.8	23.9	30.1	85.3	31.4	(2)	41.0	(2)	(2)	(2)	(2)
Machinery, except electrical.....	38.3	36.4	69.8	74.6	38.7	(2)	67.4	(2)	(2)	(2)	34.1
Engines and turbines.....	39.7	38.7	70.5	(2)	63.7	(2)	(2)	(2)	(2)	(2)	(2)
Office, computing, and accounting machines.....	63.8	62.0	78.8	69.1	71.0	(2)	72.8	(2)	(2)	(2)	(2)
Farm machinery and equipment.....	40.2	40.3	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other machinery.....	29.5	28.3	67.3	83.7	30.8	(2)	54.6	(2)	(2)	(2)	(2)
Electrical equipment and supplies....	52.6	50.6	70.6	88.7	74.1	(2)	56.3	(2)	(2)	(2)	47.5
Electric distribution equipment and industrial apparatus.....	42.6	40.3	85.6	88.3	84.7	(2)	42.6	(2)	(2)	(2)	(2)
Household appliances.....	48.6	47.9	49.6	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Communication equipment.....	59.7	58.7	65.3	92.7	68.8	(2)	55.3	(2)	(2)	(2)	42.7
Electric lighting and wiring equipment	38.6	36.8	63.4	90.6	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Electronic components and accessories	41.8	36.6	72.0	78.2	74.7	(2)	61.9	(2)	(2)	(2)	(2)
Radio and television receiving sets	71.7	70.0	80.6	95.8	(2)	(2)	73.2	(2)	(2)	(2)	(2)
Miscellaneous electrical equipment and supplies.....	39.0	36.9	54.3	64.8	(2)	(2)	(2)	(2)	(2)	(2)	(2)

See footnotes at end of table.

Table A-15. Scientists and engineers primarily engaged in research and development, ^{1/} as percent of scientists and engineers in all activities, by occupational group and industry, January 1962 -- Continued

Industry	Scientists and engineers	Engineers	Chemists	Physicists	Metalurgists	Geologists and geophysicists	Mathematicians	Medical scientists	Agricultural scientists	Biological scientists	Unclassified scientists
Transportation equipment.....	54.6	53.2	73.2	88.1	58.6	(2)	74.6	(2)	(2)	91.3	17.5
Motor vehicles and equipment.....	40.1	38.4	72.7	100.0	42.1	(2)	68.2	(2)	(2)	(2)	(2)
Aircraft and parts.....	60.2	59.2	73.8	87.9	63.7	(2)	74.9	(2)	(2)	91.2	16.3
Other transportation equipment....	27.0	24.7	65.6	(2)	(2)	(2)	88.9	(2)	(2)	(2)	(2)
Instruments and related products....	49.8	46.7	70.1	84.0	62.1	(2)	80.8	(2)	(2)	53.7	(2)
Engineering and scientific instruments.....	57.2	56.5	88.0	87.9	68.5	(2)	96.3	(2)	(2)	(2)	(2)
Other instruments and related products.....	45.3	40.2	67.1	83.0	(2)	(2)	63.3	(2)	(2)	53.7	(2)
Other manufacturing industries.....	36.4	29.5	62.5	91.8	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Nonmanufacturing.....	15.9	13.3	40.2	84.9	39.6	8.7	33.1	27.3	7.7	28.4	33.8
Mining.....	9.2	8.1	21.9	(2)	22.8	6.6	(2)	(2)	(2)	100.0	(2)
Crude petroleum and natural gas...	8.8	8.5	(2)	(2)	(2)	6.2	(2)	(2)	(2)	100.0	(2)
Metal mining.....	9.4	7.1	(2)	(2)	19.9	(2)	(2)	(2)	(2)	(2)	(2)
Coal mining.....	6.0	4.0	29.6	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Quarrying and nonmetallic mining..	18.5	14.2	34.9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Contract construction.....	1.5	1.4	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Transportation and public utilities.	4.8	4.5	23.7	(2)	(2)	(2)	17.5	(2)	(2)	(2)	(2)
Railroad transportation.....	2.7	1.8	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other transportation.....	8.3	7.6	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Communication.....	2.8	2.7	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Electric, gas, and sanitary services	5.7	5.4	22.5	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Wholesale and retail trade.....	8.8	6.2	20.0	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Finance, insurance, and real estate...	8.8	7.0	(2)	(2)	(2)	(2)	11.8	(2)	(2)	(2)	(2)
Services.....	34.1	29.1	74.0	92.4	72.7	24.3	71.8	30.5	(2)	19.2	71.1
Commercial laboratories; business and management consulting services	59.2	53.2	78.6	91.2	94.7	61.5	73.5	32.5	(2)	70.6	68.8
Medical and dental laboratories....	14.1	(2)	28.9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Engineering and architectural services.....	18.5	16.5	67.5	95.3	41.0	7.2	67.8	(2)	(2)	38.8	(2)
Other services.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Agricultural services, forestry, and and fisheries.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

^{1/} Conducting or administering research and development.
^{2/} Less than 50 cases; percentage not computed.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-16. Scientists and engineers primarily engaged in research and development, ^{1/} by size of establishment and industry, January 1962

Industry	R&D scientists and engi- neers in all establish- ments	R&D scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
Number					
All industries.....	303,800	29,000	46,900	30,300	197,600
Manufacturing.....	265,900	17,400	36,900	26,300	185,300
Ordnance and accessories.....	19,800	(2)	200	1,000	18,600
Food and kindred products.....	8,000	900	2,100	3,500	1,500
Textile mill products.....	3,600	100	3,000	100	400
Lumber and wood products, except furniture.....	300	100	100	100	(2)
Paper and allied products.....	2,700	300	1,300	300	900
Chemicals and allied products.....	39,700	4,100	9,100	3,500	23,000
Industrial chemicals.....	17,400	500	1,900	1,000	14,000
Plastics and synthetics, except glass.....	3,700	400	1,200	500	1,600
Drugs.....	8,600	500	2,000	900	5,300
Other chemical products ^{3/}	10,100	2,800	4,100	1,100	2,100
Petroleum refining.....	3,900	(2)	1,000	600	2,300
Rubber and miscellaneous plastics products.....	2,800	100	500	800	1,500
Stone, clay, and glass products.....	3,000	400	800	600	1,200
Primary metal industries.....	6,200	400	2,000	800	3,100
Blast furnace and basic steel products.....	3,900	200	1,100	200	2,400
Other primary metal industries.....	2,400	200	900	600	700
Fabricated metal products.....	6,200	1,700	1,700	900	1,900
Machinery, except electrical.....	26,600	2,700	4,800	4,000	15,000
Engines and turbines.....	1,500	100	(2)	100	1,300
Office, computing, and accounting machines.....	9,200	100	800	1,500	6,900
Farm machinery and equipment.....	3,000	600	400	200	1,800
Other machinery.....	12,800	2,000	3,600	2,200	5,100
Electrical equipment and supplies.....	64,800	4,500	5,900	6,200	48,200
Electric distribution equipment and industrial apparatus.....	10,800	1,300	1,700	2,200	5,500
Household appliances.....	1,800	100	100	100	1,500
Communication equipment.....	33,100	700	2,300	2,100	28,000
Electric lighting and wiring equipment.....	1,600	300	300	400	700
Electronic components and accessories.....	7,800	1,900	800	900	4,200
Radio and television receiving sets.....	7,800	200	400	300	6,900
Miscellaneous electrical equipment and supplies.....	2,000	100	400	200	1,300

See footnotes at end of table.

Table A-16. Scientists and engineers primarily engaged in research and development, ^{1/} by size of establishment and industry, January 1962 -- Continued

Industry	R&D scientists and engineers in all establishments	R&D scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
Transportation equipment.....	60,300	600	1,300	2,500	56,000
Motor vehicles and equipment.....	8,900	100	600	400	7,800
Aircraft and parts.....	50,000	400	500	2,100	47,000
Other transportation equipment.....	1,400	100	100	100	1,100
Instruments and related products.....	15,100	1,200	2,400	1,200	10,300
Engineering and scientific instruments.....	6,600	300	700	200	5,400
Other instruments and related products.....	8,400	900	1,700	900	4,900
Other manufacturing industries.....	3,000	300	800	500	1,400
Nonmanufacturing.....	38,000	11,600	10,000	4,000	12,300
Mining.....	2,300	800	600	300	600
Crude petroleum and natural gas.....	1,400	700	300	100	300
Metal mining.....	300	(2)	100	(2)	100
Coal mining.....	200	(2)	100	(2)	100
Quarrying and nonmetallic mining.....	300	(2)	100	200	(2)
Contract construction.....	600	200	200	100	200
Transportation and public utilities.....	2,400	100	400	500	1,300
Railroad transportation.....	100	(2)	(2)	(2)	100
Other transportation.....	400	(2)	(2)	100	200
Communication.....	400	100	300	(2)	(2)
Electric, gas, and sanitary services.....	1,500	(2)	100	400	900
Wholesale and retail trade.....	2,800	600	1,700	(2)	400
Finance, insurance, and real estate.....	400	(2)	(2)	200	200
Services.....	29,500	10,000	7,100	2,900	9,600
Commercial laboratories; business and management consulting services.....	20,200	5,800	5,500	2,500	6,400
Other services ^{3/}	9,300	4,200	1,600	300	3,200
Agricultural services, forestry, and fisheries.....	(2)	(2)	(2)	(2)	(2)

- ^{1/} Conducting or administering research and development.
^{2/} Less than 50 cases.
^{3/} Included in designated industry group are industries combined as follows:
 Other chemical products--agricultural chemicals.
 Other services--medical and dental laboratories, engineering and architectural services.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-17. Scientists and engineers primarily engaged in research and development, ^{1/} as percent of scientists and engineers in all activities, by size of establishment and industry, January 1962

Industry	All establishments	Establishments with total employment of --			
		Under 100	100-499	500-999	1,000 or more
All industries.....	35.7	19.0	29.2	37.0	43.3
Manufacturing.....	43.3	30.3	35.6	43.2	47.3
Ordnance and accessories.....	50.1	(2)	58.0	45.6	50.3
Food and kindred products.....	36.0	18.5	24.5	88.3	30.8
Textile mill products.....	51.3	66.7	57.7	27.4	30.6
Lumber and wood products, except furniture.....	16.0	66.7	5.7	19.0	(2)
Paper and allied products.....	23.2	10.7	39.1	14.3	22.5
Chemicals and allied products.....	41.5	46.1	41.4	44.3	40.5
Industrial chemicals.....	37.8	31.4	34.8	36.6	38.6
Plastics and synthetics, except glass.....	44.5	39.8	51.0	33.0	46.4
Drugs.....	39.7	23.7	32.3	50.5	44.5
Other chemical products ^{2/}	51.0	62.1	49.6	57.4	41.1
Petroleum refining.....	18.7	(2)	35.6	29.9	14.6
Rubber and miscellaneous plastics products.....	36.9	14.3	31.5	43.5	39.0
Stone, clay, and glass products.....	32.6	27.3	25.4	45.0	37.0
Primary metal industries.....	19.5	14.5	33.7	26.5	15.1
Blast furnace and basic steel products.....	19.1	17.6	38.2	17.9	15.8
Other primary metal industries.....	20.3	12.5	29.6	33.3	13.2
Fabricated metal products.....	24.8	26.8	22.8	21.6	27.2
Machinery, except electrical.....	38.3	20.3	32.4	39.4	48.6
Engines and turbines.....	39.7	53.8	(2)	15.7	43.1
Office, computing, and accounting machines.....	63.8	22.5	72.5	81.2	61.0
Farm machinery and equipment.....	40.2	22.2	34.8	43.2	57.4
Other machinery.....	29.5	19.2	28.7	30.3	37.5
Electrical equipment and supplies.....	52.6	47.2	42.0	49.6	55.3
Electric distribution equipment and industrial apparatus.....	42.6	34.4	42.2	44.5	44.5
Household appliances.....	48.6	28.7	26.4	55.9	50.5
Communication equipment.....	59.7	60.4	64.5	64.0	59.0
Electric lighting and wiring equipment.....	38.6	40.5	25.7	38.7	46.7
Electronic components and accessories.....	41.8	61.1	29.7	40.1	39.8
Radio and television receiving sets.....	71.7	64.6	25.6	69.8	80.4
Miscellaneous electrical equipment and supplies.....	39.0	24.4	41.5	59.1	37.7

See footnotes at end of table.

Table A-17. Scientists and engineers primarily engaged in research and development, 1/ as percent of scientists and engineers in all activities, by size of establishment and industry, January 1962 -- Continued

Industry	All establishments	Establishments with total employment of --			
		Under 100	100-499	500-999	1,000 or more
Transportation equipment.....	54.6	30.0	24.1	41.8	57.5
Motor vehicles and equipment.....	40.1	35.8	60.3	32.3	39.6
Aircraft and parts.....	60.2	29.2	14.1	45.6	64.0
Other transportation equipment.....	27.0	26.5	25.0	20.4	27.7
Instruments and related products.....	49.8	44.2	42.5	45.1	53.3
Engineering and scientific instruments.....	57.2	54.3	44.3	53.0	59.7
Other instruments and related products.....	45.3	41.5	41.8	43.6	47.7
Other manufacturing industries.....	36.4	16.9	32.1	39.0	51.6
Nonmanufacturing.....	15.9	12.2	17.6	19.1	19.0
Mining.....	9.2	8.3	7.8	11.4	11.7
Crude petroleum and natural gas.....	8.8	10.4	5.7	3.7	13.6
Metal mining.....	9.4	(2)	13.2	(2)	9.7
Coal mining.....	6.0	(2)	10.8	(2)	10.6
Quarrying and nonmetallic mining.....	18.5	(2)	13.5	35.5	(2)
Contract construction.....	1.5	.7	1.9	2.7	3.9
Transportation and public utilities.....	4.8	1.2	6.4	12.2	4.1
Railroad transportation.....	2.7	(2)	(2)	(2)	2.9
Other transportation.....	8.3	(2)	(2)	17.1	18.0
Communication.....	2.8	1.9	14.8	(2)	(2)
Electric, gas, and sanitary services.....	5.7	(2)	5.4	13.9	5.0
Wholesale and retail trade.....	8.8	6.3	14.5	(2)	8.2
Finance, insurance, and real estate.....	8.8	(2)	(2)	19.1	8.7
Services.....	34.1	21.3	34.8	61.4	65.9
Commercial laboratories; business and management consulting services.....	59.2	43.9	63.8	77.4	70.5
Other services <u>3/</u>	17.8	12.5	13.6	24.7	58.3
Agricultural services, forestry, and fisheries.....	(2)	(2)	(2)	(2)	(2)

1/ Conducting or administering research and development.

2/ Less than 50 cases; percentage not computed.

3/ Included in designated industry group are industries combined as follows:
 Other chemical products--agricultural chemicals.
 Other services--medical and dental laboratories, engineering and architectural services.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-18. Scientists and engineers primarily engaged in research and development^{1/} by size of establishment and occupational group, January 1962

Occupational group	R&D scientists and engineers in all establishments	R&D scientists and engineers in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
All groups.....	303,800	29,000	46,900	30,300	197,600
Engineers.....	220,900	18,800	28,600	21,100	152,500
Physical scientists.....	63,500	8,100	14,800	6,200	34,400
Chemists.....	45,500	6,100	12,600	4,900	21,800
Physicists.....	11,800	1,100	1,300	900	8,600
Metallurgists.....	5,000	400	500	400	3,600
Geologists and geophysicists.....	1,200	400	300	100	400
Life scientists.....	9,300	1,500	2,800	700	4,300
Medical scientists.....	1,800	200	600	100	900
Agricultural scientists.....	2,100	700	900	100	400
Biological scientists.....	5,500	700	1,300	500	3,000
Mathematicians.....	7,800	500	700	700	5,800
Unclassified scientists.....	2,400	(2)	100	1,500	700

^{1/} Conducting or administering research and development.

^{2/} Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-19. Scientists and engineers primarily engaged in research and development,^{1/} as percent of scientists and engineers in all activities, by size of establishment and occupational group, January 1962

Occupational group	R&D scientists and engineers as percent, in all establishments	R&D scientists and engineers as percent, in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
All groups.....	35.7	19.0	29.2	37.0	43.3
Engineers.....	32.3	14.8	24.5	32.4	40.6
Physical scientists.....	52.5	43.7	45.6	53.7	59.0
Chemists.....	55.7	56.2	48.6	58.8	60.0
Physicists.....	84.7	83.8	92.3	75.1	84.8
Metallurgists.....	40.5	22.8	29.5	40.6	47.4
Geologists and geophysicists.....	9.1	9.6	9.6	7.7	8.4
Life scientists.....	35.1	29.4	28.6	58.8	41.1
Medical scientists.....	22.8	17.4	25.1	64.9	20.6
Agricultural scientists.....	24.0	26.0	22.7	22.0	24.4
Biological scientists.....	53.9	42.2	37.9	77.6	66.7
Mathematicians.....	52.9	41.1	53.2	35.0	58.3
Unclassified scientists.....	47.0	(2)	28.2	78.8	27.0

^{1/} Conducting or administering research and development.

^{2/} Less than 50 cases; percentage not computed.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-20. Engineers, by function and industry, January 1962

Industry	Engineers, all activities	Engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
All industries.....	684,600	186,200	34,800	92,800	74,900	252,900	43,100
Manufacturing.....	480,300	163,800	30,000	56,300	47,400	159,900	22,800
Ordnance and accessories.....	36,900	16,100	1,500	1,100	1,400	16,200	600
Food and kindred products.....	10,400	1,200	800	2,900	(1)	5,000	400
Textile mill products.....	4,100	1,200	400	600	100	1,800	100
Lumber and wood products, except furniture....	900	100	100	100	(1)	600	(1)
Paper and allied products.....	7,900	800	200	1,500	500	4,600	300
Chemicals and allied products.....	39,200	8,800	1,300	4,200	2,200	18,400	4,300
Industrial chemicals.....	26,200	6,000	600	2,100	1,200	12,900	3,400
Plastics and synthetics, except glass.....	4,400	1,100	300	600	500	1,700	200
Drugs.....	1,600	200	(1)	300	(1)	800	200
Agricultural chemicals.....	500	(1)	(1)	100	(1)	300	(1)
Other chemical products.....	6,400	1,500	300	1,000	400	2,700	500
Petroleum refining.....	14,100	1,700	200	2,500	1,000	6,700	1,900
Rubber and miscellaneous plastics products...	5,800	1,200	400	1,000	700	2,200	300
Stone, clay, and glass products.....	7,500	1,400	600	1,300	1,000	2,900	300
Primary metal industries.....	22,700	2,600	600	4,600	2,100	11,600	1,200
Blast furnace and basic steel products.....	14,400	1,500	300	3,100	1,300	7,300	900
Other primary metal industries.....	8,300	1,100	200	1,600	800	4,300	200
Fabricated metal products.....	22,700	3,900	1,500	4,400	4,100	7,700	1,100
Machinery, except electrical.....	64,000	18,600	4,700	8,900	10,800	17,800	3,100
Engines and turbines.....	3,600	1,200	200	500	500	1,000	100
Office, computing, and accounting machines.	11,800	6,200	1,100	600	800	2,600	500
Farm machinery and equipment.....	7,100	2,300	500	1,200	700	2,000	400
Other machinery.....	41,500	8,900	2,800	6,500	8,800	12,200	2,200
Electrical equipment and supplies.....	112,000	49,200	7,500	10,600	14,700	25,000	5,000
Electric distribution equipment and industrial apparatus.....	23,800	7,900	1,600	2,800	4,800	5,800	800
Household appliances.....	3,500	1,300	300	400	100	1,200	100
Communication equipment.....	50,500	26,300	3,300	4,100	3,500	10,100	3,200
Electric lighting and wiring equipment.....	3,900	1,100	300	600	600	1,100	200
Electronic components and accessories.....	16,000	5,000	900	1,800	3,400	4,700	300
Radio and television receiving sets.....	9,900	6,100	800	400	1,300	1,000	300
Miscellaneous electrical equipment and supplies.....	4,500	1,400	200	500	1,000	1,200	200

See footnote at end of table.

Table A-20. Engineers, by function and industry, January 1962 -- Continued

Industry	Engineers all activities	Engineers primarily engaged in--					
		Research and development	Management and administration of--		Technical sales and service	Production and operations	All other activities
			Research and development	Other activities			
Transportation equipment.....	100,100	46,000	7,200	9,400	5,300	29,500	2,600
Motor vehicles and equipment.....	20,800	6,800	1,200	3,400	1,200	7,700	500
Aircraft and parts.....	74,400	38,300	5,700	5,200	3,700	19,700	1,800
Other transportation equipment.....	4,900	900	300	900	300	2,100	400
Instruments and related products.....	25,500	9,600	2,300	2,100	3,200	7,300	1,100
Engineering and scientific instruments..	10,200	4,500	1,300	800	700	2,600	400
Other instruments and related products..	15,300	5,100	1,100	1,300	2,500	4,700	700
Other manufacturing industries.....	6,600	1,400	500	1,100	300	2,700	500
Nonmanufacturing.....	204,300	22,400	4,700	36,400	27,500	92,900	20,300
Mining.....	15,900	900	400	3,900	1,000	9,500	300
Crude petroleum and natural gas.....	9,500	500	300	2,500	500	5,600	(1)
Metal mining.....	2,200	100	(1)	800	100	1,100	100
Coal mining.....	2,700	100	(1)	300	200	2,100	100
Quarrying and nonmetallic mining.....	1,500	100	100	300	200	700	100
Contract construction.....	40,700	300	300	8,800	3,000	21,500	6,900
Transportation and public utilities.....	47,600	1,700	400	10,700	2,500	28,400	3,800
Railroad transportation.....	5,000	100	(1)	900	100	2,800	1,100
Other transportation.....	4,100	300	(1)	1,100	(1)	2,600	100
Communication.....	13,700	300	100	3,000	300	10,000	100
Electric, gas, and sanitary services....	24,800	1,100	300	5,800	2,100	13,000	2,500
Wholesale and retail trade.....	23,500	1,300	200	4,300	13,400	3,500	800
Finance, insurance, and real estate.....	2,700	(1)	200	600	400	800	700
Services.....	73,900	18,200	3,300	8,100	7,200	29,300	7,800
Commercial laboratories; business and management consulting services.....	25,800	11,900	1,800	2,800	2,100	5,400	1,700
Medical and dental laboratories.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Engineering and architectural services...	47,100	6,300	1,500	5,300	4,400	23,600	6,000
Other services.....	1,000	(1)	(1)	(1)	600	200	200
Agricultural services, forestry, and fisheries.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)

1/ Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-21. Technicians, by size of establishment and industry, January 1962

Industry	Technicians in all establishments	Technicians in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
All industries.....	585,100	150,000	115,200	61,500	258,500
Manufacturing.....	379,500	47,500	73,400	47,200	211,500
Ordnance and accessories.....	14,100	(1)	200	1,400	12,400
Food and kindred products.....	13,900	3,700	5,400	2,600	2,200
Textile mill products.....	3,700	200	1,500	900	1,200
Lumber and wood products, except furniture.....	1,900	1,000	600	200	100
Paper and allied products.....	5,700	1,000	1,800	1,100	1,800
Chemicals and allied products.....	43,400	4,900	10,600	4,000	23,900
Industrial chemicals.....	20,800	800	3,400	1,500	15,200
Plastics and synthetics, except glass.....	5,400	700	1,700	700	2,300
Drugs.....	5,400	700	1,000	600	3,200
Other chemical products 2/.....	11,700	2,800	4,500	1,200	3,200
Petroleum refining.....	9,400	100	1,600	900	6,700
Rubber and miscellaneous plastics products.....	4,700	200	900	1,100	2,500
Stone, clay, and glass products.....	4,700	200	1,900	800	1,800
Primary metal industries.....	18,900	1,400	3,500	2,600	11,400
Blast furnace and basic steel products.....	12,200	300	1,700	1,000	9,200
Other primary metal industries.....	6,700	1,100	1,800	1,600	2,100
Fabricated metal products.....	24,600	6,100	8,200	3,900	6,400
Machinery, except electrical.....	63,400	13,900	14,400	9,200	26,000
Engines and turbines.....	3,700	100	100	500	3,000
Office computing, and accounting machines.....	11,200	100	1,200	700	9,100
Farm machinery and equipment.....	6,000	2,200	1,000	400	2,400
Other machinery.....	42,500	11,400	12,000	7,600	11,600
Electrical equipment and supplies.....	84,900	8,200	13,600	10,600	52,500
Electric distribution equipment and industrial apparatus.....	20,500	3,800	4,100	4,100	8,400
Household appliances.....	2,700	100	200	300	2,200
Communication equipment.....	34,000	900	4,000	3,400	25,500
Electric lighting and wiring equipment.....	2,400	100	1,000	600	700
Electronic components and accessories.....	14,200	2,600	2,900	1,600	7,100
Radio and television receiving sets.....	7,100	300	300	300	6,200
Miscellaneous electrical equipment and supplies.....	4,100	400	1,100	300	2,300

See footnotes at end of table.

Table A-21. Technicians, by size of establishment and industry, January 1962 -- continued

Industry	Technicians in all establish- ments	Technicians in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
		Number			
Transportation equipment.....	57,800	2,000	2,600	5,000	48,200
Motor vehicles and equipment.....	15,900	200	900	1,300	13,500
Aircraft and parts.....	36,300	1,400	1,100	3,300	30,500
Other transportation equipment.....	5,600	400	600	400	4,200
Instruments and related products.....	21,300	3,000	4,200	1,900	12,300
Engineering and scientific instruments.....	8,400	600	1,500	400	5,900
Other instruments and related products.....	12,900	2,300	2,700	1,500	6,400
Other manufacturing industries.....	7,200	1,600	2,500	1,000	2,100
Nonmanufacturing.....	205,500	102,500	41,800	14,300	47,000
Mining.....	10,100	4,400	3,000	700	2,000
Crude petroleum and natural gas.....	7,100	3,600	2,100	400	1,000
Metal mining.....	1,100	200	400	100	500
Coal mining.....	1,200	400	200	100	500
Quarrying and nonmetallic mining.....	700	200	300	200	(1)
Contract construction.....	24,600	15,600	4,300	2,100	2,500
Transportation and public utilities.....	44,300	9,400	5,000	3,100	26,800
Railroad transportation.....	3,700	(1)	(1)	(1)	3,600
Other transportation.....	3,000	300	400	600	1,700
Communication.....	21,200	7,900	3,000	1,000	9,300
Electric, gas, and sanitary services.....	16,400	1,200	1,700	1,500	12,100
Wholesale and retail trade.....	18,900	3,500	4,700	5,200	5,500
Finance, insurance, and real estate.....	2,100	(1)	900	(1)	1,200
Services.....	103,800	68,600	23,100	3,100	9,100
Commercial laboratories; business and management consulting services.....	36,100	20,700	7,700	1,900	5,900
Other services ^{2/}	67,700	47,800	15,400	1,200	3,200
Agricultural services, forestry, and fisheries.....	1,700	1,000	800	(1)	(1)

^{1/} Less than 50 cases.

^{2/} Included in designated industry group are industries combined as follows:

Other chemical products--agricultural chemicals.
Other services--medical and dental laboratories,
engineering and architectural services.

NOTE.--Totals have been calculated on the basis of of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-22. Percent distribution of technicians, by size of establishment and industry, January 1962

Industry	Technicians in all establish- ments	Technicians in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
Percent distribution					
All industries.....	100.0	25.6	19.7	10.5	44.2
Manufacturing.....	100.0	12.5	19.3	12.4	55.7
Ordnance and accessories.....	100.0	(1)	1.7	9.7	88.4
Food and kindred products.....	100.0	26.6	38.7	18.6	16.1
Textile mill products.....	100.0	4.1	39.7	24.5	31.5
Lumber and wood products, except furniture.....	100.0	52.3	34.2	8.4	5.2
Paper and allied products.....	100.0	17.8	31.8	18.5	31.8
Chemicals and allied products.....	100.0	11.4	24.4	9.3	55.0
Industrial chemicals.....	100.0	3.7	16.2	7.1	73.1
Plastics and synthetics, except glass.....	100.0	12.7	31.9	13.6	41.8
Drugs.....	100.0	12.2	18.0	11.2	58.6
Other chemical products 2/.....	100.0	24.0	38.3	10.2	27.4
Petroleum refining.....	100.0	1.4	17.4	9.8	71.4
Rubber and miscellaneous plastics products.....	100.0	4.7	19.3	23.7	52.4
Stone, clay and glass products.....	100.0	4.6	39.8	17.6	35.0
Primary metal industries.....	100.0	7.5	18.5	13.9	60.1
Blast furnace and basic steel products.....	100.0	2.7	13.5	8.3	75.5
Other primary metal industries.....	100.0	16.3	27.4	24.2	32.0
Fabricated metal products.....	100.0	25.0	33.2	15.7	26.1
Machinery, except electrical.....	100.0	21.8	22.6	14.5	41.0
Engines and turbines.....	100.0	2.6	3.3	14.4	79.7
Office, computing and accounting machines.....	100.0	1.2	11.0	6.4	81.4
Farm machines and equipment.....	100.0	36.8	17.4	6.4	39.5
Other machinery.....	100.0	26.9	28.1	17.8	27.2
Electrical equipment and supplies.....	100.0	9.7	16.0	12.5	61.9
Electric distribution equipment and industrial apparatus..	100.0	18.8	17.9	20.3	41.0
Household appliances.....	100.0	2.2	7.0	9.4	81.4
Communication equipment.....	100.0	2.8	11.8	10.1	75.2
Electric lighting and wiring equipment.....	100.0	4.0	41.2	24.0	30.8
Electronic components and accessories.....	100.0	18.3	20.1	11.5	50.1
Radio and television receiving sets.....	100.0	4.0	4.6	4.4	87.0
Miscellaneous electrical equipment and supplies.....	100.0	9.1	27.1	6.4	57.5

See footnotes at end of table.

Table A-22. Percent distribution of technicians, by size of establishment and industry, January 1962 -- Continued

Industry	Technicians in all establish- ments	Technicians in establishments with total employment of--			
		Under 100	100-499	500-999	1,000 or more
Percent distribution					
Transportation equipment.....	100.0	3.4	4.5	8.7	83.4
Motor vehicles and equipment.....	100.0	1.1	5.4	8.2	85.3
Aircraft and parts.....	100.0	3.9	3.0	9.2	83.9
Other transportation equipment.....	100.0	7.1	11.3	7.0	74.7
Instruments and related products.....	100.0	13.9	19.6	8.8	57.8
Engineering and scientific instruments.....	100.0	7.2	17.4	4.9	70.5
Other instruments and related products.....	100.0	18.1	21.0	11.3	49.6
Other manufacturing industries.....	100.0	21.7	34.9	14.4	29.0
Nonmanufacturing.....	100.0	49.9	20.3	6.9	22.9
Mining.....	100.0	43.8	29.5	7.3	19.3
Crude petroleum and natural gas.....	100.0	51.2	29.1	5.9	13.8
Metal mining.....	100.0	19.2	34.0	6.0	40.8
Coal mining.....	100.0	34.6	20.1	5.2	40.0
Quarrying and nonmetallic mining.....	100.0	24.1	44.0	28.9	(1)
Contract construction.....	100.0	63.7	17.7	8.6	10.1
Transportation and public utilities.....	100.0	26.2	11.3	7.0	60.4
Railroad transportation.....	100.0	(1)	(1)	(1)	98.4
Other transportation.....	100.0	10.3	12.0	21.3	56.5
Communication.....	100.0	37.4	14.0	4.5	44.1
Electric, gas, and sanitary services.....	100.0	7.0	10.1	9.1	73.8
Wholesale and retail trade.....	100.0	18.6	24.7	27.7	29.0
Finance, insurance, and real estate.....	100.0	(1)	43.4	(1)	56.1
Services.....	100.0	66.0	22.3	3.0	8.7
Commercial laboratories; business and management consulting services.....	100.0	57.4	21.3	5.2	16.2
Other services ^{2/}	100.0	70.7	22.8	1.8	4.8
Agricultural services, forestry, and fisheries.....	100.0	55.1	44.9	(1)	(1)

^{1/} Less than 50 cases; percentage not computed.

^{2/} Included in designated industry group are industries combined as follows:

Other chemical products--agricultural chemicals.
Other services--medical and dental laboratories,
engineering and architectural services.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-23. Technicians, by occupational group and industry, January 1962

Industry	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural, and biological technicians	Unclassified technicians
	Number				
All industries.....	585,100	212,600	254,600	16,900	100,900
Manufacturing.....	379,500	126,200	185,500	11,400	56,300
Ordnance and accessories.....	14,100	4,500	8,300	100	1,200
Food and kindred products.....	13,900	1,100	3,900	4,600	4,300
Textile mill products	3,700	200	2,700	(1)	800
Lumber and wood products,except furniture.....	1,900	900	900	(1)	100
Paper and allied products.....	5,700	1,600	2,400	(1)	1,700
Chemicals and allied products.....	43,400	3,500	25,900	5,200	8,800
Industrial chemicals.....	20,800	2,100	14,800	1,700	2,200
Plastics and synthetics, except glass.....	5,400	400	3,100	(1)	1,900
Drugs.....	5,400	200	1,000	3,200	1,000
Agricultural chemicals.....	1,000	(1)	100	100	800
Other chemical products.....	10,800	700	6,900	200	3,000
Petroleum refining.....	9,400	2,200	5,900	100	1,200
Rubber and miscellaneous plastics products.....	4,700	1,300	2,600	(1)	800
Stone, clay, and glass products.....	4,700	1,100	3,100	(1)	600
Primary metal industries.....	18,900	4,700	10,700	200	3,300
Blast furnace and basic steel products.....	12,200	3,300	6,300	100	2,500
Other primary metal industries.....	6,700	1,400	4,400	100	800
Fabricated metal products.....	24,600	15,000	6,500	100	3,000
Machinery, except electrical.....	63,400	32,900	23,200	200	7,100
Engines and turbines.....	3,700	2,200	1,300	(1)	200
Office, computing, and accounting machines.....	11,200	2,600	6,800	(1)	1,800
Farm machinery and equipment.....	6,000	2,600	2,600	(1)	800
Other machinery.....	42,500	25,500	12,500	100	4,300
Electrical equipment and supplies.....	84,900	26,200	46,500	200	11,900
Electric distribution equipment and industrial apparatus	20,500	9,100	9,400	100	1,800
Household appliances.....	2,700	1,200	1,000	(1)	500
Communication equipment.....	34,000	8,600	20,300	(1)	5,100
Electric lighting and wiring equipment.....	2,400	1,200	900	(1)	300
Electronic components and accessories.....	14,200	2,800	8,700	(1)	2,800
Radio and television receiving sets.....	7,100	2,300	4,000	(1)	800
Miscellaneous electrical equipment and supplies.....	4,100	1,000	2,300	(1)	700

See footnote at end of table.

Table A-23. Technicians, by occupational group and industry, January 1962--Continued

Industry	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural and biological technicians	Unclassified technicians
	Number				
Transportation equipment.....	57,800	20,600	30,000	400	6,900
Motor vehicles and equipment.....	15,900	7,400	5,800	200	2,500
Aircraft and parts.....	36,300	9,500	23,000	200	3,500
Other transportation equipment.....	5,600	3,600	1,100	(1)	900
Instruments and related products.....	21,300	6,700	10,600	300	3,700
Engineering and scientific instruments.....	8,400	2,500	4,800	(1)	1,000
Other instruments and related products.....	12,900	4,200	5,800	300	2,600
Other manufacturing industries.....	7,200	3,700	2,400	100	1,000
Nonmanufacturing.....	205,500	86,400	69,100	5,500	44,500
Mining.....	10,100	2,900	6,100	(1)	1,000
Crude petroleum and natural gas.....	7,100	2,100	4,600	(1)	300
Metal mining.....	1,100	200	700	(1)	200
Coal mining.....	1,200	300	500	(1)	400
Quarrying and nonmetallic mining.....	700	300	300	(1)	100
Contract construction.....	24,600	15,000	3,900	(1)	5,600
Transportation and public utilities.....	44,300	9,100	22,400	100	12,700
Railroad transportation.....	3,700	1,400	1,600	(1)	600
Other transportation.....	3,000	700	500	(1)	1,800
Communication.....	21,200	600	12,800	(1)	7,800
Electric, gas, and sanitary services.....	16,400	6,400	7,500	100	2,400
Wholesale and retail trade.....	18,900	4,400	5,100	(1)	9,400
Finance, insurance, and real estate.....	2,100	100	600	100	1,300
Services.....	103,800	54,900	30,900	3,900	14,100
Commercial laboratories; business and management consulting services.....	36,100	12,600	15,900	900	6,600
Medical and dental laboratories.....	4,100	(1)	(1)	2,900	1,200
Engineering and architectural services.....	60,000	42,200	14,700	100	3,000
Other services.....	3,500	100	300	(1)	3,200
Agricultural services, forestry, and fisheries.....	1,700	(1)	(1)	1,200	500

1/ Less than 50 cases.

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-24. Percent distribution of technicians, by occupational group and industry, January 1962

Industry	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural, and biological technicians	Unclassified technicians
	Percent distribution				
All industries.....	100.0	100.0	100.0	100.0	100.0
Manufacturing.....	64.9	59.4	72.9	67.4	55.9
Ordnance and accessories.....	2.4	2.1	3.2	.6	1.2
Food and kindred products.....	2.4	.5	1.5	26.9	4.2
Textile mill products.....	.6	.1	1.1	(1)	.8
Lumber and wood products, except furniture.....	.3	.4	.3	(1)	.1
Paper and allied products.....	1.0	.7	1.0	(1)	1.7
Chemicals and allied products.....	7.4	1.6	10.2	30.8	8.7
Industrial chemicals.....	3.6	1.0	5.8	10.2	2.2
Plastics and synthetics, except glass.....	.9	.2	1.2	(1)	1.8
Drugs.....	.9	.1	.4	19.0	1.0
Agricultural chemicals.....	.2	(1)	(2)	.5	.8
Other chemical products.....	1.8	.3	2.7	.9	3.0
Petroleum refining.....	1.6	1.1	2.3	.4	1.2
Rubber and miscellaneous plastics products.....	.8	.6	1.0	(1)	.8
Stone, clay, and glass products.....	.8	.5	1.2	(1)	.6
Primary metal industries.....	3.2	2.2	4.2	1.2	3.3
Blast furnace and basic steel products.....	2.1	1.5	2.5	.4	2.5
Other primary metal industries.....	1.1	.7	1.7	.8	.8
Fabricated metal products.....	4.2	7.1	2.6	.3	2.9
Machinery, except electrical.....	10.8	15.5	9.1	.9	7.1
Engines and turbines.....	.6	1.0	.5	(1)	.2
Office, computing, and accounting machines.....	1.9	1.2	2.7	(1)	1.8
Farm machinery and equipment.....	1.0	1.2	1.0	(1)	.8
Other machinery.....	7.3	12.0	4.9	.8	4.3
Electrical equipment and supplies.....	14.5	12.3	18.3	1.1	11.8
Electric distribution equipment and industrial apparatus	3.5	4.3	3.7	.8	1.8
Household appliances.....	.5	.6	.4	(1)	.5
Communication equipment.....	5.8	4.0	8.0	(1)	5.0
Electric lighting and wiring equipment.....	.4	.6	.3	(1)	.3
Electronic components and accessories.....	2.4	1.3	3.4	(1)	2.7
Radio and television receiving sets.....	1.2	1.1	1.6	(1)	.8
Miscellaneous electrical equipment and supplies.....	.7	.5	.9	(1)	.7

See footnotes at end of table.

Table A-24. Percent distribution of technicians, by occupational group and industry, January 1962 -- Continued

Industry	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural, and biological technicians	Unclassified technicians
	Percent distribution				
Transportation equipment.....	9.9	9.7	11.8	2.5	6.8
Motor vehicles and equipment.....	2.7	3.5	2.3	1.1	2.4
Aircraft and parts.....	6.2	4.5	9.0	1.3	3.5
Other transportation equipment.....	1.0	1.7	.4	(1)	.9
Instruments and related products.....	3.6	3.2	4.2	1.7	3.6
Engineering and scientific instruments.....	1.4	1.2	1.9	(1)	1.0
Other instruments and related products.....	2.2	2.0	2.3	1.7	2.6
Other manufacturing industries.....	1.2	1.7	.9	.5	1.0
Nonmanufacturing.....	35.1	40.6	27.1	32.6	44.1
Mining.....	1.7	1.4	2.4	(1)	1.0
Crude petroleum and natural gas.....	1.2	1.0	1.8	(1)	.3
Metal mining.....	.2	.1	.3	(1)	.2
Coal mining.....	.2	.1	.2	(1)	.4
Quarrying and nonmetallic mining.....	.1	.1	.1	(1)	.1
Contract construction.....	4.2	7.1	1.5	(1)	5.6
Transportation and public utilities.....	7.6	4.3	8.8	.8	12.6
Railroad transportation.....	.6	.7	.6	(1)	.6
Other transportation.....	.5	.3	.2	(1)	1.7
Communication.....	3.6	.3	5.0	(1)	7.8
Electric, gas, and sanitary services.....	2.8	3.0	3.0	.5	2.4
Wholesale and retail trade.....	3.2	2.1	2.0	(1)	9.3
Finance, insurance, and real estate.....	.4	(2)	.2	.8	1.2
Services.....	17.7	25.8	12.1	23.2	14.0
Commercial laboratories; business and management consulting services.....	6.2	5.9	6.3	5.5	6.6
Medical and dental laboratories.....	.7	(1)	(1)	17.2	1.2
Engineering and architectural services.....	10.3	19.8	5.8	.5	3.0
Other services.....	.6	(2)	.1	(1)	3.2
Agricultural services, forestry, and fisheries.....	.3	(1)	(1)	7.4	.5

1/ Less than 50 cases; percentage not computed.

2/ Less than .05 percent.

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-25. Technicians, by occupational group and size of establishment, January 1962

Size of establishment	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural, and biological technicians	Unclassified technicians
	Number				
Total.....	585,100	212,600	254,600	16,900	100,900
Under 100 employees.....	150,000	71,200	42,500	7,400	28,800
100 - 499 employees.....	115,200	44,900	45,000	3,400	21,900
500 - 999 employees.....	61,500	20,800	25,400	800	14,500
1,000 employees or more.....	258,500	75,800	141,700	5,300	35,700

NOTE.--Totals have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-26. Percent distribution of technicians, by occupational group and size of establishment, January 1962

Size of establishment	Technicians, all specialties	Draftsmen	Engineering and physical science technicians	Medical, agricultural, and biological technicians	Unclassified technicians
	Percent distribution				
Total.....	100.0	100.0	100.0	100.0	100.0
Under 100 employees.....	25.6	33.5	16.7	44.0	28.6
100 - 499 employees.....	19.7	21.1	17.7	20.1	21.7
500 - 999 employees.....	10.5	9.8	10.0	4.5	14.4
1,000 employees or more.....	44.2	35.6	55.6	31.4	35.3

NOTE.--Percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-27. Scientists and engineers, technicians, and ratio of technicians to scientists and engineers, by industry, January 1962

Industry	All scientists and engineers	All technicians	Average number of technicians per 100 scientists and engineers
All industries.....	851,600	585,100	68.7
Manufacturing.....	613,600	379,500	61.9
Ordnance and accessories.....	39,500	14,100	35.6
Food and kindred products.....	22,200	13,900	62.5
Textile mill products.....	7,000	3,700	53.3
Lumber and wood products, except furniture.....	1,600	1,900	114.4
Paper and allied products.....	11,700	5,700	48.8
Chemicals and allied products.....	95,500	43,400	45.5
Industrial chemicals.....	45,900	20,800	45.3
Plastics and synthetics, except glass.....	8,200	5,400	66.0
Drugs.....	21,600	5,400	25.2
Agricultural chemicals.....	2,200	1,000	44.5
Other chemical products.....	17,600	10,800	61.3
Petroleum refining.....	20,900	9,400	44.7
Rubber and miscellaneous plastics products.....	7,700	4,700	61.4
Stone, clay, and glass products.....	9,100	4,700	52.2
Primary metal industries.....	32,000	18,900	59.0
Blast furnace and basic steel products.....	20,200	12,200	60.3
Other primary metal industries.....	11,800	6,700	56.7
Fabricated metal products.....	25,100	24,600	98.0
Machinery, except electrical.....	69,200	63,400	91.6
Engines and turbines.....	3,900	3,700	95.6
Office, computing, and accounting machines.....	14,400	11,200	77.8
Farm machinery and equipment.....	7,400	6,000	81.3
Other machinery.....	43,600	42,500	97.6
Electrical equipment and supplies.....	123,200	84,900	68.9
Electric distribution equipment and industrial apparatus	25,300	20,500	80.9
Household appliances.....	3,700	2,700	72.8
Communication equipment.....	55,400	34,000	61.3
Electric lighting and wiring equipment.....	4,200	2,400	56.7
Electronic components and accessories.....	18,700	14,200	76.1
Radio and television receiving sets.....	10,800	7,100	65.8
Miscellaneous electrical equipment and supplies.....	5,100	4,100	79.6

Table A-27. Scientists and engineers, technicians, and ratio of technicians to scientists, and engineers, by industry, January 1962 -- Continued

Industry	All scientists and engineers	All technicians	Average number of technicians per 100 scientists and engineers
Transportation equipment.....	110,400	57,800	52.4
Motor vehicles and equipment.....	22,200	15,900	71.3
Aircraft and parts.....	83,000	36,300	43.8
Other transportation equipment.....	5,100	5,600	109.9
Instruments and related products.....	30,200	21,300	70.5
Engineering and scientific instruments.....	11,500	8,400	72.9
Other instruments and related products.....	18,800	12,900	69.0
Other manufacturing industries.....	8,300	7,200	86.3
Nonmanufacturing.....	238,000	205,500	86.4
Mining.....	24,600	10,100	41.2
Crude petroleum and natural gas.....	16,400	7,100	43.4
Metal mining.....	3,400	1,100	34.2
Coal mining.....	3,100	1,200	39.4
Quarrying and nonmetallic mining.....	1,800	700	37.4
Contract construction.....	41,000	24,600	59.9
Transportation and public utilities.....	49,200	44,300	90.0
Railroad transportation.....	5,300	3,700	69.8
Other transportation.....	4,200	3,000	71.1
Communication.....	13,700	21,200	154.2
Electric, gas, and sanitary services.....	26,000	16,400	63.2
Wholesale and retail trade.....	31,200	18,900	60.5
Finance, insurance, and real estate.....	4,500	2,100	47.4
Services.....	86,500	103,800	120.0
Commercial laboratories; business and management consulting services.....	34,100	36,100	105.9
Medical and dental laboratories.....	700	4,100	580.3
Engineering and architectural services.....	49,800	60,000	120.4
Other services.....	1,800	3,500	191.9
Agricultural services, forestry, and fisheries.....	1,000	1,700	181.3

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-28. Scientists and engineers, and technicians, primarily engaged in research and development, and ratio of R&D technicians to R&D scientists and engineers, by industry, January 1962

Industry	Number primarily engaged in research and development		
	Scientists and engineers ^{1/}	Technicians	R&D technicians per 100 R&D scientists and engineers
All industries.....	303,800	151,000	49.7
Manufacturing.....	265,900	127,000	47.8
Ordnance and accessories.....	19,800	4,500	22.6
Food and kindred products.....	8,000	3,200	39.9
Textile mill products.....	3,600	1,900	53.1
Lumber and wood products, except furniture.....	300	(2)	(2)
Paper and allied products.....	2,700	1,100	42.2
Chemicals and allied products.....	39,700	17,500	44.2
Industrial chemicals.....	17,400	7,800	45.2
Plastics and synthetics, except glass.....	3,700	2,100	57.9
Drugs.....	8,600	2,900	34.0
Agricultural chemicals.....	700	100	9.3
Other chemical products.....	9,400	4,600	48.9
Petroleum refining.....	3,900	2,400	61.0
Rubber and miscellaneous plastics products.....	2,800	1,300	44.6
Stone, clay, and glass products.....	3,000	1,700	55.8
Primary metal industries.....	6,200	3,600	57.9
Blast furnace and basic steel products.....	3,900	1,700	45.0
Other primary metal industries.....	2,400	1,900	78.6
Fabricated metal products.....	6,200	3,700	59.5
Machinery, except electrical.....	26,600	16,500	62.3
Engines and turbines.....	1,500	1,000	61.7
Office, computing, and accounting machines.....	9,200	5,200	56.9
Farm machinery and equipment.....	3,000	1,600	54.3
Other machinery.....	12,800	8,700	68.1
Electrical equipment and supplies.....	64,800	36,500	56.4
Electric distribution equipment and industrial apparatus.....	10,800	6,700	61.8
Household appliances.....	1,800	1,100	63.6
Communication equipment.....	33,100	17,900	54.0
Electric lighting and wiring equipment.....	1,600	900	55.2
Electronic components and accessories.....	7,800	4,100	52.0
Radio and television receiving sets.....	7,800	4,100	53.1
Miscellaneous electrical equipment and supplies.....	2,000	1,800	91.1

See footnotes at end of table.

Table A-28. Scientists and engineers, and technicians, primarily engaged in research and development, and ratio of R&D technicians to R&D scientists and engineers, by industry, January 1962 -- Continued

Industry	Number primarily engaged in research and development		
	Scientists and engineers ^{1/}	Technicians	R&D technicians per 100 R&D scientists and engineers
Transportation equipment.....	60,300	22,900	38.0
Motor vehicles and equipment.....	8,900	6,900	77.1
Aircraft and parts.....	50,000	15,300	30.6
Other transportation equipment.....	1,400	800	54.2
Instruments and related products.....	15,100	8,000	53.2
Engineering and scientific instruments.....	6,600	3,100	47.5
Other instruments and related products.....	8,500	4,900	57.6
Other manufacturing industries.....	3,000	2,100	69.9
Nonmanufacturing.....	38,000	23,900	63.0
Mining.....	2,300	600	28.4
Crude petroleum and natural gas.....	1,400	200	13.0
Metal mining.....	300	200	57.9
Coal mining.....	200	200	103.2
Quarrying and nonmetallic mining.....	300	100	25.0
Contract construction.....	600	100	9.2
Transportation and public utilities.....	2,400	800	33.4
Railroad transportation.....	100	(2)	(2)
Other transportation.....	400	100	39.0
Communication.....	400	200	55.0
Electric, gas, and sanitary services.....	1,500	400	27.5
Wholesale and retail trade.....	2,800	1,400	52.3
Finance, insurance, and real estate.....	400	(2)	(2)
Services.....	29,500	21,000	71.0
Commercial laboratories; business and management consulting services.....	20,200	14,100	69.8
Medical and dental laboratories.....	100	100	59.4
Engineering and architectural services.....	9,200	6,800	73.8
Other services.....	(2)	(2)	(2)
Agricultural services, forestry, and fisheries.....	(2)	(2)	(2)

^{1/} Conducting or administering research and development.

^{2/} Less than 50 cases.

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-29. Technicians primarily engaged in research and development, by industry, January 1962

Industry	All technicians	R&D technicians	
		Number	Percent of all technicians
All industries.....	585,100	151,000	25.8
Manufacturing.....	379,500	127,000	33.5
Ordnance and accessories.....	14,100	4,500	31.9
Food and kindred products.....	13,900	3,200	23.0
Textile mill products.....	3,700	1,900	51.2
Lumber and wood products, except furniture.....	1,900	(1)	(1)
Paper and allied products.....	5,700	1,100	20.1
Chemicals and allied products.....	43,400	17,500	40.4
Industrial chemicals.....	20,800	7,800	37.8
Plastics and synthetics, except glass.....	5,400	2,100	39.0
Drugs.....	5,400	2,900	53.3
Agricultural chemicals.....	1,000	100	6.7
Other chemical products.....	10,800	4,600	42.6
Petroleum refining.....	9,400	2,400	25.6
Rubber and miscellaneous plastics products.....	4,700	1,300	26.8
Stone, clay, and glass products.....	4,700	1,700	34.8
Primary metal industries.....	18,900	3,600	19.2
Blast furnace and basic steel products.....	12,200	1,700	14.2
Other primary metal industries.....	6,700	1,900	28.1
Fabricated metal products.....	24,600	3,700	15.0
Machinery, except electrical.....	63,400	16,500	26.1
Engines and turbines.....	3,700	1,000	25.6
Office, computing and accounting machines.....	11,200	5,200	46.6
Farm machinery and equipment.....	6,000	1,600	26.9
Other machinery.....	42,500	8,700	20.6
Electrical equipment and supplies.....	84,900	36,500	43.1
Electric distribution equipment and industrial apparatus	20,500	6,700	32.5
Household appliances.....	2,700	1,100	42.5
Communication equipment.....	34,000	17,900	52.6
Electric lighting and wiring equipment.....	2,400	900	37.6
Electronic components and accessories.....	14,200	4,100	28.6
Radio and television receiving sets.....	7,100	4,100	57.9
Miscellaneous electrical equipment and supplies.....	4,100	1,800	44.6

See footnote at end of table.

Table A-29. Technicians primarily engaged in research and development, by industry, January 1962--Continued

Industry	All technicians	R&D technicians	
		Number	Percent of all technicians
Transportation equipment.....	57,800	22,900	39.6
Motor vehicles and equipment.....	15,900	6,900	43.4
Aircraft and parts.....	36,300	15,300	42.1
Other transportation equipment.....	5,600	800	13.3
Instruments and related products.....	21,300	8,000	37.6
Engineering and scientific instruments.....	8,400	3,100	37.3
Other instruments and related products.....	12,900	4,900	37.8
Other manufacturing industries.....	7,200	2,100	29.5
Nonmanufacturing.....	205,500	23,900	11.6
Mining.....	10,100	600	6.4
Crude petroleum and natural gas.....	7,100	200	2.0
Metal mining.....	1,100	200	16.0
Coal mining.....	1,200	200	15.8
Quarrying and nonmetallic mining.....	700	100	12.4
Contract construction.....	24,600	100	.2
Transportation and public utilities.....	44,300	800	1.8
Railroad transportation.....	3,700	(1)	(1)
Other transportation.....	3,000	100	4.6
Communication.....	21,200	200	1.0
Electric, gas, and sanitary services.....	16,400	400	2.5
Wholesale and retail trade.....	18,900	1,400	7.6
Finance, insurance, and real estate.....	2,100	(1)	(1)
Services.....	103,800	21,000	20.2
Commercial laboratories; business and management consulting services.....	36,100	14,100	39.0
Medical and dental laboratories.....	4,100	100	1.4
Engineering and architectural services.....	60,000	6,800	11.3
Other services.....	3,500	(1)	(1)
Agricultural services, forestry and fisheries.....	1,700	(1)	(1)

1/ Less than 50 cases; percentage not computed.

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-30. Technicians primarily engaged in research and development, by size of establishment, January 1962

Size of establishment	All technicians	R&D technicians	
		Number	Percent of all technicians
Total.....	585,100	151,000	25.8
Under 100 employees.....	150,000	16,100	10.7
100-499 employees.....	115,200	28,100	24.4
500-999 employees.....	61,500	16,600	27.0
1,000 employees or more.....	258,500	90,200	34.9

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-31. Scientists and engineers, by industry, January 1962, and percent change from January 1961

Industry	Number of scientists and engineers, January 1962	Percent change from January 1961 ^{1/}	Industry	Number of scientists and engineers, January 1962	Percent change from January 1961 ^{1/}
All industries.....	851,600	4.0	Transportation equipment.....	110,400	6.6
Manufacturing.....	613,600	4.8	Motor vehicles and equipment.....	22,200	2.9
Ordnance and accessories.....	39,500	6.9	Aircraft and parts.....	83,000	8.1
Food and kindred products.....	22,200	5.2	Other transportation equipment.....	5,100	-.3
Textile mill products.....	7,000	-5.0	Instruments and related products.....	30,200	5.6
Lumber and wood products, except furniture..	1,600	1.5	Engineering and scientific instruments..	11,500	3.6
Paper and allied products.....	11,700	3.0	Other instruments and related products..	18,800	7.2
Chemicals and allied products.....	95,500	2.6	Other manufacturing industries.....	8,300	6.7
Industrial chemicals.....	45,900	-.2	Nonmanufacturing.....	238,000	2.0
Plastics and synthetics, except glass.....	8,200	2.4	Mining.....	24,600	4.4
Drugs.....	21,600	5.1	Crude petroleum and natural gas.....	16,400	7.0
Agricultural chemicals.....	2,200	3.5	Metal mining.....	3,400	-2.4
Other chemical products.....	17,600	7.4	Coal mining.....	3,100	-3.8
Petroleum refining.....	20,900	-1.3	Quarrying and nonmetallic mining.....	1,800	11.2
Rubber and miscellaneous plastics products..	7,700	2.9	Contract construction.....	41,000	-.3
Stone, clay, and glass products.....	9,100	2.2	Transportation and public utilities.....	49,200	3.6
Primary metal industries.....	32,000	1.5	Railroad transportation.....	5,300	-.3
Blast furnace and basic steel products....	20,200	2.0	Other transportation.....	4,200	13.1
Other primary metal industries.....	11,800	.8	Communication.....	13,700	1.6
Fabricated metal products.....	25,100	8.4	Electric, gas, and sanitary services....	26,000	4.2
Machinery, except electrical.....	69,200	4.6	Wholesale and retail trade.....	31,200	-1.0
Engines and turbines.....	3,900	-.7	Finance, insurance, and real estate.....	4,500	10.6
Office, computing, and accounting machines	14,400	4.1	Services.....	86,500	2.2
Farm machinery and equipment.....	7,400	2.7	Commercial laboratories; business and	34,100	6.1
Other machinery.....	43,600	5.6	management consulting services.....	700	-1.1
Electrical equipment and supplies.....	123,200	6.3	Medical and dental laboratories.....	49,800	-2.2
Electric distribution equipment and	25,300	1.9	Engineering and architectural services..	1,800	109.5
industrial apparatus.....	3,700	7.9	Other services.....		
Household appliances.....	55,400	10.0	Agricultural services, forestry, and	1,000	21.5
Communication equipment.....	4,200	7.4	fisheries.....		
Electric lighting and wiring equipment....	18,700	5.5			
Electronic components and accessories....	10,800	-.7			
Radio and television receiving sets.....	5,100	8.4			
Miscellaneous electrical equipment and					
supplies.....					

^{1/} Increase, unless otherwise noted.

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

Table A-32. Technicians, by industry, January 1962, and percent change from January 1961

Industry	Number of technicians, January 1962	Percent change from January 1961 ^{1/}	Industry	Number of technicians, January 1962	Percent change from January 1961 ^{1/}
All industries.....	585,100	2.9	Transportation equipment.....	57,800	1.1
Manufacturing.....	379,500	4.5	Motor vehicles and equipment....	15,900	2.7
Ordnance and accessories.....	14,100	8.0	Aircraft and parts.....	36,300	1.3
Food and kindred products.....	13,900	5.0	Other transportation equipment..	5,600	-4.4
Textile mill products.....	3,700	9.3	Instruments and related products..	21,300	2.6
Lumber and wood products, except furniture.....	1,900	-1.4	Engineering and scientific instruments.....	8,400	1.5
Paper and allied products.....	5,700	5.1	Other instruments and related products.....	12,900	3.3
Chemicals and allied products.....	43,400	9.0	Other manufacturing industries....	7,200	5.1
Industrial chemicals.....	20,800	1.9	Nonmanufacturing.....	205,500	.2
Plastics and synthetics, except glass	5,400	22.0	Mining.....	10,100	11.9
Drugs.....	5,400	7.0	Crude petroleum and natural gas.	7,100	23.1
Agricultural chemicals.....	1,000	11.6	Metal mining.....	1,100	-9.0
Other chemical products.....	10,800	19.4	Coal mining.....	1,200	-9.1
Petroleum refining.....	9,400	4.5	Quarrying and nonmetallic mining	700	5.0
Rubber and miscellaneous plastics products.....	4,700	7.4	Contract construction.....	24,600	-7.4
Stone, clay, and glass products.....	4,700	3.7	Transportation and public utilities	44,300	-.2
Primary metal industries.....	18,900	2.6	Railroad transportation.....	3,700	-4.2
Blast furnace and basic steel products	12,200	5.3	Other transportation.....	3,000	-15.7
Other primary metal industries.....	6,700	-2.0	Communication.....	21,200	8.3
Fabricated metal products.....	24,600	1.3	Electric, gas, and sanitary services.....	16,400	-5.8
Machinery, except electrical.....	63,400	4.3	Wholesale and retail trade.....	18,900	-4.3
Engines and turbines.....	3,700	-1.6	Finance, insurance, and real estate	2,100	9.7
Office, computing, and accounting machines.....	11,200	2.6	Services.....	103,800	2.2
Farm machinery and equipment.....	6,000	5.7	Commercial laboratories; business and management consulting services ..	36,100	1.7
Other machinery.....	42,500	5.2	Medical and dental laboratories..	4,100	-11.0
Electrical equipment and supplies....	84,900	5.8	Engineering and architectural services.....	60,000	4.2
Electric distribution equipment and industrial apparatus.....	20,500	4.5	Other services.....	3,500	-7.9
Household appliances.....	2,700	1.7	Agricultural services, forestry, and fisheries.....	1,700	-7.5
Communication equipment.....	34,000	11.6			
Electric lighting and wiring equipment	2,400	6.8			
Electronic components and accessories	14,200	-3.6			
Radio and television receiving sets.	7,100	5.7			
Miscellaneous electrical equipment and supplies.....	4,100	3.9			

^{1/} Increase unless otherwise noted.

NOTE.--Totals and percents have been calculated on the basis of unrounded figures and therefore may not correspond exactly with those indicated by the rounded figures shown.

This appendix contains a brief discussion of background information necessary to the interpretation of the statistical findings--coverage and conduct of the survey, nature of the estimates, problems of definition and classification of data, and comparability of the 1962 survey with earlier surveys.¹ A technical discussion of the sampling scheme, estimating methods and problems, sampling variances, and related matters is contained in appendix C.

Coverage of the Survey

The basic sample of establishments included in the survey was drawn from lists, compiled for the first quarter of 1959, of establishments reporting to State employment security agencies for unemployment compensation purposes, supplemented by a list of interstate railroads and related companies. These combined lists included approximately 2,150,000 organizations with more than 39 million employees and represented the most comprehensive roster of establishments available in the United States. To sample more intensively the business organizations known to employ scientists

¹ The earlier reports were conducted for, and published by, the National Science Foundation. See Scientific and Technical Personnel in American Industry--Report on a 1959 Survey, NSF 60-62; Scientific and Technical Personnel in Industry, 1960, NSF 61-75; Scientific and Technical Personnel in Industry, 1961, NSF 63-32 (National Science Foundation).

and engineers, the sample was further supplemented by industrial research laboratories employing 50 or more scientists and engineers as of March 1960, and small business concerns employing 10 or more scientists and engineers as of June 1960.²

Certain categories of establishments were eliminated from the master list before the sample was selected, either because a separate survey of the given category was being sponsored by the National Science Foundation or because the number of scientific and technical personnel employed was believed to be negligible. The categories of organizations omitted were those classified according to the Standard Industrial Classification system³ in the following major industry groups: 01 and 02--farms; 80--medical and other health services (except 807, medical and dental laboratories, which was included); 82--educational services; 84--museums, art galleries, and botanical and zoological gardens; 86--nonprofit membership organizations; 88--private households; 89--miscellaneous services (except 891, engineering and architectural services, which was included); 91 through 94--government; and 99--nonclassifiable establishments.

² Sources: Industrial Research Laboratories of the United States, No. 844 (National Academy of Sciences, National Research Council); A List of Small Business Concerns Interested in Performing Research and Development, June 1960 U.S. Department of Commerce, Small Business Administration.

³ All industrial classification for this survey was in terms of the 1957 Standard Industrial Classification Manual. See Standard Industrial Classification Manual, 1957 and the Supplement to 1957 Edition, 1958, Executive Office of the President, Bureau of the Budget.

Establishments below a specified minimum size, determined separately for each major industry group, were also excluded from the listing. (See table B-1.) Because of the great numbers of establishments in the smallest size groups, very few of which employ any scientists or engineers, these minimum-size cutoffs were essential to the efficiency of the survey. Altogether, some 1.8 million establishments employing nearly 10.9 million workers were excluded from the original lists of establishments. The fragmentary evidence available suggests that the establishments thus excluded employed very few persons working as scientists, engineers, or technicians. Most of the excluded personnel were engineers or technicians employed in the construction industry, where a minimum-size cutoff of 10 employees was necessary because of the difficulty of sampling the extremely large number of small construction contractors, and the financial and other limitations affecting the survey. Since the unemployment insurance (UI) listing of establishments from which the sample was drawn was compiled as of March 1959, the survey also did not reach establishments created after that date.

As the result of all the exclusions described above, a sampling universe of about 350,000 establishments employing nearly 28.5 million workers remained. Before the survey sample was drawn, the universe listing was stratified by region, industry and size of establishment. Altogether, a sample of nearly 15,000 establishments was selected at random. The sampling ratio was varied in relation to size of establishment and other factors, so as to obtain maximum reliability at minimum cost. In every covered industry, all establishments with 1,000 employees or more were included in the sample. In other industry-size cells, the sampling ratios ranged from 1 in 1 to 1 in 100. In general, the larger the establishment and the greater the number of technical personnel used by the industry, the higher was the sampling ratio.

In addition to the UI sample discussed above, the supplemental establishments drawn from the lists of interstate railroads, industrial research laboratories, and small business concerns performing research and development were included with a weight of unity and added to their appropriate industry-size class, regardless of the sampling ratio used in the UI sample for that particular size class. If a supplemental establishment duplicated a UI sample unit, it was treated as a supplemental unit, with a weight of unity.

SCOPE AND METHOD

APPENDIX B

TABLE B-1. MINIMUM SIZE OF ESTABLISHMENTS COVERED BY 1962 SURVEY

Industry	SIC Code	Minimum size of establishment covered (number of employees)
Ordnance and accessories	19	1
Food and kindred products	20	10
Textile mill products	22	50
Lumber and wood products, except furniture	24	50
Paper and allied products	26	10
Chemicals and allied products		
Industrial chemicals	281	1
Plastics and synthetics, except glass	282	1
Drugs	283	1
Agricultural chemicals	287	1
Other chemical products	284, 285, 286, 289	1
Petroleum refining	291	1
Rubber and miscellaneous plastics products	30	10
Stone, clay, and glass products	32	10
Primary metal industries		
Blast furnace and basic metal industries ..	331, 332, 3391	1
Other primary metal industries	333, 334, 335, 336, 339 (except 3391)	1
Fabricated metal products	34	1
Machinery, except electrical		
Engines and turbines	351	1
Office, computing, and accounting machines	357	1
Farm machinery and equipment	352	1
Other machinery	353, 354, 355, 356, 358	1
Electrical equipment and supplies		
Electric distribution equipment and industrial apparatus	361, 362	1
Household appliances	363	1
Communication equipment	366	1
Electric lighting and wiring equipment	364	1
Electronic components and accessories ..	367	1
Radio and television receiving sets	365	1
Miscellaneous electrical equipment and supplies	369	1
Transportation equipment		
Motor vehicles and equipment	371	1

Industry	SIC Code	Minimum size of establishment covered (number of employees)
Aircraft and parts	372	1
Other transportation equipment	373, 374, 375, 379	1
Instruments and related products		
Engineering and scientific instruments	381	1
Other instruments and related products	382, 383, 384, 385, 386, 387	1
Other manufacturing industries		
Tobacco manufactures	21	10
Apparel and other finished products	23	10
Furniture and fixtures	25	50
Printing, publishing, and allied industries	27	10
Paving and roofing materials	295, 299	1
Leather and leather products	31	10
Miscellaneous manufacturing industries ..	39	10
Mining		
Metal mining	10	10
Coal mining	11, 12	10
Crude petroleum and natural gas	13	1
Quarrying and nonmetallic mining	14	10
Contract construction	15-17	10
Transportation and public utilities		
Railroad transportation	40	100
Communication	481, 483, 482, 489	1
Electric, gas, and sanitary services	49	1
Other transportation services	41-47	1
Wholesale and retail trade	50-59	50
Finance, insurance, and real estate	60-67	50
Services		
Commercial laboratories; business and management consulting services	739	1
Medical and dental laboratories ..	807	1
Engineering and architectural services	891	1
Other services	70-79 (except 739), 81	50
Agricultural services, forestry, and fisheries	07-09	50

Conduct of the Survey

The questionnaire for the survey was identical with that used in the 1961 survey, and substantially the same as that used in the 1959 and the 1960 surveys. Copies of the questionnaire and of the covering and followup letters sent to establishments are reproduced in appendix D.

The questionnaires were mailed to most establishments in the sample in late March and early April 1962. In most instances, questionnaires for the establishments in the sample were mailed to headquarters of the companies. Some of the largest establishments were visited in person to discuss special reporting problems. At least two, but in most cases three, followups were made of all nonrespondents, by mail or by telephone. About 13,400, or approximately 90 percent of those in the sample, supplied usable information.

Two different types of statistical findings were derived from the sample data. One type, designated as primary estimates, included the following items: Total employment, total scientists and engineers, and total technicians. The second type, called secondary estimates, was components of the primary estimates.

Primary estimates were obtained, for each industry-size cell, as a product of the known March 1959 employment for the cell universe and the ratio of the sample total of the primary item to the sample total of March 1959 employment. Prior to the calculation of these estimates, imputations were made for categories of item nonrespondents, with the aid of related information from the schedule. Industry and other totals were obtained by summing appropriate cell totals.

The secondary estimates were obtained by computing for each cell a ratio of the given component item to the corresponding primary item, using information only for those establishments supplying data on both items. The secondary estimate was then derived by multiplying the ratio by the cell estimate of the related primary item.

Sampling errors were computed for estimates based on establishments with employment of less than 1,000. In addition, "sampling" errors were calculated for industry-size classes composed of establishments with 1,000 employees or more in which some of the establishments were nonrespondents. Since imputations were based on the characteristics exhibited by the respondents, such "sampling" errors could be meaningfully derived under the assumption that

nonresponse will vary in its incidence from sample to sample. Additionally, as in all surveys, it should be kept in mind that the data are subject to errors in reporting, in editing, and in tabulating. The number of such errors has been reduced insofar as possible by checking procedures and through correspondence with a number of establishments whose reports were internally inconsistent or appeared to involve misinterpretations.

Since all figures in this report are estimated from a sample, the reader is cautioned not to attribute material significance to the exact numerical value of any estimate. Rounded figures are presented throughout the report to emphasize this point. Generally speaking, the estimates with the largest numerical values have associated with them the smallest percentages of probable error.

Definitions

The definitions used in this survey, like other parts of the questionnaire, were identical with those used in the 1961 survey. These definitions have been developed in consultation with industry representatives and others have expert knowledge of the field. The aim was to describe clearly the desired information and also to conform,

insofar as possible, with customary personnel accounting practices. It was recognized, however, that wide differences in establishment organization and in personnel records among industries, and among establishments in the same industry, would make inevitable some variation in interpretation and application of the definitions. It was primarily for this reason that the questionnaire states: "Reasonable estimates will be satisfactory."

The definition of the term "technician" was especially subject to variation in response. There is as yet no general agreement as to the meaning of this term, which covers positions with a variety of job titles differing among establishments. Consequently, the categories of personnel included in the figures reported on this item probably varied somewhat among respondents in the current survey, and between the current survey and earlier ones.

A definition of the desired reporting unit was also provided. This definition was based by necessity on that used by the UI agencies in the listing of establishments from which the sample was drawn.⁴ Separate information was requested for each establishment. Since it was known that some multiestablishment companies might find it difficult to supply

⁴It should be noted that UI reporting procedures permit establishment reports for units that may be statewide or countywide in scope or less than plantwide (e.g., all of a corporation's insurance agents in a given State cited as a separate establishment).

the requested figures for each separate establishment, it was stated on the questionnaire that data might, if necessary, be submitted on a consolidated basis. The alternative procedure was followed by about 200 companies with about 900 establishments. It also was noted on the questionnaire that multi-industry companies might report along corporate industrial division lines or on other comparable basis. This method is generally preferable to a single consolidated company report, from an industry survey viewpoint; only a few companies chose the latter alternative.

Classification of Data

The industrial classification of the establishments in this survey were, in general, those assigned by the State employment security agencies, which developed the list from which the sample was drawn.⁵ The industry categories used were those of the 1957 Standard Industrial Classification System. The industry of each establishment was determined by the State agency on the basis of principal product or activity.

The industry code assigned to an establishment was changed in relatively few cases. Where a consolidated return was received, all the data for the return were classified in the industry in which the largest proportion of the employment shown on the consolidated return fell.

⁵The industry classification of the group of supplemental establishments was assigned by the Bureau of Labor Statistics, U. S. Department of Labor.

The size categories in the survey were based on total establishment employment as of March 1959. Since the sample was drawn from a listing of establishments compiled as of March 1959 and stratified on the basis of establishment employment as of that date, use of these employment figures as the basis for classification of data in the report greatly simplified the tabulations.

Comparability With Previous Surveys

Several changes which affect comparability of data have occurred since the initial survey of scientific and technical personnel was made in 1959. However, the last two surveys--1961 and 1962--are directly comparable insofar as it is possible to control a sample survey. The same sample of establishments was used, identical questionnaires and definitions were employed, and usable response to both surveys was about the same (90 percent). Certain factors which cannot be readily controlled however, affect comparability. For example, even though the response rate to both surveys was about the same, the responding establishments--particularly those in the small-size cells where the sampling ratio is the greatest--were not necessarily the same for both years. Also reports from establishments responding to both surveys sometimes indicated a change in the interpretation of definitions. Except for items where very small numbers are involved, these variations in response are believed to have had little effect upon the comparability of the data. (See appendix C for a discussion of sampling and response errors.)

The surveys conducted prior to 1961 are not completely comparable for a number of technical reasons which may affect the overall estimates of scientific and technical employment and, to a much greater extent, the estimates of different industries and sizes of companies. Before 1961, the survey was based on a sample of companies rather than on a sample of establishments. The change to an establishment reporting system was made primarily to get estimates of scientific and technical employment that are more accurately classified by industry. The value of the company-sample surveys in regard to industry estimates was limited, as was noted in the pre-1961 reports, because all employment of a given company was classified in the single industry with which the company was primarily associated. For multiple-industry companies, of which there are many, an unknown proportion of scientific and technical personnel were thus classified in industries in which they were not working. By changing to an establishment reporting system, an important limitation on the value of the data has been minimized.⁶

The change to establishment reporting may affect comparability with past surveys in other ways. The objective of these surveys is to estimate the number of persons working as scientific or technical personnel, regardless of how they became qualified for their positions. Similarly, persons with scientific or technical training whose positions do not require the use of such training were not to be included in the reports. Establishment offices are closer than headquarters offices to the individuals for whom employment data are requested and, hence, are likely to be able to report with greater accuracy the occupations and functions in which these persons were actually working. More specifically to

⁶Although multiple-industry establishments do exist, such cases present much less serious classification problems than do multiple-industry companies, chiefly because such establishments rarely involve more than a few different industries.

the present problem, establishment offices are better able to distinguish among individuals with the same or similar position titles, according to whether or not they are actually working as engineers, scientists, or technicians.

The questionnaire has also undergone major changes since the initial survey was conducted. The 1953-54 and 1956 surveys emphasized questions relating to R&D costs. Companies without R&D were requested to supply only a few overall figures on their scientific and technical staffs. Beginning with the 1959 survey, a fairly detailed two-way breakdown of scientific and technical personnel by occupational group and function was introduced. This two-way breakdown remained unchanged for the 1960 survey. But in the 1961 survey, and again in 1962, the questionnaire requested separate data on employment of scientists and engineers, by occupational group, in the "technical sales and service" function. In the earlier surveys, respondents were instructed to include such personnel in the miscellaneous functional group of "all other activities." However, the relationship between the "all other activities" category and the "technical sales and service" category initiated in 1961 casts doubt on the thesis that all technical sales and service personnel were previously classified in "all other activities." Analysis of the data suggests, though not conclusively, that the similarity of some technical service activities to research and development led, in the previous surveys, to some reporting of technical service personnel as research and development personnel.

General Sampling Scheme

The design of the basic sample was that of a stratified random sample of establishments drawn from individual industry-size classes. The universe was that of establishments reporting to each of the 50 State employment security agencies for unemployment insurance (UI) purposes, for the first calendar quarter of 1959, and supplemented by a list of interstate railroads and related companies as supplied by the Interstate Commerce Commission. Industry classification of establishments was based on information available to the State agencies. Size classification generally was determined by mid-March 1959 employment.

Sample numbers were allocated among the various strata in accordance with the principle of optimum allocation, taking into account the expected response rates by industry and by size. The overall sample size was determined so that the 95-percent tolerance band (two relative standard errors) for the estimate of the total number of scientists and engineers for all industries combined would be about 3 percent. Reciprocals of the initially determined sampling ratios were rounded to the nearest one of the following values: 1, 2, 5, 10, 20, 50, and 100. Sampling ratios varied from certainty for all establishments with 1,000 employees or more to a low of 1 in 100 for small establishments in industries having relatively few scientists and engineers. All selections were made randomly within the designated strata.

A more intensive sample of establishments known to employ scientists and engineers was drawn from a list of industrial research laboratories compiled by the National Academy of Sciences--National Research Council and from a list of small business concerns interested in performing research and development compiled by the Small Business Administration. The sample consisted of all industrial research laboratories employing 50 scientists and engineers or more as of March 1960, and all small business concerns with 10 scientists and engineers or more as of June 1960.

The selection of the sample from the State UI lists yielded about 15,000 establishments with March 1959 employment of approximately 10 million workers, or about 26 percent of all private, nonagricultural employment covered by State unemployment insurance. The augmented sample of industrial research laboratories and small business concerns contained about 750 establishments.

The survey was planned primarily as a mail survey with followups by mail, telephone, and personal contact as necessary. Experience with earlier surveys had indicated that the response to the mail questionnaire would be very high and that bias, if any, among the nonrespondents would be slight.

Estimating Methods and Problems

Estimating Methods

Two kinds of estimates were derived from the survey--primary and secondary estimates. These are described below.

The symbols used in the estimating equations are as follows:

- N = total number of establishments.
- N_1 = total number of establishments on the certainty list, of which N_{1t} give information on a primary item of estimate and N_{1c} give information on both primary and secondary items of estimate.
- B = employment benchmark (total employment in the UI March 1959 universe).
- b_i = March 1959 UI employment for the i-th sample establishment from the UI listing.
- t_{1i} = primary item of estimate for the i-th establishment on the certainty list.
- t_{2i} = primary item of estimate, either reported or imputed, for the i-th establishment in the probability sample but not on the certainty list.
- c_{1i} = secondary item of estimate for the i-th establishment on the certainty list.
- c_{2i} = secondary item of estimate for the i-th establishment in the probability sample but not on the certainty list.
- n = number of establishments in the designed probability sample from the UI listing of which n_2 are not also on the certainty list.
- n_t = number of establishments in the probability sample responding on the primary item; n_{2t} is the number not found to be on the certainty list.
- n_c = number of establishments in the probability sample responding on both the primary and the secondary items; n_{2c} is the number not found to be on the certainty list.
- n_{2s} = number of establishments in the probability sample but not found to be on the certainty list, reported or imputed to have a primary item of estimate.

Since all primary and secondary estimates, and their variances, are calculated separately for each industry-size stratum, no notation is introduced to represent industry or size in the formulas.

A primary estimate, such as total number of scientists and engineers, January 1961, is a ratio estimate as follows:

$$T' = \sum_i \frac{N_{1t}}{t_{1i}} + B \frac{\sum_i t_{2i}}{\sum_i b_i} = T'_1 + T'_2$$

A secondary estimate is either a component of, or closely related to, a primary item. It is estimated as follows:

$$C' = T'_1 \frac{\sum_i c_{1i}}{N_{1c}} + T'_2 \frac{\sum_i c_{2i}}{n_{2c}}$$

where the summations in the numerators and denominators are for those sample establishments reporting both the specific primary and secondary items on the schedule.

Estimates of totals by industry and for all industries combined are obtained by summation of the relevant stratum estimates.

Deaths, Mergers, and Consolidations

Many special adjustments were made in establishment returns in the survey because of changes in company structure. Establishments whose schedules were returned with such notations as "out of business" or "moved,

no forwarding address," were checked for more current information on name and address. In a few cases, new names and addresses were found for firms still in business and schedules were sent to them. Other establishments which were definitely determined to be out of business as of January 1962 were classified as business deaths.

Special editing procedures were devised for business mergers and for establishments sold to other firms. Such establishments which were determined to have lost their separate identities by January 1962 were classified as out-of-business cases.

Consolidations presented a problem arising from the survey itself, rather than from changes in business organization. Since the sample of establishments was drawn from unemployment insurance master files of establishments with separate employer identification numbers, it was intended that reporting units in the survey have the same identities. However, some companies were not able to prepare separate reports for each establishment in their organization, but submitted consolidated returns covering two sample units or more. Companies returning such consolidated schedules were asked to list the names of all establishments covered by the return. To maintain an unbiased estimation procedure, benchmark employment (March 1959) totals were adjusted for all cells in which there were establishments whose data were included on consolidated returns. On the basis of information furnished with or on the consolidated return, a parent establishment was designated for each such report. Data on the consolidated return were included in the industry-size class of the parent report.

Benchmark employment for every other establishment covered by the consolidated report (whether or not it was in the sample) was removed from its corresponding cell with the weight (reciprocal of the sampling ratio) of the cell of the parent establishment, and added to the benchmark employment of the parent cell with the same weight. In other words, the probability of selection of each establishment was replaced by the probability of selecting the parent. For those consolidated in the original sample, individual establishment items were edited to zero.

Sampling Variances

The sampling accuracy of a large proportion of the primary and secondary estimates was determined. The symbols used earlier in this appendix are also used in the variance formulas given below. Additional symbols are defined as necessary.

The variance of level of a primary amount, such as the number of scientists and engineers, for a given industry size stratum is approximately:

$$\sigma_{T'}^2 = \frac{N - n_t}{Nn_t} (T'_2)^2 (V_t^2 + V_b^2 - 2V_{tb})$$

where V_t^2 and V_b^2 are rel-variances, and V_{tb} is the rel-covariance, and are defined as follows:

$$V^2 = \frac{\sigma_t^2}{\bar{t}^2} = \frac{1}{n_t - 1} \frac{\left[\sum_i^{n_t} t_i^2 - n_t \bar{t}^2 \right]}{\bar{t}^2} \quad \text{with } \bar{t} = \frac{1}{n_t} \sum_i t_i$$

The summation is over the entire stratum including establishments in the certainty list which were selected also in the UI sample, and t_i is number of scientists and engineers reported by an establishment, if it is not also on the certainty list. If the establishment is also on the certainty list, $t_i=0$ regardless of the number of scientists and engineers reported. V_b^2 is expressed in similar fashion with b_i equal to March 1959 UI employment for each sample establishment without regard to whether it is on the certainty list. The rel-covariance is

$$V_{tb} = \frac{\sigma_{tb}}{\bar{t} \bar{b}} = \frac{1}{n_t - 1} \frac{\left[\sum_i^{n_t} t_i b_i - n_t \bar{t} \bar{b} \right]}{\bar{t} \bar{b}}$$

The variance of a secondary item, such as the number of scientists and engineers in research and development for a given industry-size stratum, is approximated by:

$$\sigma_{C'}^2 = \frac{N - n_c}{N n_c} (C'_2)^2 (V_c^2 + V_b^2 - 2V_{cb})$$

with the rel-variances and rel-covariance defined in a similar way, to the corresponding terms in the variance for primary estimates.

The relative standard errors are defined as follows for a primary estimate:

$$e_{T'} = \frac{\sigma_{T'}}{T'}$$

Analogous expressions hold for the other estimates.

In general, the relative errors are larger for the smaller size classes. As a rule, they are larger for smaller aggregates. In addition, it is likely that the net effect of response errors is larger for the smaller aggregates. Hence, smaller and more detailed figures should be used with caution.

- **QUESTIONNAIRE**
- **OCCUPATIONAL DEFINITIONS**
- **COVERING LETTERS**

QUESTIONNAIRE

APPENDIX D

B.L.S. No. 2716-A

Budget Bureau No. 44-R1157.1.
Approval expires December 31, 1962.

A Survey of

SCIENTIFIC AND TECHNICAL PERSONNEL IN INDUSTRY: 1962

Your reply will be held in STRICT CONFIDENCE

Conducted by the
U.S. DEPARTMENT OF LABOR
Bureau of Labor Statistics

Information supplied on this form will be seen only by sworn employees of the Bureau of Labor Statistics. Only statistical summaries that preserve the confidentiality of the data supplied will be released.

PLEASE NOTE—If you employ any scientists, engineers, or technicians, please complete the entire questionnaire, supplying as much information as possible. If you do not employ any scientists, engineers, or technicians, answer only item 1 below.

Reasonable estimates will be satisfactory. Please enter "0" where appropriate, or "not available," if such is the case, rather than leave a question unanswered. Data should apply, if possible, to the pay period ending nearest January 15.

If extra copies of the questionnaire would be helpful, they may be obtained on request.

Mail completed questionnaire to:

COMMISSIONER OF LABOR STATISTICS
U.S. DEPARTMENT OF LABOR
Washington 25, D.C.

IDENTIFICATION OF REPORTING UNIT

Your reply to this questionnaire should be restricted, if possible, to the unit identified at left. Since this survey is based on a sample of units, multi-unit companies may receive more than one questionnaire. If it is not feasible to supply separate figures for each unit, please follow one of the alternatives described in the definition of reporting unit on page 3. In any case, describe the coverage of the report by completing item 7, page 3.

(Change address if incorrect)

TERMS IN HEAVY CAPITALS ARE DEFINED ON PAGES 3 AND 4

	January 1962	January 1961
1. A. Total employment: Enter the total number of persons on the payroll(s) of the REPORTING UNIT (include both full- and part-time employees)		
b. SCIENTISTS and ENGINEERS: Enter the total number of persons included in 1A above who were working as SCIENTISTS or ENGINEERS		
c. TECHNICIANS: Enter the total number of persons included in 1A above who were working as TECHNICIANS		
d. All other employees (1A minus 1b and 1c)		

1. A. Total employment: Enter the total number of persons on the payroll(s) of the REPORTING UNIT (include both full- and part-time employees)
- b. SCIENTISTS and ENGINEERS: Enter the total number of persons included in 1A above who were working as SCIENTISTS or ENGINEERS
- c. TECHNICIANS: Enter the total number of persons included in 1A above who were working as TECHNICIANS
- d. All other employees (1A minus 1b and 1c)

IF YOU EMPLOY ANY SCIENTISTS, ENGINEERS, or TECHNICIANS (entries in 1b or 1c), PLEASE COMPLETE ENTIRE FORM. COMPLETE ONLY THIS PAGE IF ANSWERS TO BOTH 1b and 1c ARE ZERO.

Name and title of person to be addressed if questions arise concerning this report:

Address

TERMS PRINTED IN HEAVY CAPITALS ARE DEFINED. PLEASE READ DEFINITIONS CAREFULLY

2. Please enter below in column (1), line A the total number of persons on the payroll(s) of the REPORTING UNIT working as SCIENTISTS and ENGINEERS in January 1962. This should be the same as the entry for January 1962 in question 1b on page 1. In the remaining columns and lines enter the number of those scientists and engineers engaged in the occupations and functions shown in which they spent the greatest proportion of their time. Count each individual only once. Please examine the sample on page 6 before answering this question. If you cannot supply all the detail requested, enter as much information as you can.

OCCUPATION (Personnel working in borderline specializations, such as biochemistry, should be classified in the listed occupations with which their work is most closely identified.)	TOTAL EMPLOYED IN ALL FUNCTIONS (1)	PRIMARY FUNCTION—JANUARY 1962 (Classify individuals according to the function occupying the greatest proportion of their time.)				
		Performance of RESEARCH-DEVELOPMENT (2)	MANAGEMENT AND ADMINISTRATION of RESEARCH-DEVELOPMENT (3)	MANAGEMENT AND ADMINISTRATION of activities other than research-development (4)	TECHNICAL SALES AND SERVICE (5)	PRODUCTION AND OPERATIONS (6)
A. Total SCIENTISTS and ENGINEERS						
b. ENGINEERS (all types)						
c. Chemists						
d. Physicists						
e. Metallurgists						
f. Geologists and geophysicists						
g. MATHEMATICIANS						
h. MEDICAL SCIENTISTS (Exclude practitioners)						
i. AGRICULTURAL SCIENTISTS						
j. BIOLOGICAL SCIENTISTS						
k. Other SCIENTISTS (Please specify):						

3. Approximately how many of the SCIENTISTS and ENGINEERS performing or administering RESEARCH-DEVELOPMENT in January 1962 (sum of columns (2) and (3) above) spent the greatest proportion of their time working on BASIC RESEARCH?

TERMS PRINTED IN HEAVY CAPITALS ARE DEFINED. PLEASE READ DEFINITIONS CAREFULLY

4. Of the total **SCIENTISTS** and **ENGINEERS** entered in column (1), line A of item 2, please give number employed full time in the performance of **RESEARCH-DEVELOPMENT** and in the **MANAGEMENT AND ADMINISTRATION OF RESEARCH-DEVELOPMENT** plus **FULL-TIME EQUIVALENT** of those working part time in these activities. (Include all time spent in these activities regardless of primary function category in which individuals were placed in item 2.)

Note.—If the total full-time equivalent of **SCIENTISTS** and **ENGINEERS** engaged in **RESEARCH-DEVELOPMENT** (item 4C) is believed to be about the same, i.e., within 5 percent, as the sum of columns (2) and (3) of item 2, do not answer items 4A and 4B. In such case, enter the sum of columns (2) and (3) of item 2 in item 4C.

A. Number employed full time in the performance or administration of **RESEARCH-DEVELOPMENT**

B. **FULL-TIME EQUIVALENT** of those working part time in the performance or administration of **RESEARCH-DEVELOPMENT**

C. Total (may or may not agree with the sum of columns (2) and (3) of item 2)

5. Please enter below in line A the total number of persons on the payroll(s) of the **REPORTING UNIT** working as **TECHNICIANS**. This should be the same as the entry for January 1962 in line 1c on page 1. In the succeeding lines enter the number of those **TECHNICIANS** engaged in each of the indicated occupational groups.

January 1962

A. Total **TECHNICIANS**

b. Draftsmen

c. Engineering and physical science technicians

d. Medical, agricultural, and biological technicians

e. Other technicians

6. Of the total **TECHNICIANS** reported in item 5, how many spent the greatest proportion of their time in **RESEARCH-DEVELOPMENT**?

7. Please enter the following information pertaining to each unit covered by this report: (See definition of **REPORTING UNIT**.)

NAME AND ADDRESS OF EACH UNIT INCLUDED	PRINCIPAL PRODUCT OR ACTIVITY OF REPORTING UNIT	TOTAL EMPLOYMENT OF REPORTING UNIT—JANUARY 1962 (This figure needed for technical reasons in making national estimates.)

DEFINITIONS

(In order of first use of term)

REPORTING UNIT.—If possible, this questionnaire should be completed for the unit identified on page 1, including laboratories attached to the unit (unless a separate questionnaire has been received for a laboratory). The unit identified is usually engaged in only one, or predominantly one, industry or other type of economic activity, and in most cases refers to one establishment at a single physical location; however, if the geographical designation of the reporting unit is Statewide, the report should include all establishments within the designated State. If possible, the unit should correspond to that reported to the State Employment Security Agency for unemployment compensation purposes. *If it is not feasible to supply separate figures for the unit identified on page 1, please follow one of the alternatives described below.* Alternative A is preferable to Alternative B. In any case, please describe the unit(s) covered by the report by completing item 7 on page 3.

Alternative A. If your company received questionnaires for more than one unit and you cannot supply a separate report for each unit, group together those questionnaires which have the same industry classification code number printed to the right of the unit identification, and make one report for each such group. Use any of the questionnaires received, completing item 7 on page 3 to indicate the units included in each industry report.

Alternative B. If you cannot supply information for each of the units for which questionnaires were received, and Alternative A is not feasible, make one *companywide* report for each industry in which your company is active. Include reporting units for which you received questionnaires and all other units of your company. Complete item 7 on page 3 in each case to indicate the coverage of the report.

OCCUPATIONAL GROUPS

SCIENTISTS.—Count as scientists all persons actually engaged in scientific work at a level which requires knowledge of physical, life, engineering, or mathematical sciences equivalent at least to that acquired through completion of a 4-year college course with a major in one of these fields, regardless of whether they hold a college degree in the field. Include those persons in research-development, production, management, technical service, technical sales, and other positions which require them to use the indicated level of knowledge in their work. Do not include persons trained in science but currently employed in positions not requiring the use of such training. Exclude psychologists and social scientists.

ENGINEERS.—Count as engineers all persons actually engaged in chemical, civil, electrical, mechanical, metallurgical, and all other types of engineering work at a level which requires knowledge of engineering, physical, life, or mathematical sciences equivalent at least to that acquired through completion of a 4-year college course with a major in one of these fields, regardless of whether they hold a college degree in the field. Include those persons in research-development, production, management, technical service, technical sales, and other positions which require them to use the indicated level of knowledge in their work. Do not include persons trained in engineering, but currently employed in positions not requiring the use of such training. Include architectural engineers; exclude architects.

TECHNICIANS.—Count as technicians all persons actually engaged in technical work at a level which requires knowledge of physical, life, engineering, or mathematical sciences comparable to knowledge acquired through technical institute, junior college, or other formal post-high school training less extensive than 4-year college training, or through equivalent on-the-job training or experience. Some typical job titles are: Laboratory assistant, physical science aid, and electronic technician. Include all persons working as draftsmen. All employees in positions requiring the indicated level of knowledge should be included regardless of job title and company department in which employed. Exclude craftsmen such as machinists and electricians.

MATHEMATICIANS.—Count as mathematicians only those persons whose position requires knowledge of mathematics equivalent at least to that acquired through a 4-year college course with a major in mathematics and who spend the greatest proportion of their time in development or application of mathematical techniques. Include actuaries and mathematical analysts. Include statisticians and programmers for computers only if they specialize in mathematical techniques. Exclude accountants.

MEDICAL SCIENTISTS.—Count as medical scientists only those physicians, dentists, public health specialists, pharmacists, and members of other scientific professions concerned with the understanding of human diseases and improvement of human health, who spend the greatest proportion of their time in clinical investigation and other research, production, technical writing, and related activities. Exclude persons who spend the greatest proportion of their time in providing care to patients, dispensing drugs or services, diagnosis, etc., from all figures on scientists and engineers. Persons working as pathologists, microbiologists, pharmacologists, etc., should be excluded from the figures on medical scientists and included in the figures on biological scientists.

AGRICULTURAL SCIENTISTS.—Count as agricultural scientists all persons who spend the greatest proportion of their time in understanding and improving agricultural productivity, such as those working in agronomy, animal husbandry, forestry, horticulture, range management, soil culture, and veterinary science. Do not include veterinarians who are primarily engaged in providing care to animals.

BIOLOGICAL SCIENTISTS.—Count as biological scientists all persons who work in sciences which deal with life processes, other than those classified as agricultural and medical sciences. Include pathologists, microbiologists, pharmacologists, bacteriologists, toxicologists, botanists, zoologists, etc.

PRIMARY FUNCTIONS

RESEARCH-DEVELOPMENT.—Include in this function those scientists and engineers who spend the greatest proportion of their time in basic and applied research in the natural sciences (including medicine) and engineering, and in the design and development of prototypes and processes. Do not include persons who spend the greatest proportion of their time in quality control, routine product testing, market research, sales promotion, sales service, or other nontechnical activities or technical services. If the primary objective is to make further improvements on the products or process, then the work is research-development. If, on the other hand, the product or process is substantially "set," and the primary objective is to develop markets, do preproduction planning, or get the production process going smoothly, then the work is no longer research-development.

Enter in column (2) of item 2, the number of scientists and engineers who spend the greatest proportion of their time performing research-development activities, specifically including all supervisors who spend more time on actual research-development work than on administration of research-development. The number of persons who spend more time on administration of research-development than on actual research-development work should be entered in column (3) of item 2.

MANAGEMENT AND ADMINISTRATION.—Column (3) and column (4) of item 2 should include all persons who spend the greatest proportion of their time in managerial or administrative work for which a scientific and engineering background consistent with the above definitions of scientists and engineers is normally required. Enter the number of scientists and engineers engaged in administering research-development in column (3) of item 2. Enter in column (4) of item 2 the number of scientists and engineers engaged in administering technical sales and service, production and operations, and all other phases of engineering and scientific work. Do not include supervisors who spend more time on one of the functions other than management and administration.

TECHNICAL SALES AND SERVICE.—Enter in column (5) of item 2 the number of scientists and engineers included in column (1) who are primarily engaged in technical sales work and/or in providing technical services directly to customers. Include only those persons who qualify as scientists and engineers according to the above definitions of scientists and engineers, and whose work involves contact with customers. Do not include in column (5) persons engaged in providing technical service to another part of the parent company. Scientists and engineers engaged in administration and management of technical sales and service activities should be counted in column (4) of item 2.

PRODUCTION AND OPERATIONS.—Enter in column (6) of item 2 the number of scientists and engineers who spend the greatest proportion of their time on work related to the production processes or operations of the reporting unit such as inspection, quality control, etc. Include scientists and engineers working on design, analysis, and testing activities that are not part of research-development. Scientists and engineers engaged in administering these activities should be counted in column (4) of item 2.

ALL OTHER ACTIVITIES.—Enter in column (7) of item 2 the number of scientists and engineers who spend the greatest proportion of their time in functions not falling within one of the other categories in columns (2) through (6) of item 2; some examples are exploration (locating fuels and other natural resources), technical purchasing, market research, and operations research. Scientists and engineers engaged in administering these activities should be counted in column (4) of item 2.

BASIC RESEARCH (Item 3)

BASIC RESEARCH.—Count as in basic research those scientists and engineers performing or administering research-development who spend the greatest proportion of their time on research projects which represent original investigation for the advancement of scientific knowledge and do not have specific commercial objectives, although they may be in fields of present or potential interest to the company. **NOTE.**—Basic, or fundamental, research as here defined is, in most establishments, a very small part of the total research and development effort, and the number of scientists and engineers primarily engaged in basic research is usually very small.

FULL-TIME EQUIVALENT (Item 4)

FULL-TIME EQUIVALENT.—Part-time work in research or development converted into full-time units, each unit equaling the number of hours normally worked per week in reporting unit. For example, two employees, each normally working in research-development half the normal workweek, would equal one "full-time equivalent" employee.

Abbreviated sample of completed item 2. Entries in columns (2) through (7) add horizontally to corresponding entries in column (1). Similarly, entries in lines b through k add vertically to corresponding entries in line A. Fractions and percentages are not used, and "0" is entered in all spaces which do not apply to the reporting unit. In this illustration, column headings have been omitted.

OCCUPATION	PRIMARY FUNCTION						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Total SCIENTISTS and ENGINEERS	379	112	30	11	5	165	56
b. ENGINEERS . . .	340	100	25	10	5	150	50
c. Chemists	36	10	5	1	0	15	5
~~~~~							
j. BIOLOGICAL SCIENTISTS . . .	2	2	0	0	0	0	0
k. Other SCIENTISTS .	1	0	0	0	0	0	1

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# COVERING LETTERS

# APPENDIX D

U.S. DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS  
WASHINGTON 25, D.C.

In reply please  
refer to No. 341

Gentlemen:

The Bureau of Labor Statistics is conducting a survey to provide data on the 1962 employment of the Nation's scientific personnel resources. This information provides a basis for evaluating the country's current scientific and technical manpower resources and serves as a guide in developing programs to strengthen the Nation's scientific potential.

This survey is being conducted, as in 1961, on an establishment basis. If your company is made up of several plants or establishments you may receive more than one questionnaire. Each establishment for which a report is requested has been selected in a carefully drawn sample. A reply is needed for each designated reporting unit, even if the unit does not employ any scientists, engineers, or technicians. However, if it is not feasible to send in a separate report for each unit, please follow one of the alternative reporting procedures described on page 4 of the questionnaire.

Your cooperation in providing the information requested in the enclosed questionnaire is of great importance to the success of this undertaking. The data you supply will be held in strict confidence, and published information will not permit identification of data for reporting units or their parent companies. The second copy of the questionnaire is for your files.

Your company may also receive a questionnaire on research-development expenditures in 1961 (Census Form Number RD-1). This survey is being conducted for the National Science Foundation by the Bureau of the Census and will yield information on the amount of funds expended for research-development activities in industry. It also contains a question on personnel in research-development which may be used to relate the two surveys.

We shall be extremely grateful for a prompt response to the enclosed questionnaires. If you have questions regarding coverage or the interpretation of the questionnaire, please call Mr. Sutherland of our Washington staff (EXecutive 3-2420, extension 2477) or write to me.

Sincerely yours,

  
Ewan Clague  
Commissioner of Labor Statistics

Enclosures

U.S. DEPARTMENT OF LABOR  
BUREAU OF LABOR STATISTICS  
WASHINGTON 25, D.C.

In reply please  
refer to No. 341


Gentlemen:

Several weeks ago we wrote you regarding a survey of scientific and technical personnel which is being conducted by this Bureau to provide data on the 1962 employment of the Nation's scientific manpower resources. We wish to thank you for the questionnaires which have been returned to us. However, we have not received reports for some of the units for which we sent questionnaires. Duplicate questionnaire(s) for these units are enclosed, including a copy of each for your files.

It is of great importance to the success of this undertaking that we receive reports from all of your establishments. Each establishment for which a report is requested has been selected in a carefully drawn sample. A reply is needed for each designated reporting unit, even if the unit does not employ any scientists, engineers, or technicians. However, if it is not feasible to send in a separate report for each unit, please follow one of the alternative reporting procedures described on page 4 of the questionnaire. The data you supply will be held in strict confidence, and published information will not permit identification of data for reporting units or their parent companies. The second copy of the questionnaire is for your files.

We shall be extremely grateful for a prompt response to this survey. If you have questions regarding coverage or the interpretation of the questionnaire, please call Mr. Sutherland of our Washington staff (EXecutive 3-2420, extension 2477) or write to me.

Sincerely yours,

  
Ewan Clague  
Commissioner of Labor Statistics

Enclosures